

Appendix 1: Qualifications of the EAP

To protect personal information this will only be submitted in the final BAR to the DMRE

Appendix 2: Experience of the EAP

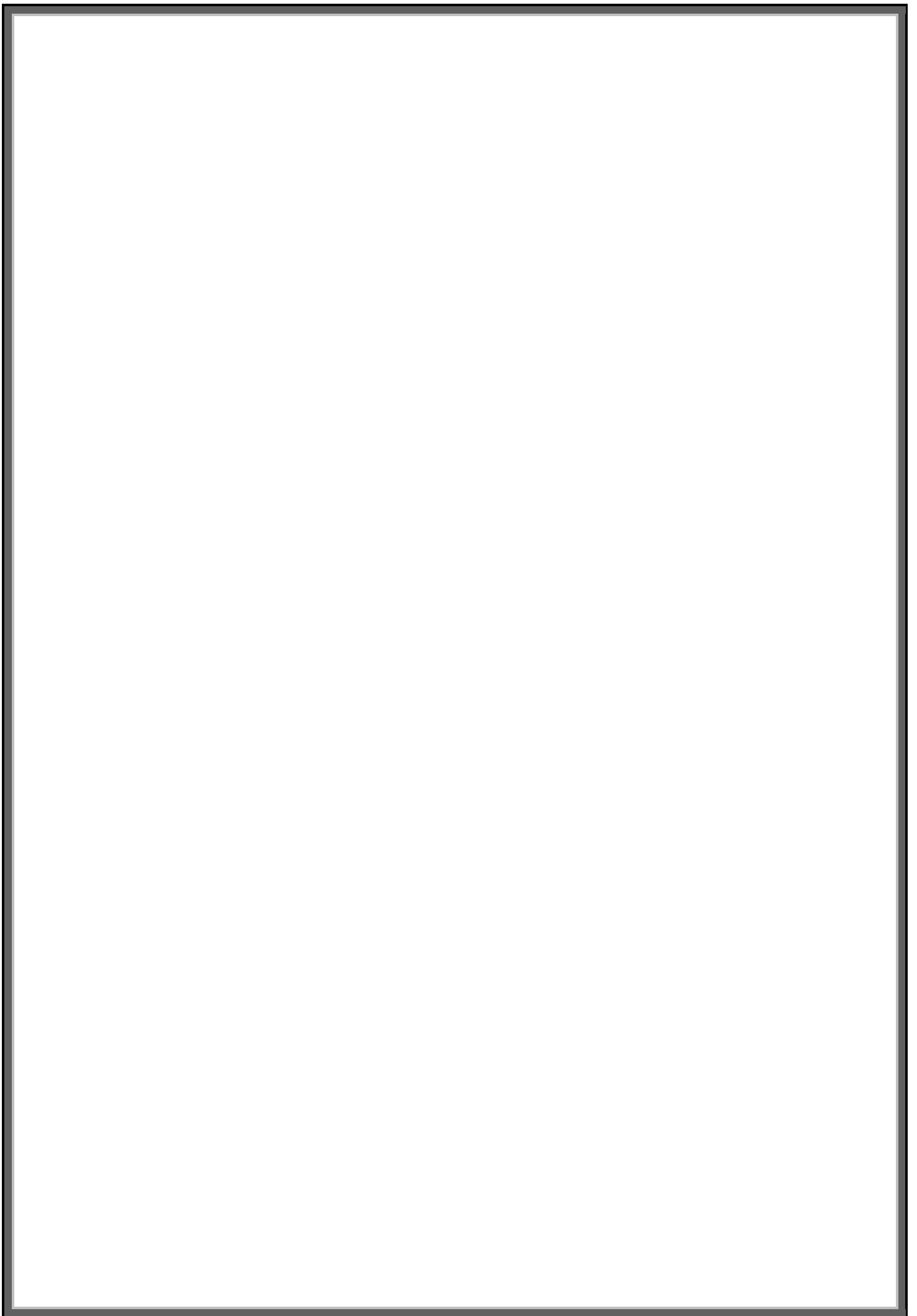
To protect personal information this will only be submitted in the final BAR to the DMRE

Appendix 3: Locality Map

Locality map at a scale not smaller than 1:250 000

Regulation 2(2) map

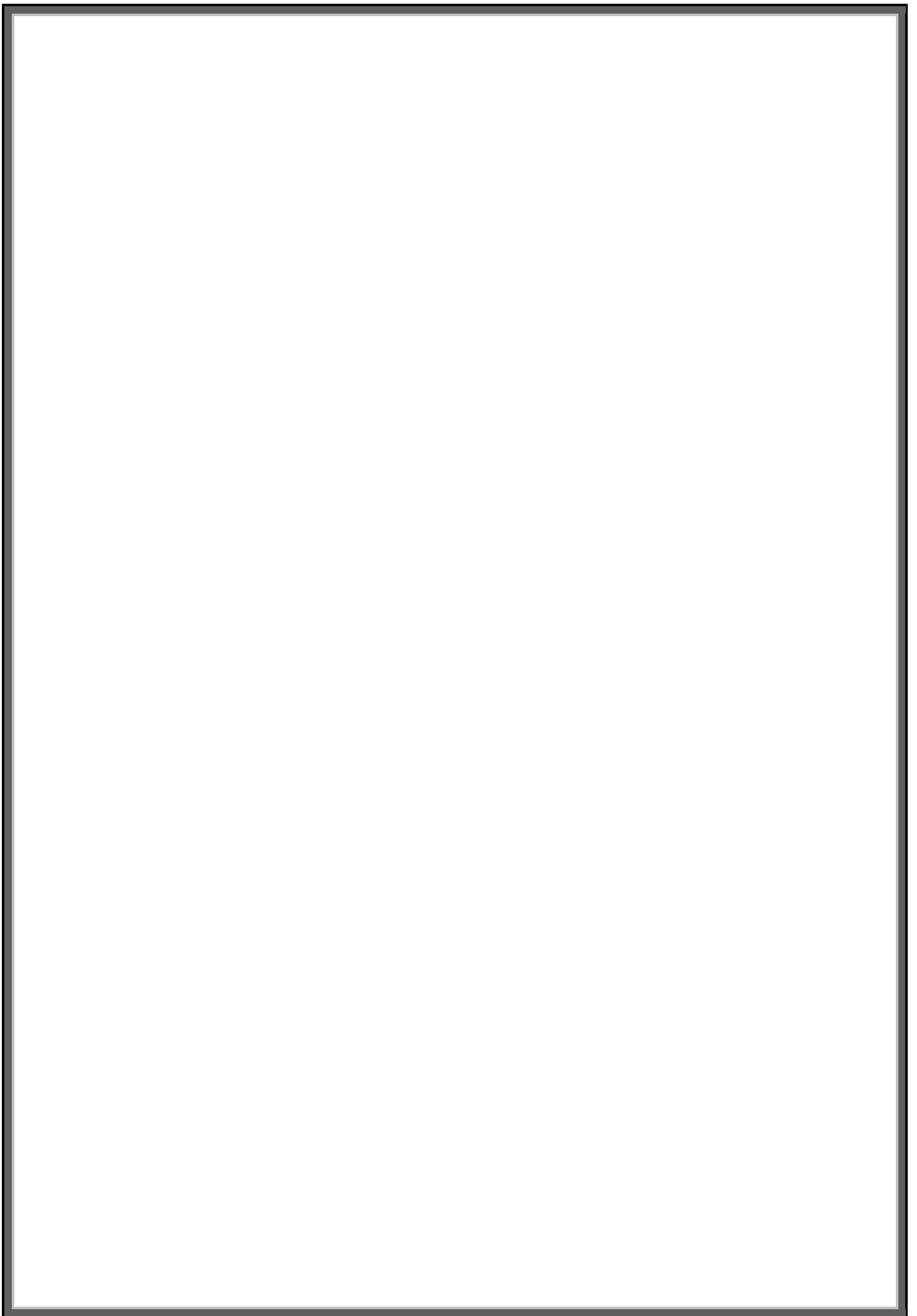
Location and area extend of main and listed activities



Appendix 4: Final Site Maps

Northern area

Southern area



Appendix 5: Public Participation Process

Issues and Response Report

In progress

**Background Information Documents /
Newspaper Advert**

PUBLIC PARTICIPATION NOTIFICATION OF AN ENVIRONMENTAL IMPACT ASSESSMENT APPLICATION (BASIC ASSESSMENT PROCESS FOR A PROSPECTING RIGHT) IN TERMS OF SECTION 16 OF THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT, 2002 (ACT NO. 28 OF 2002) AS AMENDED BY SECTION 12 OF THE ACT NO. 49 OF 2008: ON THE FARMS ALTONA 696 LR, GILLEMBERG 861 LR, NON PLUS ULTRA 683 LR, TENERIFFE 682 LR, AURORA 397 LR, NONNENWERTH 421 LR, IN THE MAGISTERIAL DISTRICT OF BLOUBERG, LIMPOPO PROVINCE.

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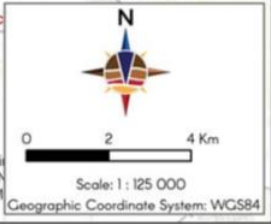
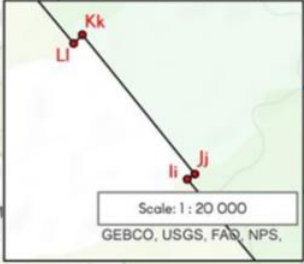
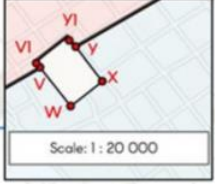
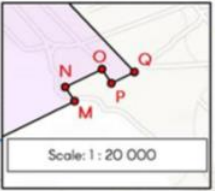
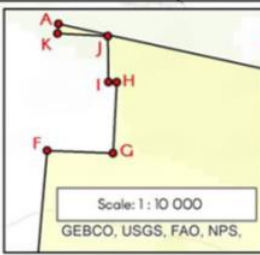
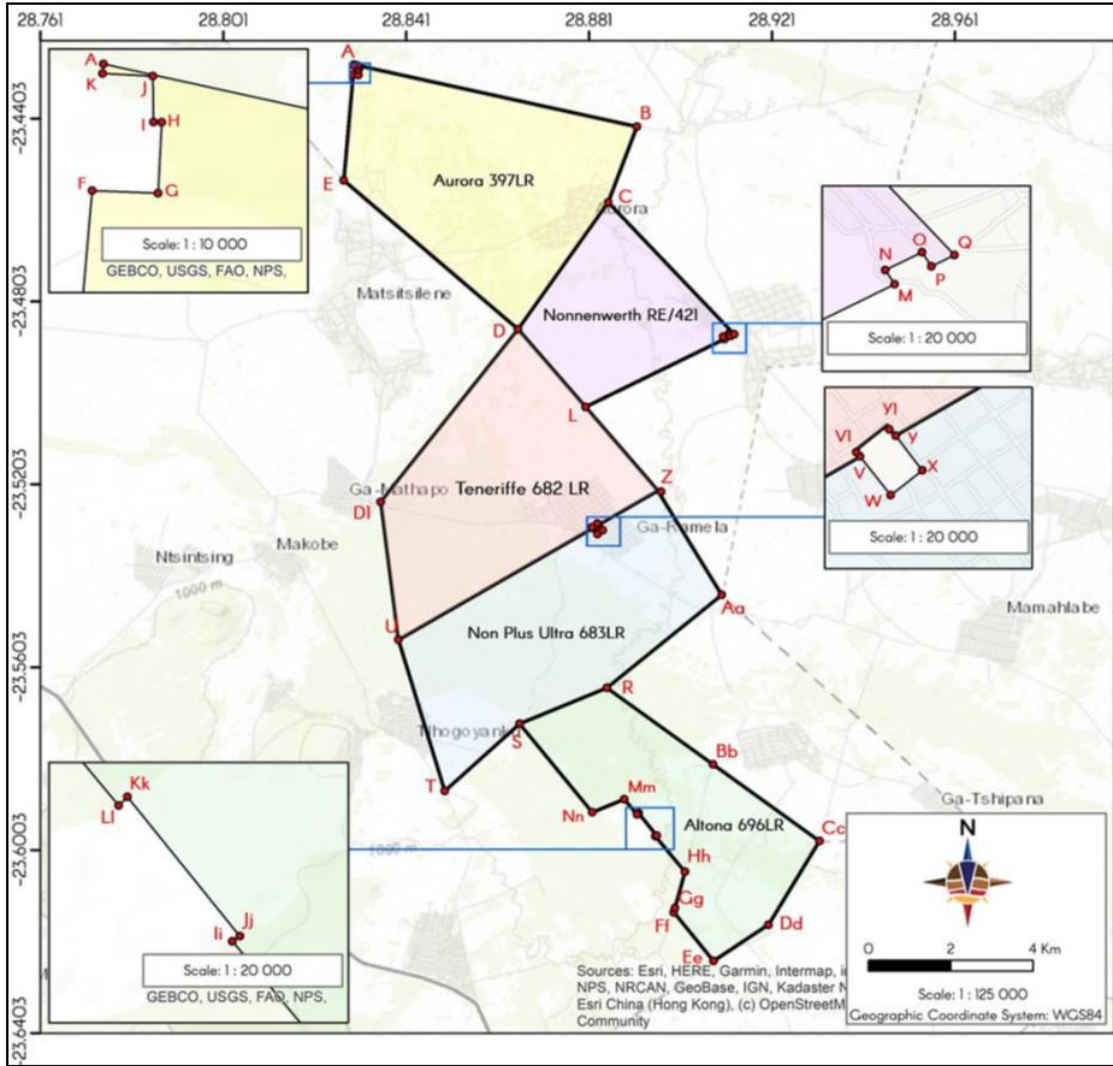
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Consultants: Prescali Environmental Consultants (Pty) Ltd. P.O Box 2544, Montana Park, 0159. Tel: 012 543 3808. Fax: 086 621 0294. Email: info@prescali.co.za. For attention: Dr Petro Erasmus. Reference: LP30/5/1/1 /2/14710PR

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Regulation 2(2) Plan

Topographic Map No. 2328BD & 2328DB
Magisterial District: Mokerong 2

Sylvania Northern Mining (Pty) Ltd

PLAN CONTEMPLATED IN REGULATION 2(2) OF THE REGULATIONS UNDER THE MPRDA

Aurora 397LR

Point	X	Y
A	28.829640	-23.428509
B	28.891486	-23.442052
C	28.885219	-23.458656
D	28.865536	-23.486363
E	28.827390	-23.453796
F	28.829443	-23.430724
G	28.830596	-23.430772
H	28.830660	-23.429530
I	28.830516	-23.429525
J	28.830506	-23.428720
K	28.829624	-23.428676

Non Plus Ultra 683LR

Point	X	Y
Z	28.896056	-23.521621
Aa	28.910062	-23.544455
R	28.884952	-23.564748
S	28.865860	-23.572631
T	28.849497	-23.587331
U	28.839342	-23.554261
V	28.881822	-23.529816
W	28.882896	-23.531171
X	28.884008	-23.530304
Y	28.883071	-23.529097

Altona Farm 696LR

Point	X	Y
R	28.884952	-23.564748
Bb	28.908162	-23.581521
Cc	28.931419	-23.598274
Dd	28.920248	-23.616569
Ee	28.908244	-23.624494
Ff	28.899559	-23.613853
Gg	28.899816	-23.612922
Hh	28.902005	-23.604971
Ii	28.895544	-23.597234
Jj	28.895811	-23.597055
Kk	28.89187	-23.592177
Ll	28.89157	-23.592479
Mm	28.888755	-23.589113
Nn	28.881736	-23.591978
S	28.865860	-23.572631

Tenerife 682LR

Point	X	Y
D	28.865536	-23.486363
L	28.880265	-23.503372
Z	28.896056	-23.521621
Y	28.883071	-23.529097
Y1	28.882778	-23.528721
V1	28.881822	-23.529601
U	28.881822	-23.529816
V	28.839342	-23.554261
D1	28.835465	-23.524132

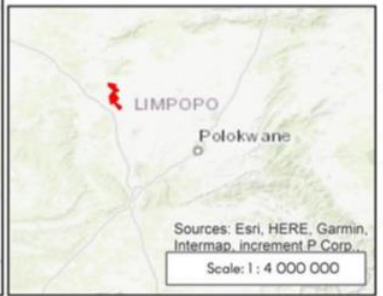
Nonnenwerth RE/421

Point	X	Y
C	28.885219	-23.458650
Q	28.912757	-23.487470
P	28.911954	-23.487869
O	28.911619	-23.487377
N	28.910332	-23.487998
M	28.910661	-23.488497
L	28.880265	-23.503372
D	28.865536	-23.486363

- Farm intersection points
- Farm boundaries

The Figure letter: A,B,C,D,E,F,G,H,I,J,K represents the farm Aurora 397LR in extent approximately 24315 hectares.
 The Figure letter: C,Q,P,C,N,M,L,D represents the farm Nonnenwerth RE/421 in extent approximately 120233 hectares.
 The Figure letter: Z,Aa,Bb,Cc,Dd,Ee,Ff,Gg,Hh,Ii,Jj,Kk,Ll,Mm,Nn,S represents the farm Non Plus Ultra 683LR in extent approximately 239730 hectares.
 The Figure letter: Z,Aa,Bb,Cc,Dd,Ee,Ff,Gg,Hh,Ii,Jj,Kk,Ll,Mm,Nn,S represents the farm Altona 696LR in extent approximately 23773 hectares.
 The Figure letter: R,Bb,Cc,Dd,Ee,Ff,Gg,Hh,Ii,Jj,Kk,Ll,Mm,Nn,S represents the farm Non Plus Ultra 683LR in extent approximately 23773 hectares.

Total Area applied for is approximately 10059.35 hectares situated in the local municipality of Mogalakwena, magisterial district of Mokerong, Limpopo Province.



Prepared By:

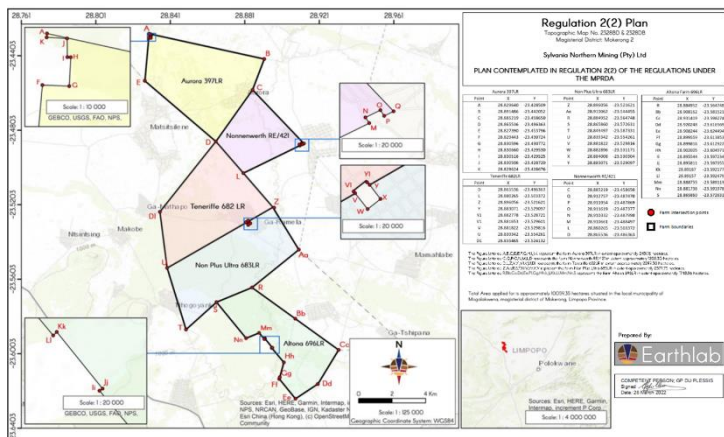
COMPETENT PERSON: GP DU PLESSIS
 Signed:
 Date: 28 March 2022

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- 007 OFFICIAL NOTICES

Classified Department

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E-mail: classad1@nmgroup.co.za

Junior Rebombo
Tel: 015 590 4470
E-mail: classad@nmgroup.co.za

Cathrine Robberts
Tel: 015 590 4446
E-mail: sales1@nmgroup.co.za

The deadlines for this publication

Classified Display:
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Classified Lineage:
Wednesday @ 09:00
Legals:
Wednesday @ 09:00

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We reserve the right to change the above deadline at any given time!

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2. Errors and omissions must be reported within the first week of insertion.
3. When querying an advertisement a reference number MUST be quoted.
4. Credit will not be given for typographical errors which do not lessen the effectiveness of the advertisement.
5. Cancellations & alterations must be phoned through before 15:00 a day before deadline prior to publication.
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7. Space is sold to the advertiser for the purpose of making announcements concerning his own business and may not be used for attacking or making insidious comparisons with other advertisers, firms, institutions or persons.

0700 LEGALS

FORM JJJ LOST OR DESTROYED DEED

Notice is hereby given in terms of Regulation 68 of the Deeds Registries Act, 1937, of the intention to apply for the issue of a certified copy of **NOTARIAL DEED OF CESSION OF EXCLUSIVE USE AREAS SK2324/2013S** (here describe the deed) passed by **SOBRAY 2 PROPRIETARY LIMITED**, Registration Number: **2007/011342/07** in respect of certain

An exclusive use area described as **PARKING P55** measuring **14 (FOURTEEN)** square metres being as such part of the common property, comprising the land and the scheme known as **ROYAL PALMS** in respect of the land and building or buildings situate at **ERF 8668 PIET POTGIETERSRUST TOWNSHIP, LOCAL AUTHORITY: MOGALAKWENA LOCAL MUNICIPALITY** as shown and more fully described on Sectional Plan Number **SS 204/2013**

Which has been lost or destroyed.

All persons having objection to the issue of such copy are hereby required to lodge the same in writing with the Registrar of Deeds Limpopo at Polokwane, 101 Dorp Street, Polokwane within two weeks after the date of the publication of this notice. Dated at Polokwane on this **5th day of September 2022**

De Bruin Oberholzer Attorneys
27 Genl. Joubert Street
Polokwane 0699
P.O. Box 3615
Polokwane 0700
Tel: 015 291 2147
E-Mail address: conveyancing@dbolaw.co.za
REF: DK/DEB49/0017

LE004465

NOTICE OF INTENTION TO APPLY FOR A CERTIFIED COPY OF DEED OF TRANSFER

Notice is hereby given in terms of Regulation 68 of the Deeds Registries Act, 1937, of the intention to apply for the issue of a certified copy of **T37910/1990** in favour of

GREWIA BOERDERY PROPRIETARY LIMITED
REGISTRATION NUMBER: 1990/0030257/07

in respect of certain

PORTION 11 OF THE FARM NABOOMFONTEIN 320 REGISTRATION DIVISION KR., LIMPOPO PROVINCE

MEASURING: 102,7838 (ONE HUNDRED AND TWO COMMA SEVEN EIGHT THREE EIGHT) HECTARES

All interested persons having objection to the issue of such copy are hereby required to lodge the same in writing with the Registrar of Deeds LIMPOPO at POLOKWANE, 101 DORP STREET, POLOKWANE CENTRAL, POLOKWANE. within two weeks from the date of the publication of this notice.

BORMAN SNYMAN & BARNARD ATTORNEYS
tvniekerk@bsblaw.co.za
Tel. 015 491 2251/2
FN2478

JR006138

publikasie ter insae sal lê vir alle persone wat daarby belang het.

Indien geen beswaar daarteen by die Meester binne die gemelde tydperk ingedien word nie, sal die eksekuteur tot uitbating daarvan oorgaan.

BORMAN SNYMAN & BARNARD INGELYF, Thabo Mbeki Rylaan 100, Posbus 42, MOKOPANE
Prokureurs vir Eksekuteurs
DV1639/J F WINNERTZ/ ANSA

JR006131

NOTICE

IN THE ESTATE OF THE LATE **ANNA BOTHA**, IDENTITY NUMBER **300106 0024 08 5**; BORN ON THE **6th DAY OF JANUARY 1930** WHO DIED AT PRETORIA ON THE **14th OF JUNE 2022** AND AT DATE OF DEATH RESIDED AT **1 LA BOCA, 230 PRETORIUS STREET, MOKOPANE, 0601**

ESTATE NUMBER: 6443/2022

ALL persons having claims against or who are indebted to the above estate, are called upon to lodge their claims or to pay their debts at or to the undermentioned firm within a period of thirty days from the date of publication hereof.

BORMAN SNYMAN & BARNARD INC.
THABO MBEKI DRIVE
P.O. BOX 42
MOKOPANE
ATTORNEYS FOR EXECUTOR
BB0490/JVDW/Susan

JR006130

0704 ESTATE NOTICES

KENNISGEWING

BOEDEL WYLE PETRUS CORNELIUS ZACHARIAS VILJOEN, IDENTITEITSNUMMER **330414 5027 085**, IN LEWE WOONAGTIG TE **KRUGERSTRAAT 92, MOKOPANE**

BOEDELNUMMER: 8094/2021

Hierby word kennis gegee dat die Eerste en Finale Likwidasie- en Distribusierekening in bogemelde boedel in die kantore van die Meester van die Hooggeregshof te Polokwane en Landdros te Mokopane vir 'n tydperk van 21 dae vanaf die datum van



84%

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RESPONSIBILITIES:

- ▶ Have a very good knowledge of spelling and language rules in English and Afrikaans
- ▶ Pay careful attention to detail
- ▶ Have an investigative nature
- ▶ Be able to work under pressure
- ▶ Be computer-literate
- ▶ Be in possession of a senior certificate, showing good marks in English and Afrikaans

If you meet these requirements, e-mail your CV and a copy of your ID to: editor@nmgroup.co.za.

Closing date for applications is 9 September 2022.

Should you not be contacted within 21 days after the closing date, consider your application as unsuccessful. NMG reserves the right to not make an appointment.

Musunda day inspires learners to aspire to great future

SILAS NDUVHENI

VHAMUSANDA Thavhayavhathu Masikhwa, the traditional leader of Ha-Luvhimbi village, visited Musunda Primary School on September 2 to encourage learners to aspire to a great future.

He said if learners commit to their education from a young age, they can achieve great things, despite coming from a rural village and an underprivileged background.

Musunda village is situated between Tshitanzhe and Gumela villages and considered one of the more impoverished communities, but Masikhwa reminded learners that anything is possible if they work hard.

"We understand you live in a rural community, but this school has the potential to produce engineers, chartered accountants, doctors and anything else you amount yourself to if you listen to your teachers, concentrate and take your education seriously," Masikhwa said.

The traditional leader addressed the learners as part of their Musunda



Traditional leader Vhamusanda Thavhayavhathu Masikhwa with some of the Musunda Primary School learners.

day celebrations and was joined by the Niani West Circuit manager Mpariseni Ramagoma, and *Muvhango* actor Gabriel Temudzani who also contributed to the day.

Joining them were the Masikhwa Royal Foundation who donated school shoes to all the learners to encourage them to go to school and invest in their futures.

"We encourage parents to be a part of their children's learning journey."

**GABRIEL TEMUDZANI
ACTOR**

Temudzani, who represented the Seed of Hope Foundation, told the learners and teachers that anything is possible and that they can reach for the stars if they use their limited resources effectively.

He reminded them of the saying, 'It takes a village to raise a child' and explained this is the reason they banded together on Musunda day to inspire local residents and especially the learners.

"We encourage parents to raise their children to have respect and be responsible people of the society one day.

"Musunda Primary's learners can achieve great results if they listen attentively to their teachers and work hard," said Temudzani.

Ramagoma supported Temudzani's message and encouraged all the adults in attendance to be involved in their children's educational journeys.

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Junior Rebombo
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E-mail: junior@nmgroup.co.za

Cathrine Roberts
Tel: 015 590 4446
E-mail: sales1@nmgroup.co.za

0700 LEGALS

0702 GENERAL NOTICES

71%

of readers of the local paper read on Wednesday, Thursday and Friday before the weekend shop

ROOTS* 2019

MUSINA PLAASLIKE MUNISIPALITEIT GRONDGEBUIKBESTUUR SKEMA 2010, WYSIGINGSKEMA 427, KENNISGEWING VAN 'N HERSONERING AANSOEK

Rirothe Planning Consulting, synde die gemagtigde agent van die eienaar van die Erf hieronder genoem, gee hiermee kennis ingevolge Artikel 36 van die Musina Plaaslike Munisipaliteit Ruimtelike Beplanning en Grondgebruikbestuur Verordening 2016 saamgelees met die bepaling van Ruimtelike Beplanning en Grondgebruikbestuur Wet van 2013 dat ons Musina Plaaslike Munisipaliteit aansoek gedoen het vir die wysiging van die Grondgebruikskema bekend as die Musina Grondgebruikbestuurskema 2010 deur die hersonering van Erf 1840 Musina Uitb 14 van Residensieel 1 na Residensieel 2 vir die doel van wooneenhede.

Besonderhede van die aansoek te ter insae gedurende gewone kantoorure by die Stadsbeplanningskantore Irwinstraat 21, Musina, vir 'n tydperk van 28 dae vanaf 08 September 2022. Besware teen of vertoe ten opsigte van die aansoek moet ingedien of gerig word in skryf aan die Munisipale Bestuurder by bogenoemde adres of Privatsak X611 Musina 0900 binne 'n tydperk van 28 dae vanaf 08 September 2022.

Adres van Agent: 662 Seshogo Zone 8 Polokwane 0742 Posbus 5 Tshidimbini 0972 Tel: 084 287 0467

LE004457

MUSINA LOCAL MUNICIPALITY LAND USE MANAGEMENT SCHEME 2010, AMENDMENT SCHEME 427, NOTICE OF A REZONING APPLICATION

Rirothe Planning Consulting, being the authorised agent of the owner of the Erf mentioned below, hereby give notice in terms of Section 36 of the Musina Local Municipality Spatial Planning and Land Use Management Bylaw 2016 read together with the provision of Spatial Planning and Land Use Management Act of 2013 that we have applied Musina Local Municipality for the amendment of the Land Use Management Scheme 2010 by the rezoning of Erf 1840 Musina Ext 14 from Residential 1 to Residential 2 for the purpose of dwelling units.

Particulars of the applications will lie for inspection during normal office hours at the Town Planning Offices 21 Irwin Street, Musina, for a period of 28 days from 08 September 2022. Objections to or representations in respect of the application must be lodged with or made in writing to the Municipal Manager at the above address or Private Bag X611 Musina 0900 within a period of 28 days from 08 September 2022.

Address of Agent: 662 Seshogo Zone 8 Polokwane 0742 P.O. Box 5 Tshidimbini 0972 Tel: 084 287 0467

LE004455

U SHANDUKISWA HA COLLINS CHABANE LOCAL MUNICIPALITY LAND USE SCHEME, 2019 (AMENDMENT SCHEME 121)

Rine, Vha Ratshita Development Specialists sa dzhendedzi li re mlayoni la vhane vha tshipida tsha 35 tsha bulasi ya Beaufort 32 LT, ri kho nea ndivhadzo uya nga tshitenwa tsha 93 na 94 tsha mulayo wa masipala, uri ro ita khumbelo kha Collins Chabane Local Municipality ya u shandukisa Collins Chabane Land Use Scheme, 2019 nga u shandukisa khushumisele kwa mavu a ndaka u bva kha 'Agriculture' u ya kha 'Business 1' for Service Station/Filling Station (with a convenience store) nga tshitenwa tsha 64 tsha Collins Chabane Local Municipality Spatial Planning and Land Use Management By-Law, 2019.

Zwidodombedzwa zwa khumbelo iyi zwinga tolwa nga tshifhinga tsha mushumo ofisini ya Minidzhere wa Masipala, Collins Chabane Local Municipality, Private Bag X9271, Malamulele, 0982 lwa maduvha a fumi raru u bva nga la mbili la Khubumedi Gidimbili fumbilimbili. Muthu munwe na munwe kana mumelele ane avha na khandezzo nga ha khumbelo iyi anga tou nwaleta Minidzhere wa Masipala kha adresi yo bulwaho afho ntha kana kha:

Phuravethe Bege X611 Musina, 0900 nga ngomu ha maduvha a fumi raru u bva nga la mbili la Khubumedi Gidimbili fumbilimbili.

Diresi ya dzhendedzi: Ratshita Development Specialists (Pty) Ltd P.O. Box 384 Tshidimbini, 0972 cell: 0718942540

LE004441

NOTICE

Dear policyholder, please note that your policy with **Marindi Funeral Scheme**, a juristic representative of Structured Risk Solutions (FSP 50618), and underwritten by African Rainbow Life FSP (FSP: 49802) policy has been cancelled from 30 September 2022.

You should confirm and arrange alternative underwriting for your policy to ensure you remain covered. Contact **Marindi Funeral Scheme** on **015 516 8198** to arrange alternative cover.

Structured Risk Solutions (FSP 50618)

JFR006128

www.

93%

of Polokwane used the internet in the past 4 weeks

ROOTS* 2019

PUBLIC PARTICIPATION NOTIFICATION OF AN ENVIRONMENTAL IMPACT ASSESSMENT APPLICATION (BASIC ASSESSMENT PROCESS FOR A PROSPECTING RIGHT) IN TERMS OF SECTION 16 OF THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT, 2002 (ACT NO. 28 OF 2002) AS AMENDED BY SECTION 12 OF THE ACT NO. 49 OF 2008: ON THE FARMS ALTONA 696 LR, GILLENBERG 861 LR, NON PLUS ULTRA 683 LR, TENERIFFE 682 LR, AURORA 397 LR, NONNENWERTH 421 LR, IN THE MAGISTERIAL DISTRICT OF BLOUBERG, LIMPOPO PROVINCE.

Notice is hereby given in terms of the National Environmental Management Act, 1998 in respect of listed activities that have been triggered by the application in terms of the Mineral and Petroleum Resources Development Act, 2002 (MPRDA) (As Amended).

Activity: Application for a prospecting right by Sylvania Northern Mining (Pty) Ltd for Chrome Ore, Cobalt, Copper Ore, Gold Ore, Nickel Ore, Platinum Group Metals in terms of section 16 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).

Location: The proposed prospecting activities will be located on the Farms Altona 696 LR, Gillemberg 861 LR, Non Plus Ultra 683 LR, Teneriffe 682 LR, Aurora 397 LR, Nonnenwerth 421 LR, In The Magisterial District Of Blouberg, Limpopo Province.

Environmental Authorisation Process: Prescali Environmental Consultants (Pty) Ltd has been appointed to undertake the Environmental Authorisation process in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) read with the Environmental Impact Assessment Regulations, 2014 as amended in 2017 and 2021. The environmental authorisation application is subject to a Basic Assessment process and will be submitted for approval to the Department of Mineral Resources and Energy (DMRE), Polokwane. Listed activities to be applied for in terms of the NEMA are GNR983 listed activity 20 (prospecting application activities) and GNR983 Listed activity 22 (rehabilitation and closure for prospecting activities).

Public Participation: The purpose of the public participation process is to inform Interested and Affected Parties (IAPs) regarding the proposed prospecting right and environmental authorisation process. IAPs will also be provided with the opportunity to comment on and contribute to the identification of environmental impacts of the proposed activities. Registered IAPs will be granted an opportunity to review and comment on the Draft Basic Assessment/EMPr reports for a period of 30 days.

Public Meeting: Prescali will host an open day in compliance with applicable any regulations that may or may not prohibit large gatherings. Details pertaining to the dates and location of the open days will be forwarded to registered Interested and Affected Parties. The purpose of the open days will be to introduce and discuss the proposed project and any identified environmental impacts.

Should you wish to register as an interested and/or affected party of if you require further information on the abovementioned application and/or proposed project activities; please submit your name, contact information, interest and comments or relevant issues on the matter in writing on or before 30 October 2022 to Prescali Environmental Consultants.

Consultants: Prescali Environmental Consultants (Pty) Ltd. P.O. Box 2544, Montana Park, 0159. Tel: 012 543 3808. Fax: 086 621 0294. Email: info@prescali.co.za. For attention: Dr Petro Erasmus. Reference: LP30/5/11/2/14710PR

Please note: this does not serve as an offer of employment nor guarantee that the project will be implemented.

The deadlines for this publication

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Point 1. Title: SN1  14Sep22 11:28



 Ad-hoc

⊙ 14-Sep-22 11:29:00

⊕ -23.62182, 28.91346

UTM:35s 695210 7386336

MGRS:35KPP9520986335 (±8m)

Altitude: 1021 (±12m)

Heading: SE148 (±12°T)



Point 2. Title: SN2 📍 14Sep22 10:23



Ad-hoc

Bochum/My Darling, LP, ZA

14-Sep-22 10:23:11

-23.53080, 28.87990

UTM:35s 691917 7396462

MGRS:35KPP9191796461 (±8m)

Altitude: 983 (±11m)

Heading: NE62 (±14°T)



Point 3. Title: SN3 📍 14Sep22 08:17



Ad-hoc

ΔMokopane, LP, ZA

⊙ 14-Sep-22 08:17:30

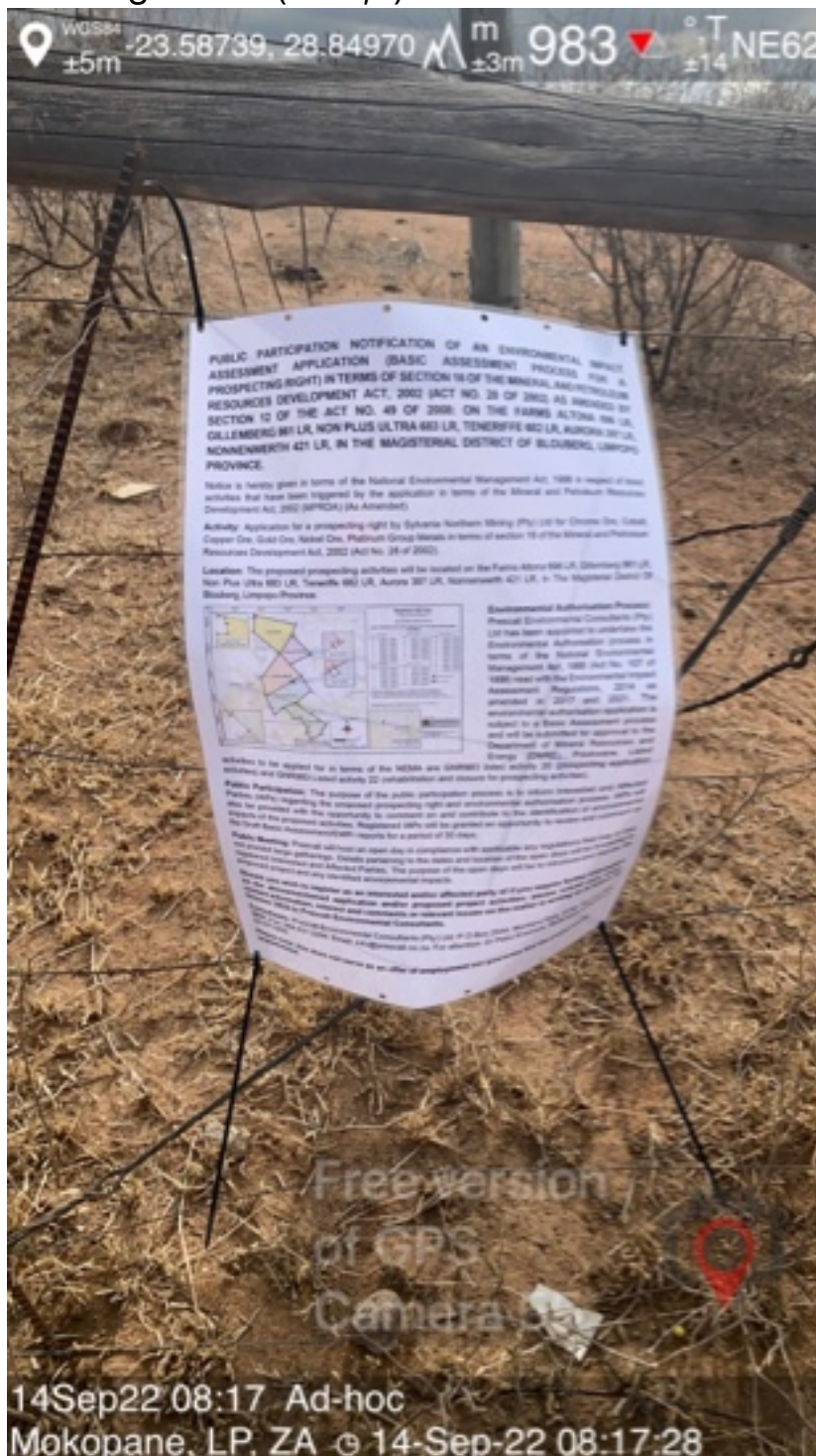
⊕ -23.58739, 28.84970

UTM:35s 688753 7390234

MGRS:35KPP8875290234 (±5m)

Altitude: 983 (±3m)

Heading: NE62 (±14°T)



Point 4. Title: SN4 📍 14Sep22 08:42



Ad-hoc

△Mokopane, LP, ZA

🕒 14-Sep-22 08:42:32

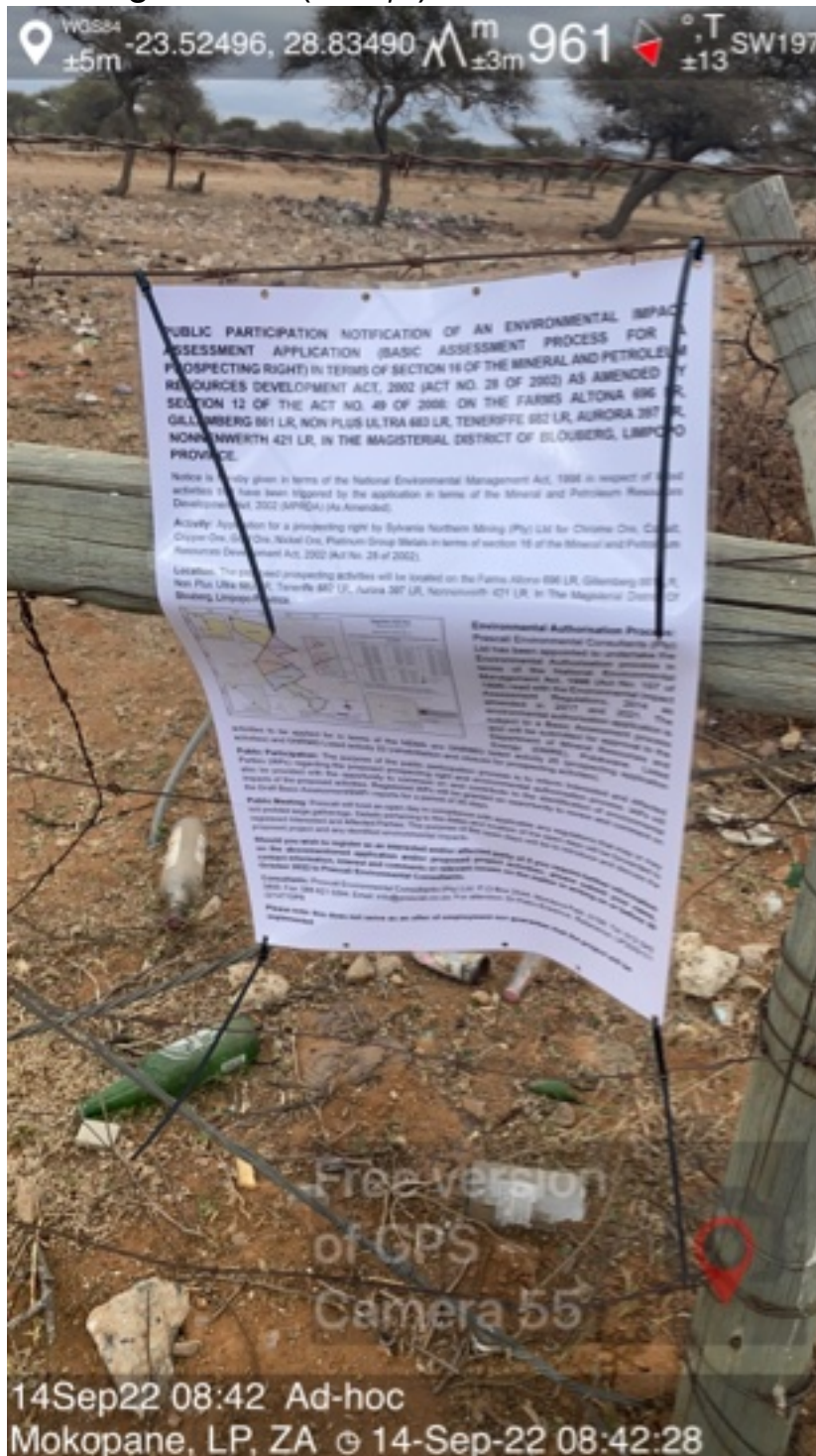
📍 -23.52496, 28.83490

UTM:35s 687331 7397167

MGRS:35KPP8733097167 (±5m)

Altitude: 961 (±3m)

Heading: SW197 (±13°T)



Point 5. Title: SN5  14Sep22 09:04



Ad-hoc

⊙ 14-Sep-22 09:04:54

⊕ -23.45825, 28.83263

UTM:35s 687193 7404559

MGRS:35KPQ8719204558 (±20m)

Altitude: 980 (±7m)

Heading: SW230 (±13°T)



Point 1. Title: SN6  14Sep22 09:23



 Ad-hoc

⊙ 14-Sep-22 09:23:50

⊕ -23.45823, 28.83267

UTM:35s 687197 7404561

MGRS:35KPQ8719604560 (±11m)

Altitude: 980 (±11m)

Heading: SW208 (±13°T)



Point 2. Title: SN7 📍 14Sep22 09:39



Ad-hoc

Bochum/My Darling, LP, ZA

14-Sep-22 09:39:31

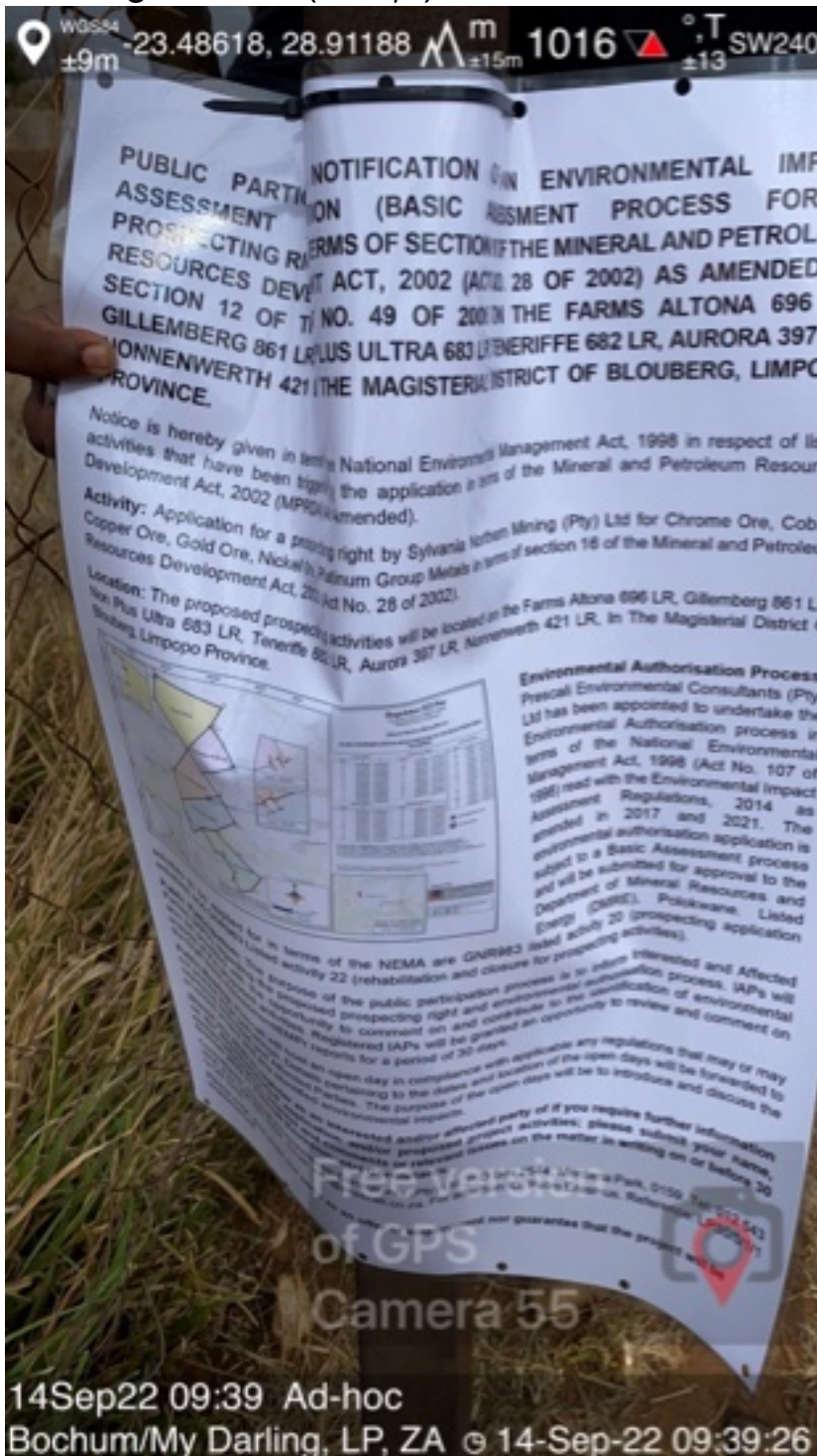
-23.48618, 28.91188

UTM:35s 695249 7401360

MGRS:35KPQ9524801360 (±9m)

Altitude: 1016 (±15m)

Heading: SW240 (±13°T)



14Sep22 09:39 Ad-hoc
Bochum/My Darling, LP, ZA 14-Sep-22 09:39:26

Proof of consultation (emails send and received)

To protect personal information this will only be submitted in the final BAR to the DMRE

Letters / Registration forms received

To protect personal information this will only be submitted in the final BAR to the DMRE

Appendix 6: Specialist Reports

Desktop Surface Water Assessment

Desktop Surface Water Assessment Report

For

Sylvania Northern Mining (Pty) Ltd Investments

Situated on the Farms

Altona 696 LR, Gillemberg 861 LR, Non Plus Ultra
683 LR, Teneriffe 682 LR, Aurora 397 LR,
Nonnenwerth 421 LR and Portion 2 of Schaffhausen
689 LR

within the

Magisterial Districts of Blouberg and Mogalakwena,
Limpopo Province

Prepared by



P.O. Box 2544
Montana Park
0159
Tel: 012 543 3808
Fax 086 621 0294
E-mail: info@prescali.co.za



Title Page

Desktop Surface Water Assessment Report for Sylvania Northern Mining (Pty) Ltd Investments - situated on the Farms Altona 696 LR, Gillemberg 861 LR, Non Plus Ultra 683 LR, Teneriffe 682 LR, Aurora 397 LR, Nonnenwerth 421 LR and Portion 2 of Schaffhausen 689 LR within the Magisterial Districts of Blouberg and Mogalakwena, Limpopo Province.

Compiled By:

Prescali Environmental Consultants (Pty) Ltd
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Fax: 086 621 0294
E-mail: info@prescali.co.za
Web: www.prescali.co.za

Compiled For:

Sylvania Northern Mining (Pty) Ltd
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Tel: 011 673 1171
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Authors:

Dr P. Erasmus (Ph.D. Zoology) *(EAPASA)(Pri.Sci.Nat)*

Reviewer:

E van der Linde *(EAPASA)(Pri.Sci.Nat)*

Report Number:

Sylvania Northern Mining (Pty) Ltd/Surface.v1.

Report Date:

23 September 2022

Executive Summary

Prescali Environmental Consultants (Pty) Ltd was appointed by Sylvania Northern Mining (Pty) Ltd Investments to conduct a desktop surface water assessment for the proposed Prospecting Right activities within the Capricorn and Waterberg District Municipalities in the Limpopo Province.

The proposed prospecting activities will consist of non-invasive (desktop) and invasive (ground geophysics and soil geochemical samplings / drilling / trenching) activities. It is also possible that a contractor's camp may be established close to the prospecting activities.

	Altona 696 LR, Gillemberg 861 LR, Non Plus Ultra 683 LR, Teneriffe 682 LR, Aurora 397 LR, Nonnenwerth 421 LR	Schaffhausen 689 LR
Drill Site	10 m x 10 m Drill Sites 1 Drill site= 100 m ² Total Drill Site Areas (6) = 600 m ²	10 m x 10 m Drill Sites 1 Drill site= 100 m ² Total Drill Site Areas: (4) = 400 m ²
Trenching	25 m x 2 m x 2 m Trench Sites 1 Trench = 50 m ² Total Trench Areas (25) = 1 250 m ²	25 m x 2 m x 2 m Trench Sites 1 Trench = 50 m ² Total Trench Areas: (8) = 400 m ²
Contractor's camp	N/A	400 m ²
Rehabilitation and Closure	1 850 m ²	1 200 m ²

The Sylvania Northern Mining (Pty) Ltd Investments prospecting right application area is situated in the Limpopo Water Management Area (WMA) (A primary catchment), specifically quaternary catchment A62E, A62F, A62G and A62H of the Mogalakwena River catchment. The Present Ecological Status (PES) for both the perennial rivers (Seepabana and Matlala Rivers) closest to the prospecting right area, decreased in classification from the 1999 assessment to the 2018 assessment. The Ecological Importance and Sensitivity Class (EI and ES) of the rivers in the applicable reaches are Moderate and Very Low respectively.

Based on the desktop assessment the proposed prospecting activities will have a low to medium risk / impact before mitigation / management measures are implemented and a low risk following the implementation.

If the management measures and recommendation as outlined in this report is implemented it is recommended that the proposed prospecting activities be authorized.



Main Activity	Secondary activity	Phase	Impact	Aspect	Risk Rating	Risk after management
Ground geophysics and soil geochemical sampling	Vegetation removal	C	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which could impact on the biota, habitat, flow regime and the physico- and chemical quality of the water in the watercourse.	Surface water quality	Low	Low
	Topsoil stockpiling	C, O	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which could impact on the biota, habitat, flow regime and the physico- and chemical quality of the water in the watercourse.	Surface water quality	Low	Low
	Topsoil stockpiling/vegetation removal & general activities	C, O	Dust generated from stockpile areas could impact on surface water quality, and biota should it reach watercourses and settle within this area.	Surface water quality	Low	Low
	Replace topsoil	R	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which could impact on the biota, habitat, flow regime and the physico- and chemical quality of the water in the watercourse.	Surface water quality	Low	Low
	Replace topsoil	R	Dust generated from stockpile areas could impact on surface water quality, and biota should it reach watercourses and settle within this area.	Surface water quality	Low	Low
Trenching	Vegetation removal	C	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which could impact on the biota, habitat, flow regime and the physico- and chemical quality of the water in the watercourse.	Surface water quality	Low	Low
	Topsoil stockpiling	C, O	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which could impact on the biota, habitat, flow regime and the physico- and chemical quality of the water in the watercourse.	Surface water quality	Low	Low



Main Activity	Secondary activity	Phase	Impact	Aspect	Risk Rating	Risk after management
	Topsoil stockpiling/vegetation removal & general activities	C, O	Dust generated from stockpile areas could impact on surface water quality, and biota should it reach watercourses and settle within this area.	Surface water quality	Low	Low
	Overburden stockpiling	C, O	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which could impact on the biota, habitat, flow regime and the physico- and chemical quality of the water in the watercourse.	Surface water quality	Low	Low
	Containment of rainwater in trench	O	Removal of run-off from the surface water resource could reduce surface flow in watercourses which in turn could impact on the habitat and biota within this area.	Surface water quantity	Low	Low
	Heavy machinery equipment on site	C, O	Soil contamination from hydrocarbon spills if not removed could impact on water quality should the hydrocarbons enter the watercourses, this could impact on the biota and habitat as well.	Surface water quality	Low	Low
	Chemical toilets and sewage waste management	C, O	Contamination from spills from chemical toilets could impact on water quality should the spilled material enter any watercourse and this could impact on the biota.	Surface water quality	Low	Low
	General waste generation	C, O	General waste generation e.g. plastic bags, bottles etc. could impact on water quality and the habitat and biota in watercourses.	Surface water quality	Low	Low
Resource drilling: drill pad and sump	Heavy machinery equipment on site	C, O	Soil contamination from hydrocarbon spills if not removed could impact on water quality should the hydrocarbons enter the watercourses, this could impact on the biota and habitat as well.	Surface water quality	Low	Low
	Drilling sludge	O	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which could impact on the biota, habitat, flow regime and the physico- and chemical quality of the water in the watercourse.	Surface water quality	Low	Low



Main Activity	Secondary activity	Phase	Impact	Aspect	Risk Rating	Risk after management
	Vegetation removal & General activities	C, O	Dust generated could impact on surface water quality, and biota should it reach watercourses and settle within this area.	Surface water quality	Low	Low
	Vegetation removal	C	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which could impact on the biota, habitat, flow regime and the physico- and chemical quality of the water in the watercourse.	Surface water quality	Low	Low
	Operation of drill pad sump	O	Removal of run-off from the surface water resource could reduce surface flow in watercourses which in turn could impact on the habitat and biota within this area.	Surface water quantity	Low	Low
	Chemical toilets and sewage waste management	C, O	Contamination from spills from chemical toilets could impact on water quality should the spilled material enter any watercourse and this could impact on the biota.	Surface water quality	Low	Low
	Capping of Borehole	R	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which could impact on the biota, habitat, flow regime and the physico- and chemical quality of the water in the watercourse.	Surface water quality	Low	Low
	Rip impacted area	R	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which could impact on the biota, habitat, flow regime and the physico- and chemical quality of the water in the watercourse.	Surface water quality	Low	Low
	Rip impacted area	R	Dust generated could impact on surface water quality, and biota should it reach watercourses and settle within this area.	Surface water quality	Low	Low
	General waste generation	C, O	General waste generation e.g. plastic bags, bottles etc. could impact on water quality and the habitat and biota in watercourses.	Surface water quality	Low	Low



Main Activity	Secondary activity	Phase	Impact	Aspect	Risk Rating	Risk after management
Access road	Vegetation removal (all access roads combined)	C	Soil contamination from hydrocarbon spills if not removed could impact on water quality should the hydrocarbons enter the watercourses, this could impact on the biota and habitat as well.	Surface water quality	Low	Low
	Daily travelling to prospecting site	C, O	Dust generated could impact on surface water quality, and biota should it reach watercourses and settle within this area.	Surface water quality	Low	Low
	Daily travelling to prospecting site	C, O	Soil contamination from hydrocarbon spills if not removed could impact on water quality should the hydrocarbons enter the watercourses, this could impact on the biota and habitat as well.	Surface water quality	Low	Low
	Rip road area	R	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which could impact on the biota, habitat, flow regime and the physico- and chemical quality of the water in the watercourse.	Surface water quality	Low	Low
Contractor camp	Vegetation removal	C	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which could impact on the biota, habitat, flow regime and the physico- and chemical quality of the water in the watercourse.	Surface water quality	Medium	Low
	Diesel storage	O	Soil contamination from hydrocarbon spills if not removed could impact on water quality should the hydrocarbons enter the watercourses, this could impact on the biota and habitat as well.	Surface water quality	Medium	Low
	Chemical toilets and sewage waste management	O	Contamination from spills from chemical toilets / emptying of septic tank (if applicable) could impact on water quality which in turn could impact on the biota and habitat as well.	Surface water quality	Medium	Low
	Storage of material	O	Contaminated water from material storage area could detrimentally impact on watercourses quality, biota and habitat.	Surface water quality	Medium	Low



Main Activity	Secondary activity	Phase	Impact	Aspect	Risk Rating	Risk after management
	Storage of general and hazardous waste	O	Contaminated water from waste storage area could detrimentally impact on watercourses quality, biota and habitat.	Surface water quality	Medium	Low
	Topsoil stockpiling/Vegetation removal & General activities	C, O	Dust generated could impact on surface water quality, and biota should it reach watercourses and settle within this area.	Surface water quality	Medium	Low
	Vehicle maintenance	C, O	Hydrocarbon spills from vehicles and other equipment could negative impact water quality, habitat and biota.	Surface water quality	Medium	Low
	Removal of all infrastructures	R	Potential for spills from e.g. hydrocarbon tanks, septic tank, chemical toilets could impact on the surface water resource quality, habitat and biota if not managed.	Surface water quality	Medium	Low
	Rip impacted area	R	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which could impact on the biota, habitat, flow regime and the physico- and chemical quality of the water in the watercourse.	Surface water quality	Medium	Low
	Camp area (whole off)	C, O	Removal of run-off from the surface water resource could reduce surface flow in watercourses which in turn could impact on the habitat and biota within this area.	Surface water quantity	Medium	Low
Prospecting activities (all)	Cumulative impact: Big area (Areas 1, 2, 3 and 4)	C, O	The proposed prospecting activities could impact on surface water quality as a result of hydrocarbon spills and siltation from run-off.	Surface water quality	Medium	Low
	Cumulative impact: Big area (Areas 1, 2, 3 and 4)	O	The proposed prospecting activities could impact on surface water quantity; however, it is expected that the boreholes and trenching will be done consecutively thus the impact severity should not increase from that of the individual activities.	Surface water quantity	Medium	Low



Main Activity	Secondary activity	Phase	Impact	Aspect	Risk Rating	Risk after management
	Cumulative impact: Big area (Areas 1, 2, 3 and 4)	R	During the rehabilitation phase water quality could be impacted as a result of hydrocarbon spills and from siltation from ripped areas that are not vegetated.	Surface water quality	Medium	Low
Prospecting activities (all)	Cumulative impact: Schaffhausen	C, O	The proposed prospecting activities could impact on surface water quality as a result of hydrocarbon spills and siltation from run-off.	Surface water quality	Medium	Low
	Cumulative impact: Schaffhausen	O	The proposed prospecting activities could impact on surface water quantity; however, it is expected that the boreholes and trenching will be done consecutively thus the impact severity should not increase from that of the individual activities.	Surface water quantity	Medium	Low
	Cumulative impact: Schaffhausen	R	During the rehabilitation phase water quality could be impacted as a result of hydrocarbon spills and from siltation from ripped areas that are not vegetated.	Surface water quality	Medium	Low



Table of Contents

	Page
1 CONTACT PERSON AND CORRESPONDING ADDRESS	1
1.1 Details of Specialist	1
1.2 Expertise of the Specialist.....	1
1.3 Declaration of Independence	1
1.4 Scope and Purpose of this Report	1
2 PROJECT DESCRIPTION	2
2.1 Need and Desirability of the Project	2
2.2 Description of the existing and proposed activities	3
2.2.1 Non-Invasive Activities:	3
2.2.2 Invasive Activities.....	5
2.2.3 Description of Pre-/Feasibility Studies	6
2.3 Proposed alternatives	7
3 LEGISLATION AND GUIDELINES THAT HAVE BEEN CONSIDERED	7
3.1 National Environmental Management Act, 1998 (Act No. 108 of 1998) as amended	7
3.1.1 Integrated Environmental Management.....	8
3.1.2 Content of Specialist Reports.....	8
3.2 National Environmental Management Waste Act, 2008.....	12
3.3 National Water Act, 1998	13
3.4 Other Relevant Legislation	14
3.5 Integrated Development Plans and Environmental Management Frameworks	15
3.5.1 Waterberg District Environmental Management Framework.....	15
4 METHODOLOGY EMPLOYED DURING THE ASSESSMENT.....	16
4.1 Desktop assessment	16
4.1.1 GIS Information sourced and used.....	16
4.2 Site visit	16
4.3 Riparian vegetation assessment	17
4.4 Impact Assessment Methodology	17
5 DESCRIPTION OF THE SURFACE WATER ENVIRONMENT	18
5.1 Climate Data	18
5.2 Description of the Regional Aquatic Environment.....	21
5.2.1 Affected River Basin.....	21
5.2.2 Quaternary Catchments.....	21
5.2.3 River Resource Classification	23



5.2.4	NFEPA and Fish population assessment.....	25
5.2.5	Background Water Quality	26
5.2.6	Surface Water Quantity.....	28
5.3	Site specific aquatic ecosystem Descriptions.....	28
5.3.1	Aquatic ecosystem types	28
5.3.2	Normal Dry Weather Flow	31
5.3.3	Drainage Density.....	32
5.3.4	Flood Lines	33
5.4	Sensitive areas and Sensitivity of sites to be developed	34
5.5	Surface Water Uses.....	36
5.6	Water Authority	36
5.7	Water Use Authorisation.....	36
6	IMPACT ASSESSMENT METHODOLOGY	36
6.1	Areas of Influence.....	36
6.1.1	Area of direct influence (ADI).....	36
6.1.2	Area of indirect influence (AII)	36
6.2	Significant Environmental Ratings	37
6.3	Risk classification	37
7	DESCRIPTION OF ENVIRONMENTAL ISSUES AND POTENTIAL IMPACTS INCLUDING CUMULATIVE IMPACTS.....	37
7.1	Existing Impacts at the proposed development sites.....	37
7.2	Potential impacts that could Occur	37
7.3	Levels of acceptable change	38
8	ENVIRONMENTAL MANAGEMENT PROGRAMME	70
8.1	Monitoring programme	70
9	LIMITATIONS AND ASSUMPTIONS	70
10	CONCLUSION AND RECOMMENDATIONS	70
11	APPENDICES	70
12	REFERENCES	70

Appendix 1: The expertise of the EAP to carry out the procedures

Appendix 2: Declaration of Independence



List of Tables

	Page
Table 3-1: Legislative report requirements GNR982.....	8
Table 3-2: GNR320 site verification requirements.....	9
Table 3-3: Content of specialist report GN320.....	9
Table 3-4: Content of compliance statement (Low Sensitivity) or specialist assessment (high sensitivity)	11
Table 4-1: GIS data sets used in the desktop assessment.....	16
Table 4-2: Risk Assessment Key	17
Table 4-3: Rating Classes	18
Table 4-4: Calculations used to determine Rating Class	18
Table 5-1: Mean climatic rainfall conditions for the project area ¹⁹	19
Table 5-2: Applicable catchment areas MAR, MAP and MAE information (Baily & Pitman, 2015) .	23
Table 5-3: Classification of the River Reaches (CSIR, 2018) (CSIR, 2011).....	24
Table 5-4: Average background surface water quality (DWAF, 1996) (DWAF, 1996) (DWAF, 1996) (DWAF, 1996).....	27
Table 7-1: Impact assessment rating results without mitigation measures	39
Table 7-2: Proposed Management Measures (PRH – Prospecting right holder; ECO- Environmental control officer).....	51
Table 7-3: Impact assessment following the implementation of management measures	56

List of Figures

	Page
Figure 2-1: Location of the surface water assessment area.....	3
Figure 5-1: Baltimore monthly temperatures, precipitation and wind speed ¹⁹	19
Figure 5-2: Mean annual precipitation (WR2012).....	20
Figure 5-3: Mean annual A-Pan evaporation (WR2012).....	20
Figure 5-4: Base map of the Limpopo water management area and its sub-areas (DWAF, 2004))	21
Figure 5-5: Quaternary catchments and primary and secondary Rivers (WR2012)	22
Figure 5-6: Location of proposed Sylvania Northern prospecting site, specific surface water resources and inland wetland areas.....	23
Figure 5-7: River condition, Present Ecological Status, Ecological Importance and Sensitivity	25
Figure 5-8: Location of DWS data sites in relation to the proposed Sylvania Northern prospecting right area.....	28
Figure 5-9: Cross section through a wetland (DWAF, 2005)	29
Figure 5-10: River classification (DWAF, 2005)	31
Figure 5-11: Mogalakwena River Monthly flow volume (million cubic meters).....	32
Figure 5-12: Total Annual flow in the Mogalakwena River (million cubic meters)	32
Figure 5-13: Location of surface drainage lines and surface water areas used to calculate the drainage density of the Prospecting Right application area.....	33
Figure 5-14: Flood lines.....	34
Figure 5-15: Sensitive features in the Prospecting Right application area	35
Figure 7-1: Assumed location of prospecting activities and access roads	38



Abbreviations

%	Percentage	NEMA	National Environmental Management Act, 1998 (act 108 of 1998)
°C	Degrees Celsius		
ADI	Area of direct influence		
AII	Area of indirect influence	NEMWA	National Environmental Management Waste Act, 2008 (Act No. 59 of 2008)
DWAF	Department of Water and Forestry		
EAP	Environmental Assessment Practitioner	NFEPA	National Freshwater Ecosystem Priority Areas
ECO	Environmental Control Officer	NWA	National Water Act, 1998 (Act 36 of 1998)
EIA	Environmental Impact Assessment	PES	Present Ecological Status
EMF	Environmental Management Framework	PFS	Pre-Feasibility Study
EMPr	Environmental Management Programme	SACNASP	South African Council for Natural Applied Science Professionals
IDP	Integrated Development Plan	SANBI	South African National Biodiversity Institute
IEM	Integrated Environmental Management	SDF	Spatial Development Framework
km ²	Square kilometres	TDS	Total dissolved solids
MAR	Mean annual runoff	WISA	Water Institute of South Africa
mm	Millimetre	WMA	Water Management Area



1 CONTACT PERSON AND CORRESPONDING ADDRESS

Sylvania Northern Mining (Pty) Ltd Investments (Sylvania Northern) contracted Prescali Environmental Consultants (Pty) Ltd (Prescali) to manage the environmental authorisation process for the proposed prospecting activities on the Farms Altona 696 LR, Gillemberg 861 LR, Non Plus Ultra 683 LR, Teneriffe 682 LR, Aurora 397 LR, Nonnenwerth 421 LR and Portion 2 of Schaffhausen 689 LR.

Prescali was also appointed as an independent Environmental Assessment Practitioner (EAP) to undertake the necessary scope of work for a Desktop Surface Water Assessment to assist with the application for an Environmental Authorisation for the proposed prospecting activities on the Farms Altona 696 LR, Gillemberg 861 LR, Non Plus Ultra 683 LR, Teneriffe 682 LR, Aurora 397 LR, Nonnenwerth 421 LR and Portion 2 of Schaffhausen 689 LR within the Magisterial District of Blouberg, in the Limpopo Province.

1.1 DETAILS OF SPECIALIST

Specialist:	Dr Petro Erasmus	Ms Elaine van der Linde
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Aspect	Assessment and document compilation	Document review

1.2 EXPERTISE OF THE SPECIALIST

- Dr. P. Erasmus has qualifications in Zoology and Biochemistry and further studied in Zoology and Marine pollution. She is registered as a Pr. Sci.Nat. (SACNASP), Natural Professional Scientist, for Ecological and Environmental Sciences (Registration number 116207) and with the Water Institute of South Africa (WISA). Dr. Erasmus is also registered with EAPASA as an Environmental Assessment Practitioner (2019/1473). Her qualifications are provided in Appendix 1.
- Ms. E. van der Linde has qualifications in Geology, Engineering Geology and Environmental Management and experience in Water and Environmental Management. She is registered as a Pr. Sci. Nat. (SACNASP), Natural Professional Scientist, Registration number 400219/05. Ms van der Linde is also registered with EAPASA. Her qualifications are provided in Appendix 1.

1.3 DECLARATION OF INDEPENDENCE

The Declarations of Independence is provided in Appendix 2.

1.4 SCOPE AND PURPOSE OF THIS REPORT

The scope and purpose of the surface water assessment is:

- To provide a description of the surface water environment (and its sensitivity) in and around the Sylvania Northern Mining (Pty) Ltd prospecting right application area; and
- To evaluate the potential impacts of the proposed prospecting sections and supporting infrastructure areas and activities on the nearby surface water resources.

2 PROJECT DESCRIPTION

2.1 NEED AND DESIRABILITY OF THE PROJECT

The “need and desirability” of a project “is the consideration of the strategic context of a development proposal within the broader societal needs and the public interest”¹ and should be determined by considering the broader community’s needs and interests as reflected in a credible Integrated Development Plan (IDP), Spatial Development Framework (SDF) and Environmental Management Framework (EMF) for the area where the project will be taking place (DEA, 2017).

The minerals included in the prospecting rights application are: Platinum Group Minerals and Gold; Nickel and Copper; Cobalt and Chrome. Purely on the minerals itself the exploitation of these are desirable due to the uses of these minerals and the potential employment opportunities that could be generated should future mining be identified as a viable option.

Metal	Potential uses
Chrome (Cr)	Chromium is used in the Electroplating industry, in and in paints and dyes ² .
Cobalt (Co)	Cobalt is a component of various alloys that are used in the manufacture of aircraft engines, gas turbines, high speed steels. It is also used in magnets and magnetic recording devices, a catalyst in the petroleum and chemical industries and as a drying agent in paints and ink. The radioactive isotope Co-60 is used in medical treatment and to irradiate food for preservation and consumer protection ³ .
Copper (Cu)	Used in the creation of various alloys such as bronze. Other uses are: agricultural poison, algicide in water purification and in a number of goods such as coins, cans, cooking foil, saucepans, electricity cables, planes, and space vehicles ⁴ .
Gold (Au)	Mainly used to manufacture jewellery, glass it is also used in different parts in electronics items, as reflecting material in windows, embroidery thread and in medicine ⁵ .
Nickel (Ni)	Nickel has the capacity to resist erosion and thus is used in the production of coins (money), wires, gas turbines, rocket engines, and alloys used for armour plating, nails and pipes. In combination with copper (Monel alloys) it is resistant to sweater corrosion and thus is used in propeller shafts of boats and desalination plants. ⁶
Platinum Group Metals (PGM)	Platinum Group Metals ⁷ are known for their purity, high melting points, catalytic / oxidation and reduction properties and corrosion resistance, PGMs are utilized in various industrial processes, technologies and commercial applications. Consumer and industrial products include flat panel monitors, glass fibre, medical tools, computer hard drives, nylon and razors. Platinum, palladium and rhodium are also used as autocatalysis and pollution control in the automotive sector.

One of the main targets identified in the Mogalakwena IDP⁸ is a “Reduction of official unemployment rate from 15.9% in 2014 to 14% by 2020. (Expanded unemployment rate from 30.9% in 2014 to less than 33% by 2020)” on a provincial level. For the Mogalakwena LM, according to Census 2011, of the 78 647 economically active (employed or unemployed but looking for work) people in the district, 40,2% are unemployed. The unemployment rate of Mogalakwena is almost double that of the other municipalities in the district. This could be attributed to a reduction in mining activities in recent years.

¹ https://cdn.slrconsulting.com/uploads/2020-06/TEPSA_11B12B_DSR_Chap5.pdf 23 June 2022

² <https://byjus.com/chemistry/chromium/#uses-of-chromium> 15 September 2022

³ <https://byjus.com/chemistry/cobalt/> 4 November 2021

⁴ <https://byjus.com/chemistry/copper/> 4 November 2021

⁵ <https://byjus.com/chemistry/gold/> 15 September 2022

⁶ <https://byjus.com/chemistry/nickel/> 4 November 2021

⁷ <https://www.platinumgroupmetals.net/pgm-markets/default.aspx> 4 November 2021

⁸ https://www.cogta.gov.za/cgta_2016/wp-content/uploads/2020/12/Mogalakwena-Final_IDP_2020-21-1.pdf 9 September 2022

Of the 39 515 economically active youth (15–35 years) in the area, 51,7% are unemployed, which is also the highest in the district.

From the Blouberg IDP⁹ “Employment rate of Blouberg declined by 1% from 9178 to 9130 between 2000 and 2010 before recovering by 6.7% to 13 655 in 2016”.

The potential for employment should the prospecting indicate that mining is viable would be good for the Local Municipalities employment rate.

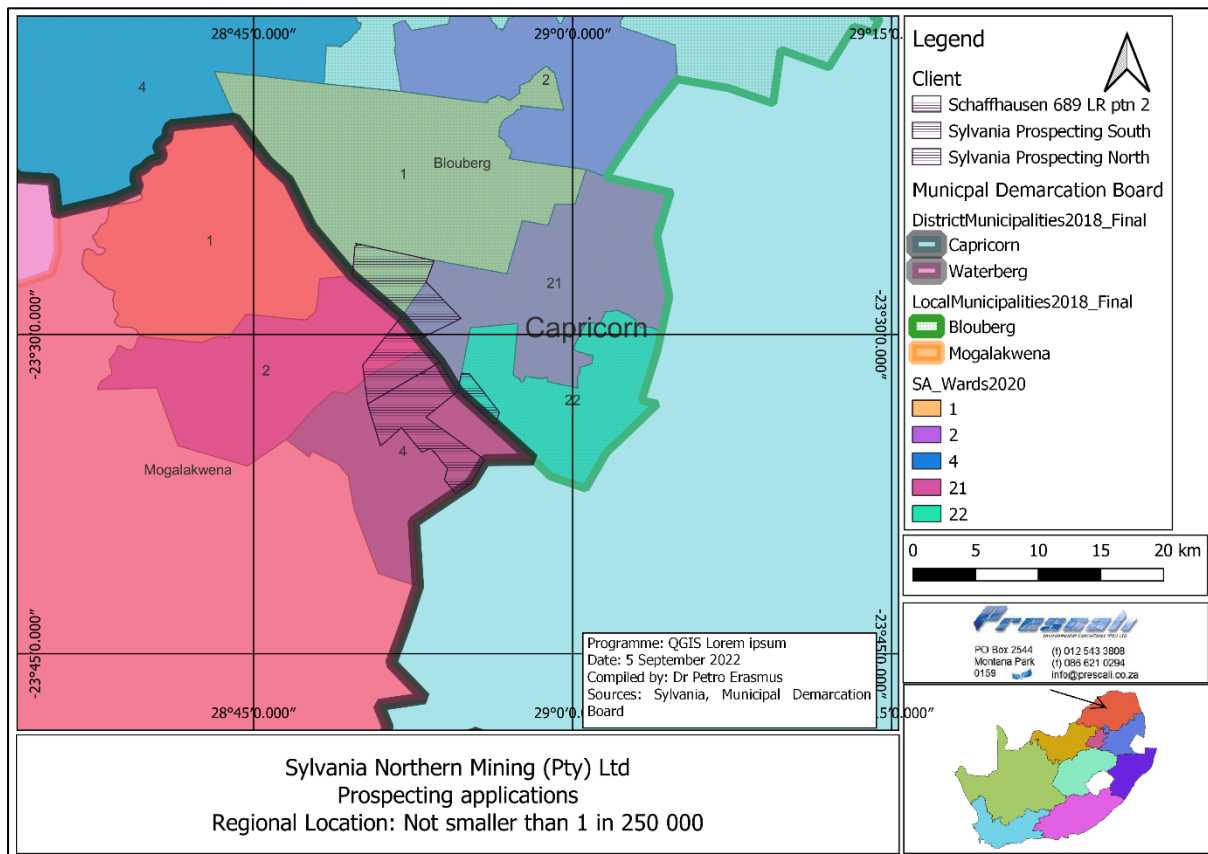


Figure 2-1: Location of the surface water assessment area

2.2 DESCRIPTION OF THE EXISTING AND PROPOSED ACTIVITIES

From Google Earth™ it can be seen that the area is undeveloped though agricultural fields are visible as well as residential (village) areas.

The following sections outline the proposed prospecting activities and the phases and timelines in which they will occur.

2.2.1 Non-Invasive Activities:

2.2.1.1 Phase 1

- **1.1 – 1.3 Investigate academic data and liaise with communities:** [Year 1; Duration: 6 Months]: Historical mining data and academic literature references will be acquired and reviewed. The data includes historical borehole information and any available geological maps.

⁹ <http://www.blouberg.gov.za/sstaff/pages/sites/blouberg/documents/idp/SUMMARY%20OF%20THE%20IDP.pdf> 9
 September 2022



Additional relevant information will also be acquired. This newly acquired information will be scrutinised, inventoried and verified (QA/QC procedure). Relevant academic studies about the area will also be examined for details on controls of mineralisation. Remote sensing data including satellite imagery, regional airborne geophysical data will also be acquired.

- **1.4 Desktop study: [Year 1; Duration: 1 month]:** A desktop study will be undertaken with a focus on the controls of mineralisation in the project area. The study aims to better understand the mineralisation features to define detailed exploration target areas more accurately.
- **1.5 Inventories, capture and QA/QC and database creation: [Year 1; Duration: 5 months]:** The above data will be compiled into a geological database in GIS digital map format to perform target generation exercises as well as geological modelling during later stages of the project.
- **1.6 Preliminary site visit: [Year 1; Duration: 1 week]:** A field visit will be undertaken to familiarise the applicant with surface features (such as cultural features, infrastructure, water bodies and wetlands) in the project area and to meet the surface landowners. During this visit farm boundaries within the project area and farming activities will be verified. An effort will be made to identify any factors that may impact the exploration program. The information collected during the site visit will be used to derive and prioritise preliminary exploration targets.
- **1.7 – 1.8 Regional geochemistry and geophysical interpretation: [Year 1; Duration: 4 months]:** Existing regional soil geochemical data and geophysical data will be interpreted to derive exploration targets in the prospecting area.
- **1.9 Integrate information and define exploration targets: [Year 1; Duration: 1 month]:** Information collected will be analysed and interpreted. Preliminary exploration targets will be delineated and ranked according to appropriate prospect activity parameters including geological stratigraphy and structures, historic exploration results, etc. This will permit an exploration strategy to be devised for the project area.

2.2.1.2 Phase 2

- **2.1 – 2.2 Ground geophysics and soil geochemical sampling: [Year 2; Duration: 10 months]:** Please refer to the invasive exploration section.
- **2.3 Trenching: [Year 2; Duration: 5 months]:** Please refer to the invasive exploration section.

2.2.1.3 Phase 3

- **3.1 Drilling: [Year 3; Duration: 8 months]:** Please refer to the invasive exploration section.
- **3.2 Logging, sampling and analysis: [Year 3; Duration: 12 Months]:** Logging of the lithology, mineralization, structure and alteration will be undertaken on all the drill holes, followed by a sampling of the mineralized sections of the drill holes. Included in the number of samples produced per drill hole will be the QA/QC samples (approximately about 30%). Samples will be sent to a commercial laboratory for elemental analysis.
- **3.3 Geological modelling: [Year 3; Duration: 6 Months]:** Utilising all the detailed geological and grade information, a geological model for the deposit will be generated.

2.2.1.4 Phase 4

- **4.1 Resource drilling: [Year 4; Duration: 4 Months]:** Please refer to the invasive exploration section.
- **4.2 Estimation of resource: [Year 4; Duration: 3 Months]:** Utilising all the detailed geological and grade information, an estimation of the resource will be undertaken for the deposit.



- **4.3 Pre-feasibility study:** [Year 4; Duration: 12 Months]: A pre-feasibility study investigates whether a concept satisfies the objectives and the technical, economic, social and environmental constraints for a particular project. Preparation for the pre-feasibility study will include: -
 - Initial conceptual mine planning
 - Planning the infrastructure requirements
 - Environmental management planning
 - Financial modelling
 - Market analysis
 - Analysis of transport logistics to market
 - Assessment of personnel and training requirements
 - Assessment of socio-economic factors
 - Permitting requirements

2.2.1.5 Phase 5

- **5.1 Feasibility study:** [Year 5; Duration: 6 Months]: A feasibility study is multidisciplinary by nature requiring the highest levels of expertise available. Such studies are both costly and time-consuming.

2.2.2 Invasive Activities

It is of significance to note that the specific exploration methods to be employed will depend on the results generated from previous phases and this programme assumes that the results are positive in each stage. It should also be noted that the first step in any exploration programme is to attempt to acquire and compile any existing exploration data in the area. Should this be successful, certain items in the programme could be reduced or could even become redundant and the pace of the entire programme could be accelerated.

- **2.1 – 2.2 Ground geophysics and soil geochemical sampling:** [Year 2; Duration: 10 months]: Geochemical sampling campaigns with pre-designed sampling grids of 250 m x 250 m will be undertaken on the prospecting areas. The collected samples will be analysed for major elements with the use of a portable XRF to enable the creation of geochemical anomaly maps. Ground magnetic surveys will be carried out to delineate structural features which may control mineralisation in the prospect area.
 - The sample points will be 250 m apart from each other. Two soil samples will be taken at each sample point from the same source. The soil sample will usually entail the removal of the top 20-30 cm of soil using a hand shovel, and 2 samples of 3-5 kg each will be bagged. A GPS point will be taken. The hole from where the sample is taken does not exceed 1m in depth, and will be a maximum of 1 m². The hole will be filled once the sample is taken with the material that was initially removed. The location test holes will usually be shifted slightly as not to affect the vegetation in the immediate vicinity. The work is carried out on foot, with a hand shovel and does not entail the use of any machinery on the sample area. The soil test area will be photographed before, during, and after the sample collection is complete.
 - The 250 m grid will not be established over the entire area, but will be selected based on the findings from the year 1 desktop study.
- **Trenching:** [Year 2; Duration: 5 months]: Eight short (25 m x 2 m x 2 m) trenches will be excavated over the outcrop positions of the defined orebodies. The trenches will be geologically mapped and the sidewalls of the trenches will be sampled. Once this is complete, the trenches will be refilled. During the trenching and mapping, temporary barriers will be erected around the excavation to prevent people/animals from falling into the trenches.



- **3.1 and 4.1 Resource drilling:** [Year 3; Duration: 8 months]: Drilling (diamond or RC) of the prospective areas will commence establishing the presence of mineralisation in the prospect areas. Geological borehole logging, downhole geophysical logging, core magnetic susceptibility measurement and sampling will also be carried out. It is anticipated that initially approximately 4 drill holes will be drilled. Drill holes could vary in depth from 150 to 350 m, with an average depth of 250 meters. The total amount of drilling to be budgeted for at this stage is 750 meters depth. Depending on the results of this drilling further 1 drill hole totalling 250 meters depth may be required.

	Altona 696 LR, Gillemberg 861 LR, Non Plus Ultra 683 LR, Teneriffe 682 LR, Aurora 397 LR, Nonnenwerth 421 LR	Schaffhausen 689 LR
Drill Site	10 m x 10 m Drill Sites 1 Drill site= 100 m ² Total Drill Site Areas (6) = 600 m ²	10 m x 10 m Drill Sites 1 Drill site= 100 m ² Total Drill Site Areas: (4) = 400 m ²
Trenching	25 m x 2 m x 2 m Trench Sites 1 Trench = 50 m ² Total Trench Areas (25) = 1 250 m ²	25 m x 2 m x 2 m Trench Sites 1 Trench = 50 m ² Total Trench Areas: (8) = 400 m ²
Contractor's camp	N/A	400 m ²
Rehabilitation and Closure	1 850 m ²	1 200 m ²

Sample analysis of all the potential intersections will be carried out by a certified commercial laboratory. For budgeting purposes, it is estimated that about 50% of the drilled meters will be sampled.

The geological information generated will be used to model and estimate the resource. The resources will at least be expected to be in the Indicated Category according to the JORC code.

2.2.3 Description of Pre-/Feasibility Studies

It is envisaged that a Pre-Feasibility Study (PFS) will commence following Phase 3 exploration. A PFS will be done to investigate various options and to be able to choose the most appropriate option to conduct a full Feasibility Study on. The study will comprise of, inter alia, the following:

- Geological modelling and geological resource statement.
- Mine planning and preliminary design.
- Study of surface infrastructural requirements and general engineering.
- Metallurgical studies and preliminary plant design.
- Studies relating to water availability and usage.
- Studies relating to electricity requirements and availability.
- Environmental Impact Studies.

The results of the studies will form the basis of a financial model to test the viability of the various options and the proposed project.

All studies will be conducted by independent professionals.

2.3 PROPOSED ALTERNATIVES

No alternatives were evaluated for this assessment. It is anticipated that the final site layout plan implemented by the application will take into considerations the recommendation of this report before finalising the location of the site-specific prospecting activities such as contractors camp, drilling sites and trenches.

3 LEGISLATION AND GUIDELINES THAT HAVE BEEN CONSIDERED

3.1 NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT NO. 108 OF 1998) AS AMENDED

The overarching principles of sound environmental responsibility are reflected in the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA). The principles of the Act include:

- Environmental management must place people and their needs at the forefront of its concern¹⁰.
- Development must be socially, environmentally and economically sustainable¹¹.
- That biological diversity is maintained, that pollution and degradation of the environment is avoided or minimised, that disturbance of landscapes and cultural heritage is avoided or minimised, that waste is avoided or minimised and recycled or disposed of in a responsible manner, that the use of non-renewable resources is responsible and equitable, that a risk averse and cautious approach is applied (i.e. the Precautionary Principle is used) and that negative impacts on the environment are anticipated and prevented or minimised and remedied where they cannot be avoided¹².
- Environmental management should be integrated and consider the best practicable environmental option¹³.
- Equitable access to resources, public participation, cradle to grave philosophies, transparency, application of global and international responsibilities, the Polluter Pays principle and the recognition of sensitive and stressed ecosystems¹⁴.

NEMA states that before certain development activities can be undertaken, an environmental impact assessment must be followed. The environmental departments of the various provincial governments are responsible for evaluating applications that have been submitted in terms of the EIA regulations¹⁵. Based on the findings of the EIA process, a decision will be made by the Limpopo Department of Agriculture, Conservation and Environment on whether the development is authorised or refused.

The National Department of Environmental Affairs are responsible for evaluating projects of national importance (for instance projects that cross provincial or national boundaries).

The written decision called an Environmental Authorisation, is a legal document setting out the conditions of the authorisation and the actions required to protect human health and the environment. Any affected party may appeal against the decision contained in an environmental authorisation. Appeals must be lodged with the Minister who considers appeals in terms of the relevant provisions of NEMA and the environmental regulations.

¹⁰ Section 2(2) of the NEMA.

¹¹ Section 2(3) of the NEMA.

¹² Section 4(a) of the NEMA.

¹³ Section 4(b) of the NEMA.

¹⁴ Section 4(d)(e)(f)(k)(n)(p)(r) of the NEMA.

¹⁵ Government Gazette No. 40772 7 April 2017: R324/R324/R326/R327



3.1.1 Integrated Environmental Management

Integrated Environmental Management (IEM) is a philosophy and procedure for ensuring that environmental considerations are fully integrated into all stages of the development process. This philosophy aims to achieve a desirable balance between conservation and development. The aim of the IEM guidelines is to ensure a pro-active approach to sourcing, collating and presenting information at a level that can be interpreted at all levels.

3.1.2 Content of Specialist Reports

Government Notice R982 as published in Government Gazette 38282 dated 4 December 2014 and as amended by Government Notice 326 in Government Gazette 40772 dated 7 April 2017, outlines in Appendix 6 the requirements for specialist reports. The table below provides an overview of the requirements and the applicable sections of this report.

Table 3-1: Legislative report requirements GNR982

GNR982 as amended by GN326	Report Section
(1) A specialist report prepared in terms of these Regulations must contain—	
(a) details of—	
(i) the specialist who prepared the report; and	1.1
(ii) the expertise of that specialist to compile a specialist report including a curriculum vitae;	1.2
(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	1.3
(c) an indication of the scope of, and the purpose for which, the report was prepared;	1.4
(cA) an indication of the quality and age of base data used for the specialist report;	4.1
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	7.1, 7.2, 7.3
(d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	4.2
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	4.4
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	2.3 0
(g) an identification of any areas to be avoided, including buffers;	5.4
(h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	5.4 Figure 5-15
(i) a description of any assumptions made and any uncertainties or gaps in knowledge;	9
(j) a description of the findings and potential implications of such findings on the impact of the proposed activity or activities;	7.1 7.2
(k) any mitigation measures for inclusion in the EMPr;	8
(l) any conditions for inclusion in the environmental authorisation;	9
(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	8.1
(n) a reasoned opinion—	
(i) whether the proposed activity, activities or portions thereof should be authorised;	9
(iA) regarding the acceptability of the proposed activity or activities; and	9
(ii) if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	8, 9



GNR982 as amended by GN326	Report Section
(o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	Not applicable
(p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	Not applicable
(q) any other information requested by the competent authority.	Not applicable
(2) Where a government notice gazetted by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	Not applicable

On 20 March 2020 “Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the NEMA when applying for environmental authorization” was published in GN 320 (Government Gazette 43110). One of the themes identified and covered by this protocol are Aquatic biodiversity. It is important to note that the protocol replaces the requirements of Appendix 6 of the EIA Impact regulations as outlined above. The protocol as published are outlined below. Please refer to Section 5.4 for the compliance statement for sites that classified as Low sensitivity.

Table 3-2: GNR320 site verification requirements

GN 320	Report Section
1. The site sensitivity verification must be undertaken by an Environmental Assessment Practitioner or a specialist.	1.1 and 1.2
2. The sensitivity verification must be undertaken through the use of:	
a. A desktop analyses, using satellite imagery;	Section 5.4
b. A preliminary on-site inspection; and	Section 5.4
c. Any other available and relevant information.	Existing GIS information: Table 4-1
3. The outcome of the site sensitivity verification must be recorded in the form of a report that:	
a. Confirms or disputes the current use of the land and the environmental sensitivity as identified by the screening tool, such as new developments or infrastructures, the change in vegetation cover status etc.;	Section 5.4
b. Contains a motivation and evidence (e.g. photographs) of either the verified or different use of the land and environmental sensitivity; and	Section 5.4
c. Is submitted together with the relevant assessment report prepared in accordance with the requirements of the Environmental Impact Assessment Regulations.	This report

The following baseline descriptions must be included in the report.

Table 3-3: Content of specialist report GN320

Requirement	Section
2.3.1. a description of the aquatic biodiversity and ecosystems on the site, including; (a) aquatic ecosystem types; and (b) presence of aquatic species, and composition of aquatic species communities, their habitat, distribution and movement patterns;	5.3
2.3.2. the threat status of the ecosystem and species as identified by the screening tool;	5.4
2.3.3. an indication of the national and provincial priority status of the aquatic ecosystem, including a description of the criteria for the given status (i.e. if the site includes a wetland or a river freshwater ecosystem priority area or sub catchment, a	5.2.4

Requirement	Section
strategic water source area, a priority estuary, whether or not they are free -flowing rivers, wetland clusters, a critical biodiversity or ecologically sensitivity area); and	
2.3.4. a description of the ecological importance and sensitivity of the aquatic ecosystem including:	5.2.3
(a) the description (spatially, if possible) of the ecosystem processes that operate in relation to the aquatic ecosystems on and immediately adjacent to the site (e.g. movement of surface and subsurface water, recharge, discharge, sediment transport, etc.); and	5.2.2 5.2.3 5.3
(b) the historic ecological condition (reference) as well as present ecological state of rivers (in- stream, riparian and floodplain habitat), wetlands and/or estuaries in terms of possible changes to the channel and flow regime (surface and groundwater).	5.2.3
2.4. The assessment must identify alternative development footprints within the preferred site which would be of a "low" sensitivity as identified by the screening tool and verified through the site sensitivity verification and which were not considered appropriate.	2.3
2.5. Related to impacts, a detailed assessment of the potential impacts of the proposed development on the following aspects must be undertaken to answer the following questions:	7.1 7.2 7.3
2.5.1. Is the proposed development consistent with maintaining the priority aquatic ecosystem in its current state and according to the stated goal?	
2.5.2. is the proposed development consistent with maintaining the resource quality objectives for the aquatic ecosystems present?	
2.5.3. how will the proposed development impact on fixed and dynamic ecological processes that operate within or across the site? This must include:	
(a) impacts on hydrological functioning at a landscape level and across the site which can arise from changes to flood regimes (e.g. suppression of floods, loss of flood attenuation capacity, unseasonal flooding or destruction of floodplain processes);	
(b) will the proposed development change the sediment regime of the aquatic ecosystem and its sub -catchment (e.g. sand movement, meandering river mouth or estuary, flooding or sedimentation patterns);	
(c) what will the extent of the modification in relation to the overall aquatic ecosystem be (e.g. at the source, upstream or downstream portion, in the temporary I seasonal I permanent zone of a wetland, in the riparian zone or within the channel of a watercourse, etc.); and	
(d) to what extent will the risks associated with water uses and related activities change;	
2.5.4. how will the proposed development impact on the functioning of the aquatic feature? This must include:	
(a) base flows (e.g. too little or too much water in terms of characteristics and requirements of the system);	
(b) quantity of water including change in the hydrological regime or hydroperiod of the aquatic ecosystem (e.g. seasonal to temporary or permanent; impact of over - abstraction or instream or off stream impoundment of a wetland or river);	
(c) change in the hydrogeomorphic typing of the aquatic ecosystem (e.g. change from an unchanneled valley-bottom wetland to a channelled valley-bottom wetland);	
(d) quality of water (e.g. due to increased sediment load, contamination by chemical and/or organic effluent, and/or eutrophication);	
(e) fragmentation (e.g. road or pipeline crossing a wetland) and loss of ecological connectivity (lateral and longitudinal); and	
(f) the loss or degradation of all or part of any unique or important features associated with or within the aquatic ecosystem (e.g. waterfalls, springs, oxbow lakes, meandering or braided channels, peat soils, etc.);	



Requirement	Section
2.5.5. how will the proposed development impact on key ecosystems regulating and supporting services especially: (a) flood attenuation; (b) streamflow regulation; (c) sediment trapping; (d) phosphate assimilation; (e) nitrate assimilation; (f) toxicant assimilation; (g) erosion control; and (h) carbon storage?	
2.5.6. how will the proposed development impact community composition (numbers and density of species) and integrity (condition, viability, predator - prey ratios, dispersal rates, etc.) of the faunal and vegetation communities inhabiting the site?	
2.6. In addition to the above, where applicable, impacts to the frequency of estuary mouth closure should be considered, in relation to: (a) size of the estuary; (b) availability of sediment; (c) wave action in the mouth; (d) protection of the mouth; (e) beach slope; (f) volume of mean annual runoff; and (g) extent of saline intrusion (especially relevant to permanently open systems).	Not Applicable

Table 3-4: Content of compliance statement (Low Sensitivity) or specialist assessment (high sensitivity)

GN 320	Specialist assessment
The compliance statement / assessment must be prepared by a suitably qualified specialist registered with the SACNASP, with expertise in the field of aquatic sciences.	Dr Erasmus is registered with SACNASP in the field of environmental and ecological sciences. She is suitably qualified to conduct the assessment, please refer to Appendix 1 of the main Report
The compliance statement / assessment must: be applicable to the preferred site and the proposed development footprint;	This report evaluated the Prospecting Right application footprint area.
2.7 The findings of the specialist assessment must be written up in an Aquatic Biodiversity Specialist Assessment Report that contains, as a minimum, the following information:	
2.7.1. contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;	Section 1.1
2.7.2. a signed statement of independence by the specialist;	Appendix 2
2.7.3. a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	Section 4
2.7.4. the methodology used to undertake the site inspection and the specialist assessment, including equipment and modelling used, where relevant;	Section 4
2.7.5. a description of the assumptions made, any uncertainties or gaps in knowledge or data;	Section 9
2.7.6. the location of areas not suitable for development, which are to be avoided during construction and operation, where relevant;	Section 5.4

GN 320	Specialist assessment
2.7.7. additional environmental impacts expected from the proposed development;	Section 7
2.7.8. any direct, indirect and cumulative impacts of the proposed development on site;	Section 7
2.7.9. the degree to which impacts and risks can be mitigated;	Section 7.2
2.7.10. the degree to which the impacts and risks can be reversed;	Section 7.3
2.7.11. the degree to which the impacts and risks can cause loss of irreplaceable resources;	Section 7
2.7.12. a suitable construction and operational buffer for the aquatic ecosystem, using the accepted methodologies;	Section 5.4
2.7.13. proposed impact management actions and impact management outcomes for inclusion in the Environmental Management Programme (EMPr);	Section 8
2.7.14. a motivation must be provided if there were development footprints identified as per paragraph 2.4 above that were identified as having a "low" aquatic biodiversity sensitivity and that were not considered appropriate;	Section 5.4
2.7.15. a substantiated statement, based on the findings of the specialist assessment, regarding the acceptability or not of the proposed development and if the proposed development should receive approval or not; and	Section 10
2.7.16. any conditions to which this statement is subjected.	Section 10

3.2 NATIONAL ENVIRONMENTAL MANAGEMENT WASTE ACT, 2008

The National Environmental Management Waste Act, 2008 (Act No. 59 of 2008) (NEMWA) came into effect on 1 July 2009 and aims to:

- Reform the law regulating waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development.
- Provide for institutional arrangements and planning matters; to provide for national norms and standards for regulating the management of waste by all spheres of government.
- Provide for specific waste management measures.
- Provide for the licensing and control of waste management activities; to provide for the remediation of contaminated land; to provide for the national waste information system; and to
- Provide for compliance and enforcement; and to provide for matters connected therewith.

Important Regulations regarding residue deposits and stockpiles and associated infrastructures are the following:

- GN R632 of 24 July 2015 (as amended): National Environmental Management: Waste Act (59/2008): regulations regarding the planning and management of residue stockpiles and residue deposits, 2015.

The NEMWA was amended in 2014 in Act No. 26 of 2014: National Environmental Management: Waste Amendment Act, 2014. In June 2022 the NEMWA was amended again and residue deposits were removed from the definition of waste in the National Environmental Management Amendment Act IV.

3.3 NATIONAL WATER ACT, 1998

The National Water Act, 1998 (Act No. 36 of 1998) (NWA) aims to manage the national water resources¹⁶ to achieve sustainable use of water for the benefit of all water users. This requires that the quality of water resources is protected and also requires integration of the management of water resources with the delegation of powers to institutions at the regional or catchment level.

The purpose of the Act is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in ways, which consider:

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

Water uses are authorised under the following sections of the National Water Act:

- Section 39: General Authorisation; and
- Section 40: License.

There are 11 water uses described in Section 21 of the National Water Act:

- (a) taking water from a water resource;
- (b) storing water;
- (c) impeding or diverting the flow of water in a watercourse¹⁷;
- (d) engaging in a stream-flow reduction activity contemplated in Section 36;
- (e) engaging in a controlled activity identified as such in section 37(1) or declared under Section 38(1);
- (f) discharging waste or water containing waste into a water resource through a pipe, canal, Sewer, sea outfall or other conduit;
- (g) disposing of waste in a manner which may detrimentally impact on a water resource;
- (h) disposing in any manner of water which contains waste from, or which has been heated in any industrial or power generation process;
- (i) altering the bed, banks, course or characteristics of a watercourse;
- (j) removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and
- (k) using water for recreational purposes.

The above is regulated by the following:

- Government Gazette No. 32805 of 18 December 2009: No. 1198: General Authorisation in terms of Section 39 of the National Water Act, 1998 (Act No. 36 of 1998) in terms of Section 21(c) and (i) for the purpose of rehabilitating a wetland for conservation purposes. Schedule: Impeding or

¹⁶ Water resource includes a watercourse, surface water, estuary or aquifer

¹⁷ Watercourse: (a) a river or spring, (b) a natural channel in which water flows regularly or intermittently; (c) a wetland, lake or dam into which, or from which, water flows; and (d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks.



diverting the flow of water in a water course (Section 21(c)) and Altering the bed, banks, course or characteristics of a watercourse (Section 21(i)).

- Government Gazette No. 40229 of 26 August 2016: No. 509: General Authorisation in terms of Section 39 of the National Water Act, 1998 (Act No. 36 of 1998) for water uses defined in Section 21(c) and Section 21(i).
- Government Gazette No. 36920 of 6 September 2013: No. 665: Revision of General Authorisations in terms of Section 39 of the National Water Act 1998 (Act No. 36 of 1998) (The Act). *Applicable water uses described are: Section 21(e), (f), (g), (h), (j).*
- Revision of General Authorisation for the taking and storage of water was published in Government Gazette 40243 of 2 September 2016 and came into effect on 2 March 2017.

Of specific importance for mines are:

- GN704 of 4 July 1999: Regulations on use of water for mining and related activities aimed at the protection of water resources as published in Government Gazette 20119. Commencement date: 4 June 1999.

Of importance is also the guidelines published by the (then) Department of Water and Forestry:

- Best Practice Guidelines dealing with aspects of the DHSWS's water management:
 - H1. Integrated Mine Water Management;
 - H2. Pollution Prevention and Minimisation of Impacts;
 - H3. Water Reuse and Reclamation;
 - H4. Water Treatment;
- Best Practice Guidelines dealing with general water management strategies, techniques and tools, which could be applied cross-sectoral activities:
 - G1. Storm Water Management;
 - G2. Water and Salt Balances;
 - G3. Water Monitoring Systems;
 - G4. Impact Prediction;
 - G5. Water Management Aspects for Mine Closure;
- Best Practice Guidelines dealing with specific Mining activities or aspects. These guidelines address the prevention and management of impacts from:
 - A1. Small-Scale Mining;
 - A2. Water Management for Mine Residue Deposits;
 - A3. Water Management in Hydrometallurgical Plants;
 - A4. Pollution Control Dams;
 - A5. Water Management for Surface Mines; and
 - A6. Water Management for Underground Mines.

3.4 OTHER RELEVANT LEGISLATION

In addition to the foregoing, the project must also comply with the provisions of other relevant international and national legislation and conventions, which includes the following:

- Constitution of South Africa, 1996 (Act No. 108 of 1996);
- Atmospheric Pollution Prevention Act, 1965 (Act No. 45 of 1965);
- Hazardous Substances Act and Regulations, 1983 (Act No. 85 of 1983);
- National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004);
- Carbon Tax Act, 2019 (Act No. 15 of 2019);



- National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004);
- National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003);
- National Heritage Resources Act, 1999 (Act No. 25 of 1999);
- National Nuclear Energy Regulator Act, 1999 (Act No. 47 of 1999);
- National Parks Act, 1976 (Act No. 57 of 1976);
- National Spatial Biodiversity Assessment, 2011 (as available from South African National Biodiversity Institute (SANBI));
- Nuclear Energy Act, 1999 (Act No. 46 of 1999);
- Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) and Major Hazard Installation Regulations;
- Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983);
- Limpopo Environmental Management Act, 2003 (Act No. 7 of 2003).

The requirements of these will be assessed and included in the specialist reports and the EIA/EMP.

3.5 INTEGRATED DEVELOPMENT PLANS AND ENVIRONMENTAL MANAGEMENT FRAMEWORKS

3.5.1 Waterberg District Environmental Management Framework¹⁸

The purpose of this EMF is to develop a framework that will integrate policies and frameworks, and align different government mandates in a way that will streamline decision-making to improve cooperative governance and guide future development in an environmentally responsible manner. The key surface water issues identified in this District are:

- Water availability and utilisation
 - The relative scarcity of water in the Waterberg District is recognised by all sectors and groups in the district.
 - The protection of important water catchment areas from activities (dams, weirs, road/track/path crossings, removal indigenous vegetation, etc) that may have a negative impact on water production and runoff, and in particular the upper parts of river systems, is a major concern.
 - The need to determine and maintain ecological reserves for all the rivers in the area should be addressed as a matter of urgency.
 - The extensive occurrence of alien vegetation along certain waterways impacts negatively on water production and runoff.
 - Illegal dams and water extraction impact negatively on water production and runoff.
- Water quality and pollution
 - Water pollution was identified as one of the major issues in the district. Causes of water pollution include:
 - Failing of municipal sewage works (biggest concern);
 - Lack of proper sewage systems and management at lodges and tourism facilities on farms and game reserves in the area;
 - Other sources mentioned include agricultural pesticides and fertilisers as well as polluted water runoff from industries and mines.
 - The quality of water for human consumption is an issue in especially the rural settlements as well as some of the small towns.

¹⁸ https://screening.environment.gov.za/ScreeningDownloads/EMF/WDEMF_Final_EMF_Report.pdf 02/08/2022

4 METHODOLOGY EMPLOYED DURING THE ASSESSMENT

4.1 DESKTOP ASSESSMENT

A desktop assessment was done using existing GIS database information and Google Earth™ imagery. Available documentation as available for other applications were used where relevant.

4.1.1 GIS Information sourced and used

This assessment was conducted to determine which water resources are available in and around the Prospecting Right area.

The desktop assessment looked at the Screening tool report generated for the area. In addition, the following Geographical Information Systems (GIS) data sets were used throughout this document.

Table 4-1: GIS data sets used in the desktop assessment

Data Set	Provider	Date
Sensitivity rating	Screening tool	August 2022
National Land cover	EGIS	2020
District and Local Municipalities Wards	Municipal Demarcation board	2018 2020
Location of Prospecting Right application	Sylvania	August 2022
2328 Hydrol Lines / Utilities, Educational, Public, Industrial, Elevation lines	Surveyor general	2013
2328 Land use	Surveyor general	2014
Water Resources of Southern Africa 2012 Study (WR2012 (Baily & Pitman, 2015)): Various .shp files	Water Research Commission	2015
NFEPA: River_FEPA.shp	SANBI/CSIR	July 2011
NFEPA: NFEPA_Rivers.shp	SANBI/CSIR	July 2011
NFEPA: Fishsanc.shp	SANBI/CSIR	July 2011
NFEPA: Fishsanc_All_Spp.shp	SANBI/CSIR	July 2011
NFEPA: ESA_FishSupportAreas.shp	SANBI	2011 & 2014
National Freshwater Ecosystem Priority Areas: FEPA_subWMA.shp	SANBI	July 2011
National Freshwater Ecosystem Priority Areas: FEPA_WMA.shp	SANBI	July 2011
NFEPA: NFEPA_Wetlands.shp	SANBI	July 2011
River Ecosystem threat status	(CSIR, 2018)	2018
National wetland 5 and Confidence map	(CSIR, 2018)	2018
Artificial wetland	(CSIR, 2018)	2018
DHSWS web site for information on Water quality data and rainfall data.	DHSWS	Refer to Tables where information is provided in this report
Various internet information sources as referenced in the document		

4.2 SITE VISIT

No site was conducted.

4.3 RIPARIAN VEGETATION ASSESSMENT

No riparian vegetation was conducted.

4.4 IMPACT ASSESSMENT METHODOLOGY

Appendix A of Regulation No. 509 of 26 August 2016 prescribed the Water Use Risk Assessment Protocol and this methodology was used. An outline of the methodology is indicated below.

Table 4-2: Risk Assessment Key

Severity: How severe does the aspects impact on the environment and resource quality characteristics (flow regime, water quality, geo-morphology, biota, habitat)?	
Insignificant / non-harmful	1
Small / potentially harmful	2
Significant / slightly harmful	3
Great / harmful	4
Disastrous / extremely harmful and/or wetland(s) involved	5
Where "or wetland(s) are involved" it means the activity is located within the delineated boundary (the temporary, seasonal or permanent zone) of any wetland. The score of 5 is only compulsory for the significance rating.	
Spatial Scale: How big is the area that the aspect is impacting on?	
Area specific (at impact site)	1
Whole site (entire surface right)	2
Regional / neighbouring areas (downstream within quaternary catchment)	3
National (impacting beyond secondary catchment or provinces)	4
Global (Impacting beyond SA boundary)	5
Duration: How long does the aspect impact on the environment and resource quality?	
One day to one month, PES, EIS and/or REC not impacted	1
One month to one year, PES, EIS and/or REC impacted but no change in status	2
One year to 10 years, PES, EIS and/or REC impacted to a lower status but can be improved over this period through mitigation	3
Life of the activity, PES, EIS and/or REC permanently lowered	4
More than life of the organization/facility, PES and EIS scores, an E or F	5
PES and EIS (Sensitivity) must be considered.	
Frequency of the Activity: How often do you do the specific activity?	
Annually or less	1
6 monthly	2
Monthly	3
Weekly	4
Daily	5
Frequency of the incident/impact: How often does the activity impact on the environment?	
Almost never / almost impossible / >20%	1
Very seldom / highly unlikely / >40%	2
Infrequent / unlikely / seldom / >60%	3
Often / regularly / likely / possible / >80%	4
Daily / highly likely / definitely / >100%	5
Legal Issues: How is the activity governed by legislation?	
No legislation	1
Fully covered by legislation (wetlands are legally governed)	5



Located within the regulated areas: Within the outer edge of the 1 in 100-year flood line or delineated riparian area as measured from the middle of the watercourse measured on both banks, or within a 500 m radius from the boundary of any wetland (The boundary of a wetland is the outer edge of the seasonal or temporary zone as delineated for the wetland)	
Detection	
Immediately	1
Without much effort	2
Need some effort	3
Remote and difficult to observe	4
Covered	5

Table 4-3: Rating Classes

Rating	Class	Management description
1 – 55	(L) Low Risk	Acceptable as is or consider requirement for mitigation. Impact to watercourses and resource quality small and easily mitigated.
56 – 169	(M) Moderate Risk	Risk and impact on watercourses are notably and require mitigation measures on a higher level, which costs more and require specialist input. Licence required.
170 – 300	(H) High Risk	Always involves wetlands. Watercourse(s) impacts by the activity are such that they impose a long-term threat on a large scale and lowering of the Reserve. Licence required.

A low-risk class must be obtained for all activities to be considered for a General Authorization.

Table 4-4: Calculations used to determine Rating Class

Consequence = Severity + Spatial Scale + Duration
Likelihood = Frequency of Activity + Frequency of Incident + Legal Issues + Detection
Risk = Consequence x Likelihood

5 DESCRIPTION OF THE SURFACE WATER ENVIRONMENT

5.1 CLIMATE DATA

The nearest town to the prospecting area is Baltimore (44 km north west) which has a Subtropical steppe climate (Classification: BSh). The district's yearly temperature is 23.26 °C and receives about 57.75 millimetres of precipitation annually¹⁹.

¹⁹ <https://tckctck.org/south-africa/limpopo/baltimore> 02/08/2022

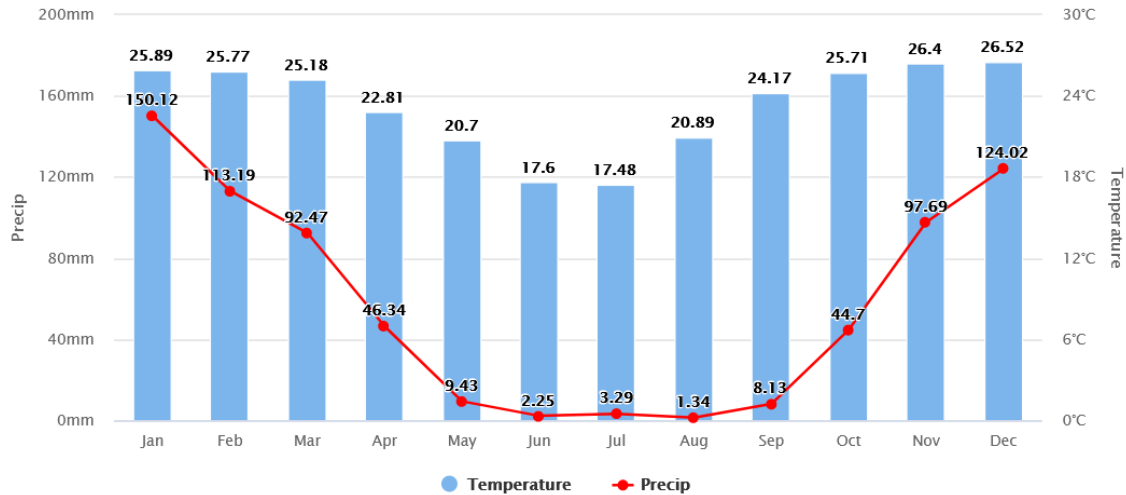


Figure 5-1: Baltimore monthly temperatures, precipitation and wind speed¹⁹

5.1.1.1 Precipitation and Evaporation

From the information from tckctck.org the average rainfall figures are provided in Table 5-1. Mean Annual Precipitation for the proposed Sylvania Northern prospecting area is indicated in Figure 5-2 and from WR2012 it ranges from 388 mm to 480 mm across the boundaries as indicated. With regards to evaporation, the proposed Sylvania Northern prospecting operations is located within the 2200 – 2600 mm A-pan evaporation zone, Figure 5-3.

Table 5-1: Mean climatic rainfall conditions for the project area ¹⁹

Month	Average precipitation mm	Average precipitation days (≥ 1.0 mm)	Average relative humidity (%)
Jan	150.12	15.24	71.12
Feb	113.19	12.3	71.54
Mar	92.47	11.45	70.36
Apr	46.34	6.71	68.99
May	9.43	2.46	61.29
Jun	2.25	0.19	59.6
Jul	3.29	0.95	59.63
Aug	1.34	0.37	51.65
Sep	8.13	1.8	49.05
Nov	44.7	6.82	52.69
Oct	97.6	11.36	59.41
Dec	124.02	15.33	66.85
Year	57.75	7.08	61.85

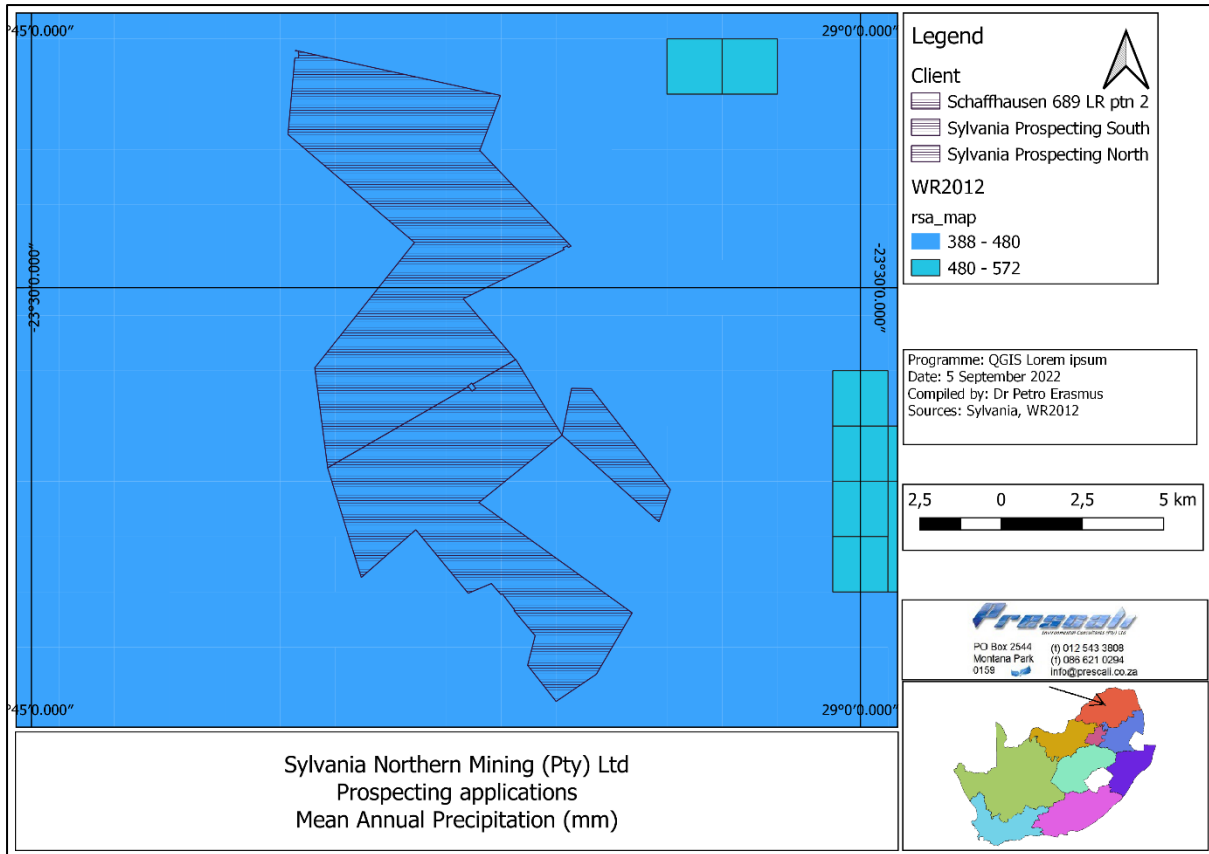


Figure 5-2: Mean annual precipitation (WR2012)

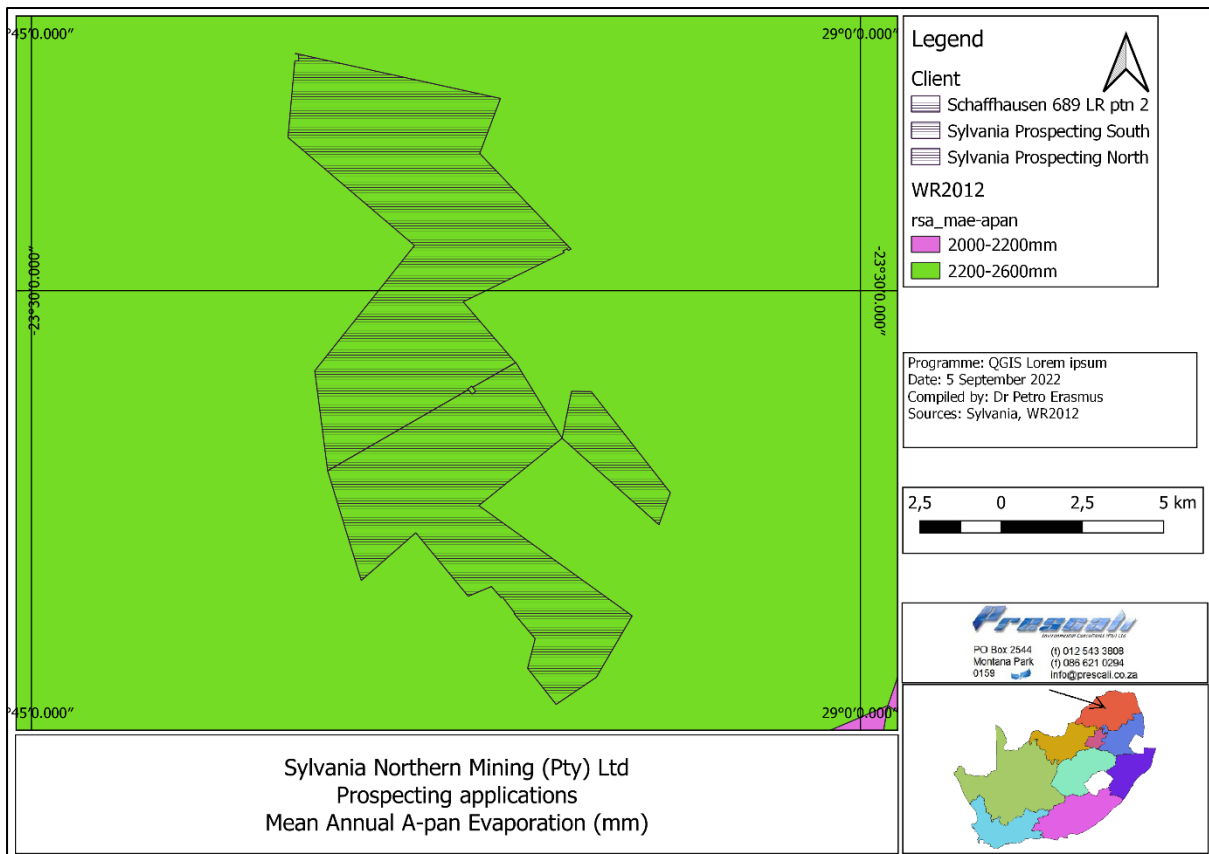


Figure 5-3: Mean annual A-Pan evaporation (WR2012)

5.2 DESCRIPTION OF THE REGIONAL AQUATIC ENVIRONMENT

5.2.1 Affected River Basin

The Sylvania Northern prospecting right application area is situated in the Limpopo Water Management Area (WMA) (A primary catchment), specifically quaternary catchment A62E, A62F, A62G and A62H of the Mogalakwena River catchment (Figure 5-4) (DWAF, 2004).

From the 2016 reconciliation strategy (Lombaard, J., 2016), the Mogalakwena River (A61 to A63) catchment has limited surface water resources but large groundwater resources, which have already been extensively exploited by the irrigation sector. The mining sector is expanding rapidly in this catchment and the water supply to these mines must be secured as a matter of priority. Additional water resources are groundwater and transfers from the Olifants River catchment.

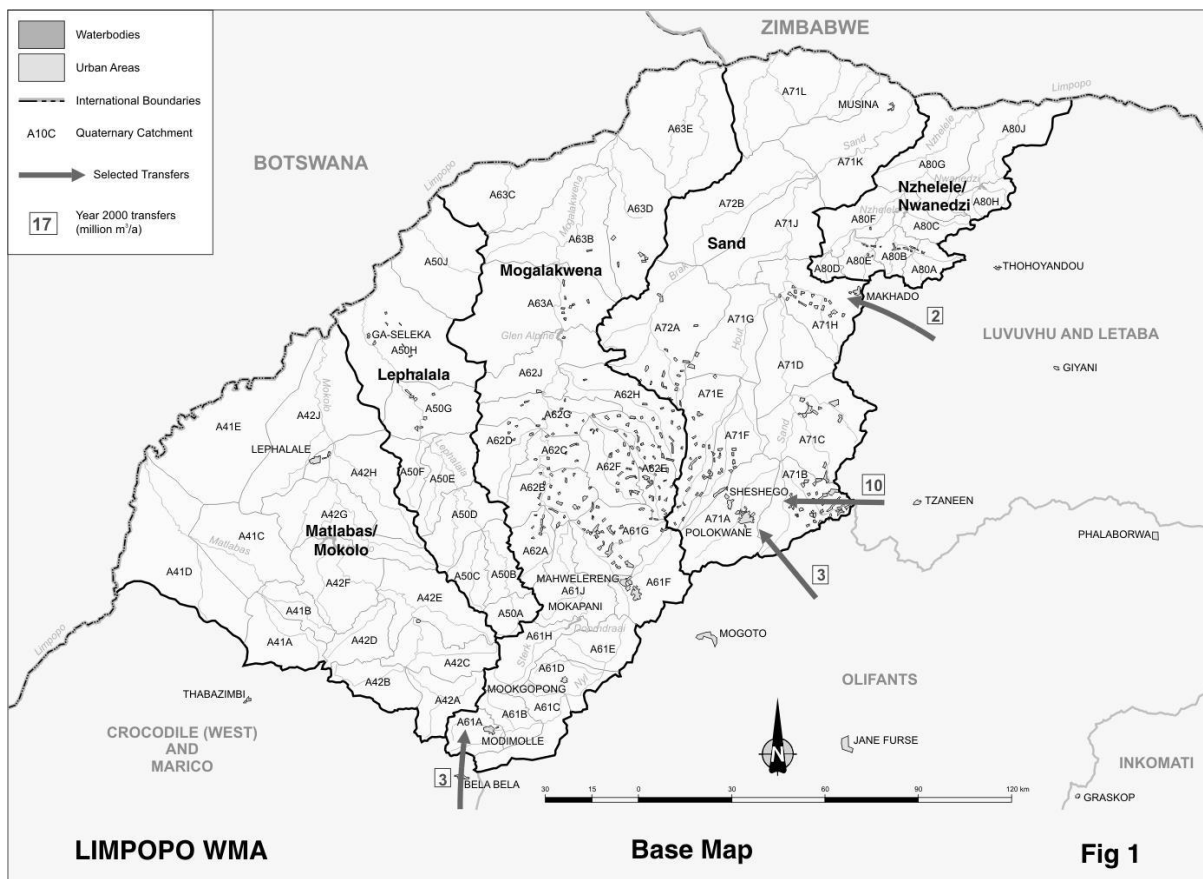


Figure 5-4: Base map of the Limpopo water management area and its sub-areas (DWAF, 2004)

5.2.2 Quaternary Catchments

The proposed Sylvania Northern prospecting area is located within the A62E, A62F, A62G and A62H quaternary catchments (Mogalakwena River catchment).

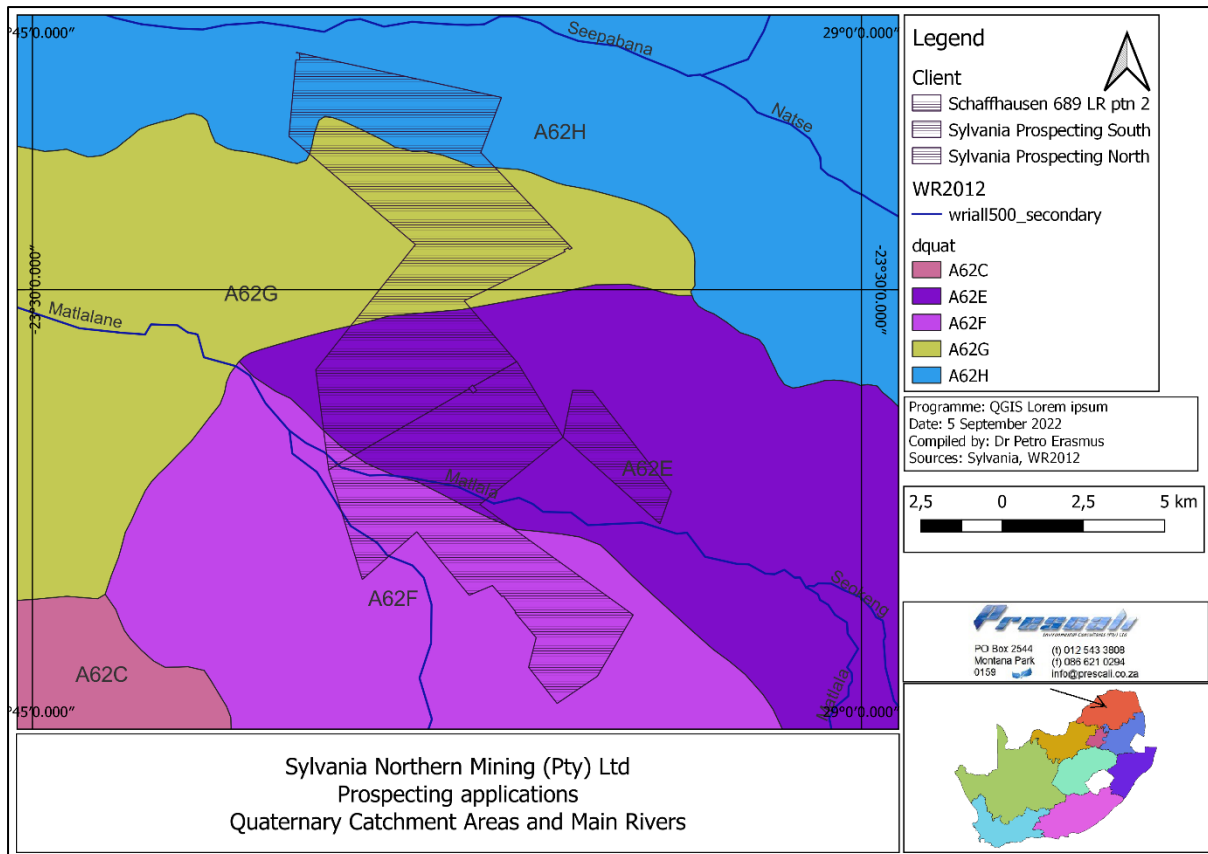


Figure 5-5: Quaternary catchments and primary and secondary Rivers (WR2012)

5.2.2.1 A60 Mogalakwena catchment (Lombaard, J., 2016)

Though the Mogalakwena catchment has a large potential for growth, it has insufficient water supply to meet current needs and the Doorndraai Dam is over-allocated, while all water resources in the Mogalakwena catchment have been fully developed.

The middle of this catchment is densely populated with informal settlements that are mainly supplied from groundwater, posing a risk to surface water quality, as well as groundwater quality due to the high concentration of pit latrines. This can lead to long-term contamination of underlying aquifers with *E.coli* and nitrate as well as unsafe concentrations of bacteria, viruses and chemicals.

Groundwater is also threatened by mine water decant and naturally occurring fluorides emanating from the underlining granite in some areas. With an increase of development within the mining sector the potential of more mine water decant is a high risk. Additional water quality determinants associated with the gold and base-metal mines as well as smelters are antimony, pH, TDS, total suspended solids and tin.

Large scale irrigation around the dams in this catchment can lead to deterioration of water quality due to runoff of potential agro-chemical pollutants into the water source.

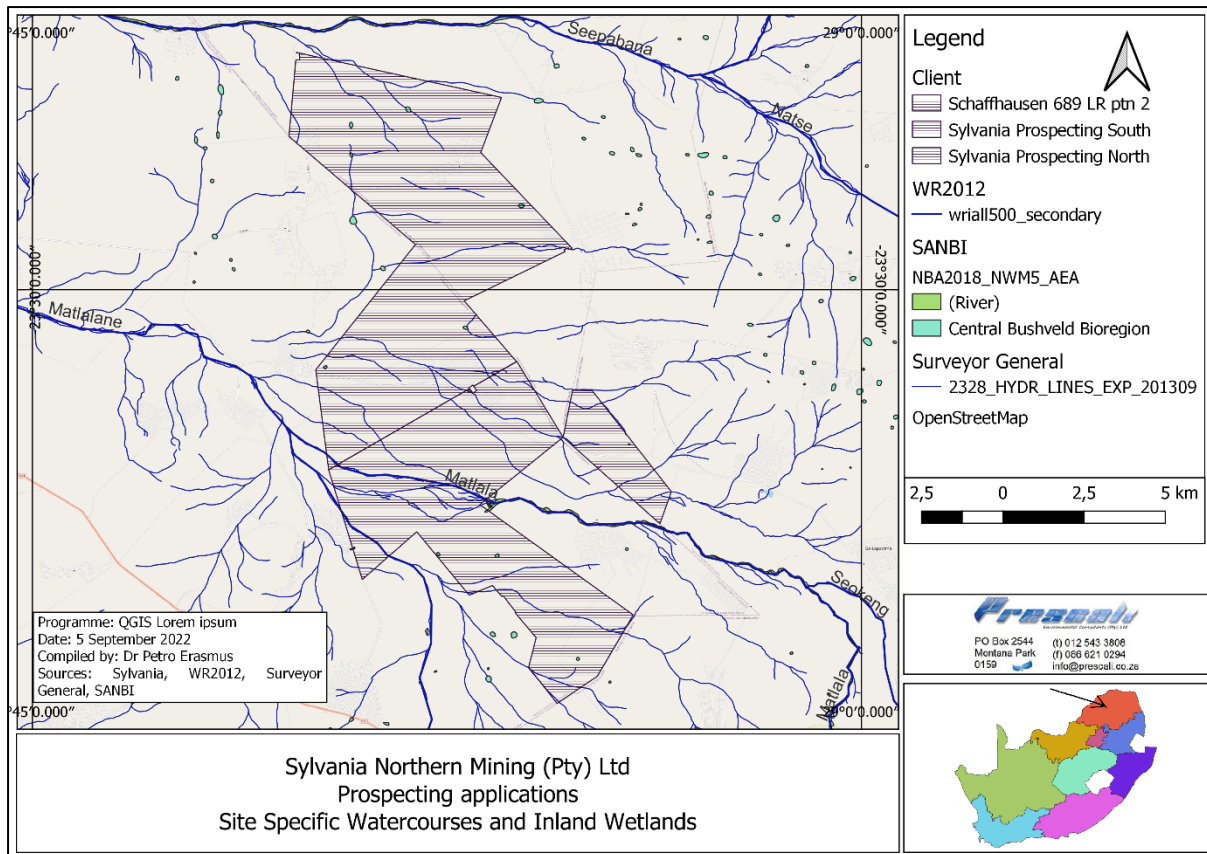


Figure 5-6: Location of proposed Sylvania Northern prospecting site, specific surface water resources and inland wetland areas

The Mean Annual Evaporation, Mean Annual Precipitation and MAR for the applicable quaternary catchments are indicated in Table 5-2.

Table 5-2: Applicable catchment areas MAR, MAP and MAE information (Baily & Pitman, 2015)

Area	Catchment area		MAE (mm) (S-pan)	MAP (mm)	MAR (million m ³ /a)
	Gross (km ²)	Net (km ²)			
A62	5795	5584	1883	479	75,99
A62E	621	621	1850	460	5,51
A62F	620	620	1850	478	3,35
A62G	627	539	1900	437	6,22
A62H	871	871	1900	439	5,88
A62E PAA	39,9015				0,354
A62F PAA	25,9748				0,140
A62G PAA	25,9264				0,257
A62H PAA	14,4352				0,097

5.2.3 River Resource Classification

The ecological status (EcoStatus) of a river refers to its overall condition or health, i.e. the totality of the features and characteristics of the river and its riparian areas, which manifests in its ability to support a natural array of species. This ability relates directly to the capacity of the system to provide a variety of goods and services.

The Minister of Water and Sanitation is required to establish a classification system, and to determine the class and resource quality objectives for all or part of the resources considered to be significant.

From the desktop data assessment it can be seen that the Present Ecological Status (PES) for both the rivers closest to the prospecting right area decreased in classification from the 1999 assessment to the 2018 assessment. The Ecological Importance and Sensitivity Class (EI and ES) of the rivers in the applicable reaches are Moderate and Very Low respectively²⁰ (Figure 5-7).

Table 5-3: Classification of the River Reaches (CSIR, 2018) (CSIR, 2011)

	Matlala	Seepabana	Mogalakwena
Flow	Ephemeral	Perennial	Perennial
Order	2	2	3
Mainstem	1	1	1
PES1999	B: Large Natural	B: Largely Natural	D
Ecoregion	5	1	1
Geomorphic Zone	E	D	F
River Type	5_N_L	1_P_U	1_P_F
FFRID	0	0	0
FFRREGION	0	0	0
FFRFlagship	0	0	0
PES_2018	C	D	D
NBA2018ETS	CR	LT	CR
NBA2018PL	NP	WP	PP
FRID_2018	0	0	0
FRFAG_2018	0	0	0
FEPA Code	4	4	2

- FFRID: Free flowing river identification. Each system and its tributaries have the same identifier.
- FFRREGION: The lumped ecoregion into which free-flowing rivers fall, used to achieve representation of free-flowing rivers across the country.
- FFRFlagship: Flagship free-flowing rivers as identified through an expert review process.
- PES_2018: Data that became available between 2011 and 2017 from Reserve or Ecological Water Requirement (EWR) and Water Resource Classification System (WRCS) studies.
- NBA2018ETS: Ecosystem threat status (ETS) of river ecosystem types: this was based on the extent to which each river ecosystem type had been altered from its natural condition.
- NBA2018PL: Ecosystem protection level (EPL) of river ecosystem types: river ecosystem types in protected areas needed to be in good condition rivers (A or B ecological category) to be considered as protected. Well protected, moderately protected, poorly protected river ecosystem types have at least 100%, 50%, 5% of their biodiversity target in protected areas and in natural or near-natural ecological condition; not protected river ecosystem types have < 5%.
- FRID_2018: Free-flowing river ID. Each system and its tributaries have the same identifier.
- FRFAG_2018: In NBA 2018 where no river condition changes were recorded the free-flowing/flagship rivers remained unchanged.

Ecoregion 1 (39 383,5 km²), Limpopo Plain, consists of plains and lowlands with a low to moderate relief. Vegetation consists mainly of Bushveld types and Mopane veld (Kleynhans, Thirion, & Moolman, 2005).

Ecoregion 5 (7 245.9 km²), Northern Plateau have the following vegetation types: Mixed Bushveld (main); Clay Thorn Bushveld (limited) and North Eastern Mountain Grassland (Limited). The topography is dominated by plains with low to moderate relief (Kleynhans, Thirion, & Moolman, 2005).

²⁰ <http://www.dwa.gov.za/iwqs/rhp/eco/peseismodel.aspx> 9 September 2020

No biomonitoring was conducted for this report; from the Freshwater Biodiversity Organisation website one sampling result date was available for the Matlala River (below Debengeni falls: A6N0KA-00001) and fish species were recorded²¹:

Taxon	Occurrences	Origin	Endemism	Cons. Status (Global)
<i>Amphilius natalensis</i> Boulenger, 1917	1	Native	Widespread	Least concern
<i>Amphilius uranoscopus</i> (Pfeffer, 1889)	1	Native	Subregional endemic	Least concern

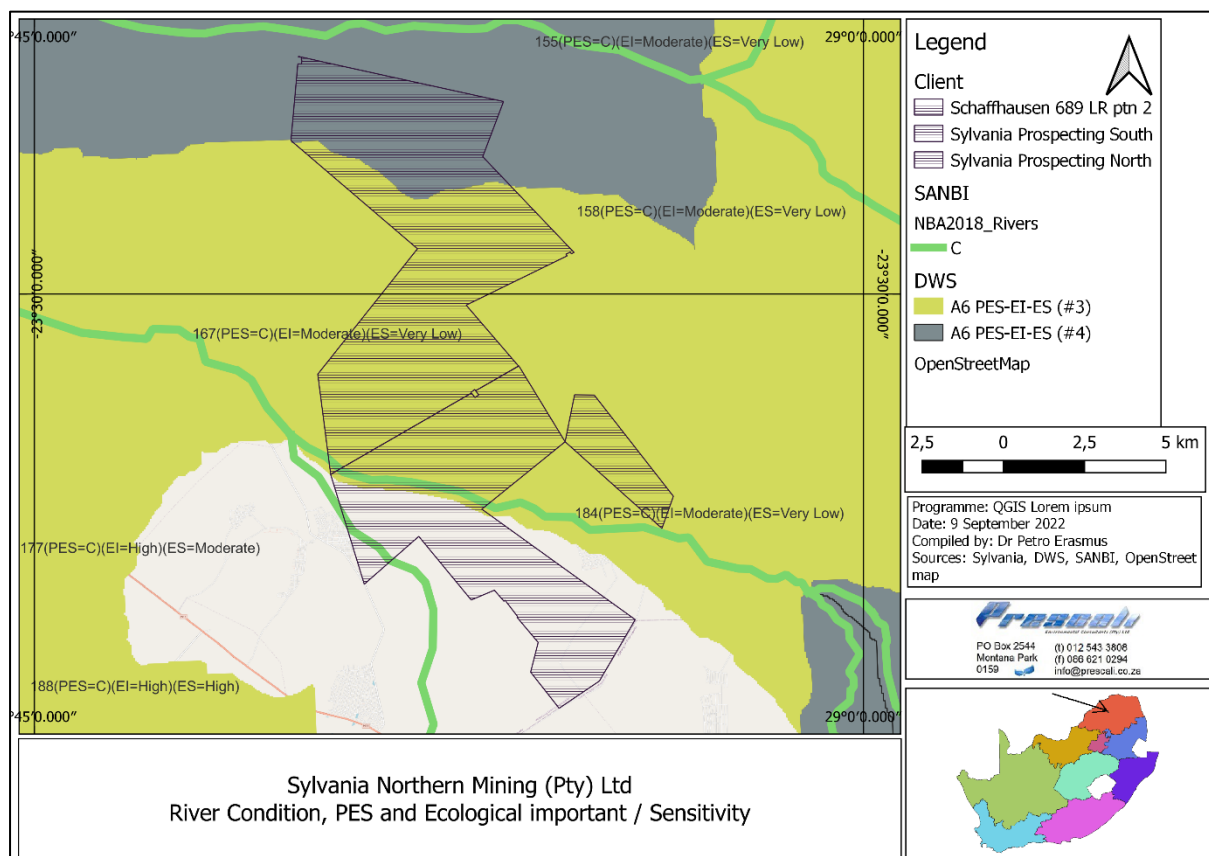


Figure 5-7: River condition, Present Ecological Status, Ecological Importance and Sensitivity

5.2.4 NFEPA and Fish Population Assessment

The quaternary catchments have a NFEPA code 0 classification: Not classified.

- It does not fall within a fish sanctuary area for threatened species;
- It does not fall within a fish relocation area for threatened species;
- It does not fall within a fish translocation area for threatened species;
- It does not fall within a fish rehabilitation area for threatened species; and
- It does not fall within a fish Corridor area for threatened species.

²¹[https://freshwaterbiodiversity.org/map/#site-detail/taxon=&search=MATLALA&siteId=30447&collector=&category=&yearFrom=&yearTo=&months=&boundary=&userBoundary=&referenceCategory=&spatialFilter=&reference=&endemic=&conservationStatus=\[\]&modules=1&validated=&sourceCollection=\[%22fbis%22,%22gbif%22,%22virtual_museum%22\]&abioticData=&ecologicalCategory=&rank=&siteIdOpen=30447&orderBy=name&polygon=&thermalModule=&dst=](https://freshwaterbiodiversity.org/map/#site-detail/taxon=&search=MATLALA&siteId=30447&collector=&category=&yearFrom=&yearTo=&months=&boundary=&userBoundary=&referenceCategory=&spatialFilter=&reference=&endemic=&conservationStatus=[]&modules=1&validated=&sourceCollection=[%22fbis%22,%22gbif%22,%22virtual_museum%22]&abioticData=&ecologicalCategory=&rank=&siteIdOpen=30447&orderBy=name&polygon=&thermalModule=&dst=) 9
 September 2022



5.2.5 Background Water Quality

The DHSWS has monitoring points in the Mogalakwena Rivers and the average concentrations are provided in Table 5-4:

- WMS A62_1000004250 (1-4250): Uitzicht Verstoeteling 670 LR Bridge on Mogalakwena River 0.6 km Before Confluence with Matlalane (2009-01-22 to 2009-02-25); and
- WMS A62_90366: Glen Alpine Dam on Mogalakwena River: near Dam Wa (ncwq NEMP) (1975-11-12 to 2018-05-14) downstream of the confluence with the Seepabana River.

The water quality at the Glen Alpine Dam is of good quality complying with the Water Quality Guidelines except for aluminium and for phosphorus (inorganic). The upstream site indicates very poor water quality but only two samples' results were available, it may be that the samples were taken from stagnant water which could affect the quality thereof.

Table 5-4: Average background surface water quality (DWAf, 1996) (DWAf, 1996) (DWAf, 1996) (DWAf, 1996)

Parameter		A62-90366 ²²	A62-100004250 ²³	Aquatic	Domestic	Agriculture	
						Livestock	Irrigation
Alkalinity	mg CaCO ₃ /l	87,185	1221	N/A	N/A	N/A	N/A
Aluminium	mg/l	0,07	0,05	≤ 0.005	≤ 0.015	≤ 5	< 5
Calcium	mg Ca/l	20,069	22	N/A	< 32	< 1000	N/A
Chlorine (free)	mg/l	48,79	ND	N/A	N/A	N/A	N/A
Electrical conductivity	mS/m	35,928	1059,5	15% from normal	< 70	156 (Dairy Pigs and Poultry), 313 Cattle & Horses, 469 (Sheep)	6,25
Fluoride	mg/l	0,328	1,1	< 0.75	< 1	< 2 All other livestock; < 6 ruminants	< 2
Magnesium	mg/l	9,674	90	N/A	< 30	< 500	N/A
pH	pH units	7,917	8,85	5% from normal	6 - 9	N/A	6.5 - 8.4
Phosphorus (inorganic)	mg/l	0,084	ND	0,005	N/A	N/A	N/A
Potassium	mg/l	3,578	53,5	N/A	< 50	N/A	N/A
Silica	mg/l	5,405		N/A	N/A	N/A	N/A
Sodium	mg/l	34,221	2140	N/A	< 100	< 2000	< 70
Sulphate	mg/l	8,299	510	N/A	< 200	< 1000	N/A

²² www.dwa.gov.za/iwqs/wms/data/A62/A62_90366.zip 9 September 2022

²³ www.dwa.gov.za/iwqs/wms/data/A62/A62_100004250.zip 9 September 2022

5.2.6 Surface Water Quantity

5.2.6.1 Mean Annual Runoff

The MAR is indicated in Table 5-2. Please refer to Section 5.3.2 for flow data recorded for the Mogalakwena River.

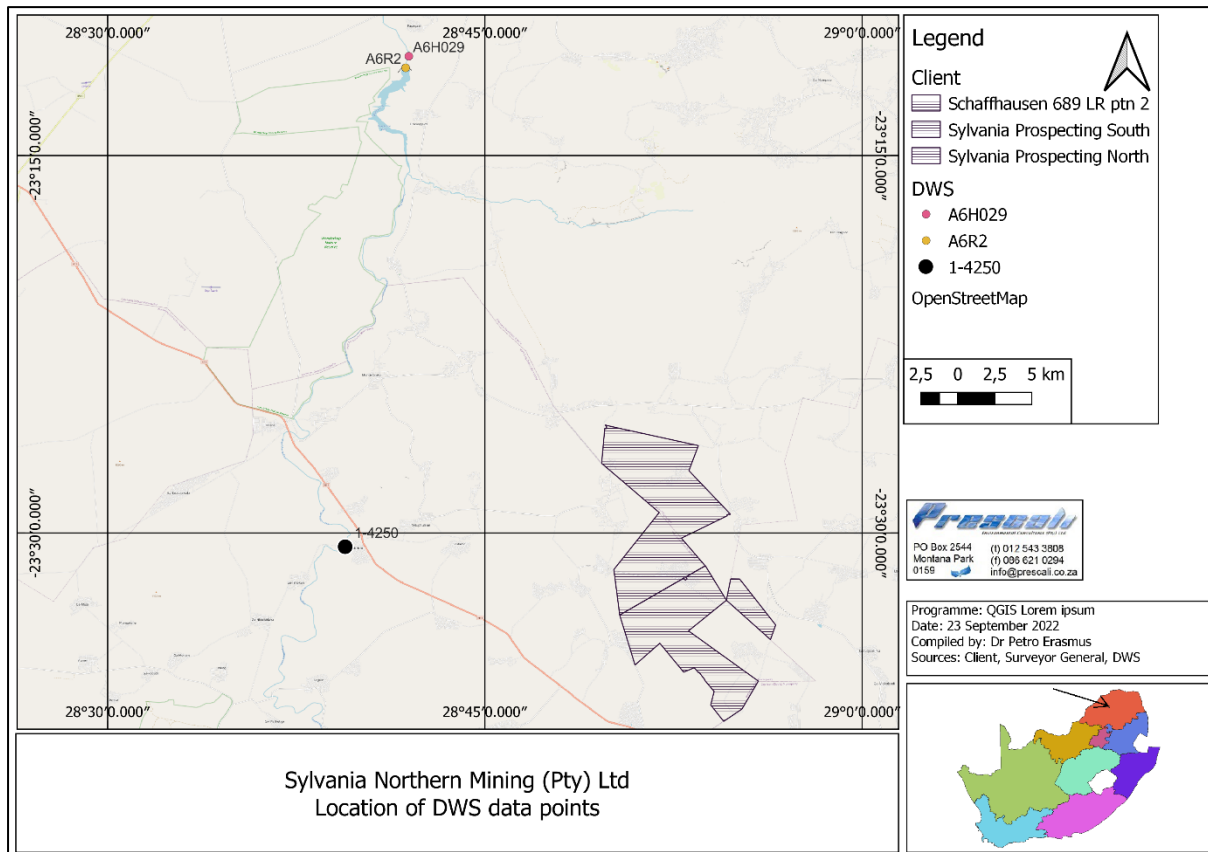


Figure 5-8: Location of DWS data sites in relation to the proposed Sylvania Northern prospecting right area

5.3 SITE SPECIFIC AQUATIC ECOSYSTEM DESCRIPTIONS

5.3.1 Aquatic ecosystem types

Aquatic ecosystems can be classified into two types namely²⁴:

- Lentic Ecosystems: and
- Lotic Ecosystems.

5.3.1.1 Lentic Ecosystems – Wetlands, Impoundments, Lakes

Lentic ecosystems refer to standing or basin ecosystems and include lakes, impoundments and wetlands²⁴.

- **Lakes:** Generally, lakes are formed in basins created by geological activities e.g., warping and faulting of the earth's crust or as a result of glacial activities²⁴. There are no lakes at the proposed Sylvania Northern prospecting right area.
- **Impoundments:** Impoundments, or dams are manmade infrastructures and can be onstem (i.e., the watercourse itself is dammed) or offstem (i.e., the dam is located a distance from the watercourse and water is pumped from the watercourse / underground reservoir to the dam)²⁴.

²⁴ <http://www.egyankosh.ac.in/bitstream/123456789/16255/1/Unit-8.pdf> 18 August 2020

There are no major dams in the Mogalakwena River catchment (DWS, 2004) and the Glen Alpine Dam that was constructed mainly for irrigation purposes are located on the Mogalakwena River.

- Wetlands: A wetland as defined by the NWA means “land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil”. As described by (DWAF, 2005) the word “wetland” refers to ecosystems of which the primary driving force is water. Its prolonged presence in wetlands is a fundamental determinant of soil characteristics and plant and animal species composition. Any part of the landscape where water accumulates for long enough and often enough to influence the plants, animals and soils occurring in that area, is thus a wetland. The objective of the delineation procedure is to identify the outer edge of the temporary zone. This outer edge marks the boundary between the wetland and adjacent terrestrial areas.

Wetlands must have one or more of the following indicators:

- Wetland (hydromorphic) soils that display characteristics resulting from prolonged saturation;
- The presence, at least occasionally, of water loving plants (hydrophytes);
- A high-water table that results in saturation at or near the surface, leading to anaerobic conditions developing in the top 50 cm of the soil; and
- Terrain Unit indicator to identify the locality of the wetland within the landscape.

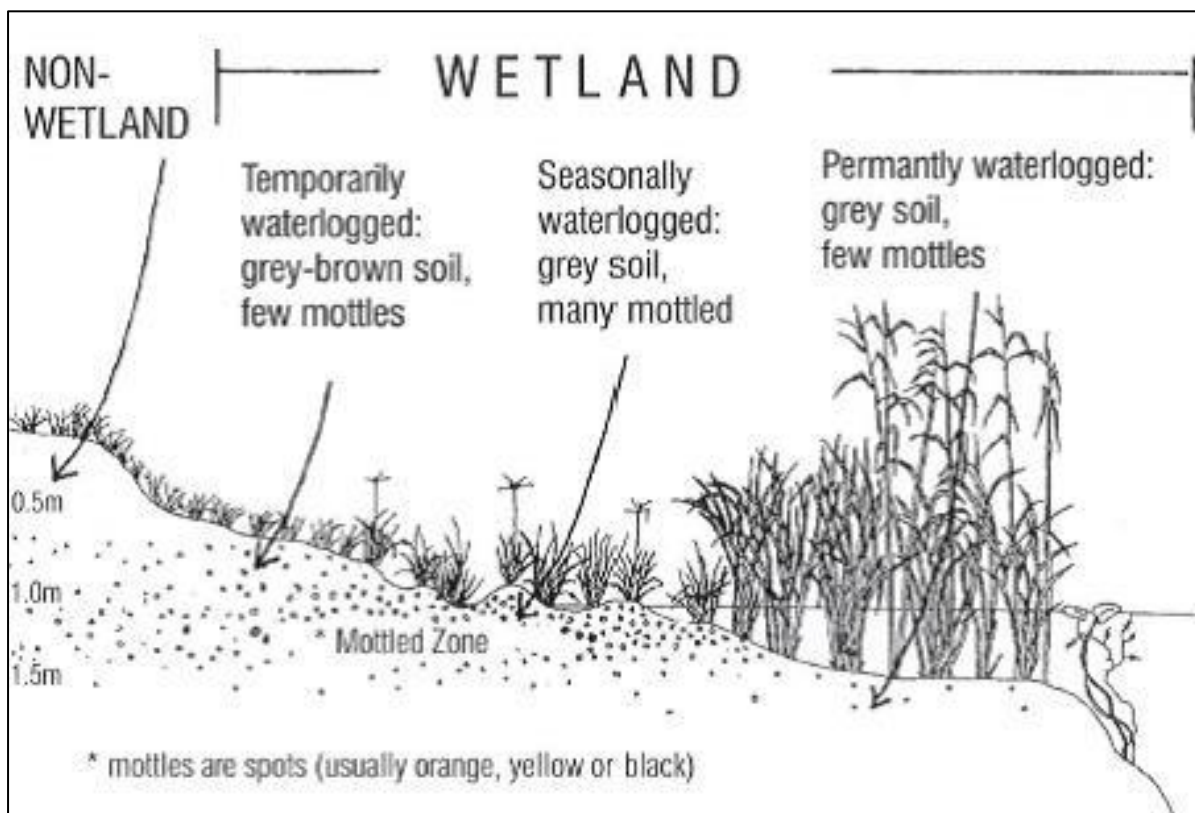


Figure 5-9: Cross section through a wetland (DWAF, 2005)

From the 2018 National Wetland Map 5: Ecosystem threat status and protection level data map (CSIR, 2018) several natural wetlands were identified at the proposed Sylvania Northern prospecting right area (not visually confirmed using Google Earth™), refer to Figure 5-6.



5.3.1.2 Lotic ecosystems – Rivers, streams etc.

Lotic systems include rivers and the most outstanding feature of such habitats are flowing water which moulds the characteristics of the water bed and influences the distribution of the organisms therein²⁴.

A water course is defined by the NWA as:

- River or spring;
- A natural channel in which water flows regularly, or intermittently;
- A wetland, lake or dam into which, or from which water flows (refer to Section 5.3.1.1); and
- Any collection of water that the Minister may, by notice in the Gazette, declare to be a water course, and a reference to a watercourse includes where relevant, its bed and banks.

For the purpose of this assessment, the applicable river / watercourse reaches were classified according to the guidelines by DWS in "*A practical field procedure for identification and delineation of wetlands and riparian areas*" as shown in Figure 5-10. Using this classification, three sections along the length of a watercourse are defined based on their position relative to the zone of saturation in the riparian area:

- Section "A" is defined as being above the zone of saturation and it therefore does not carry baseflow. They are mostly too steep to be associated with alluvial deposits and are not flooded with sufficient frequency to support riparian habitat or wetlands. This type does however carry storm runoff during fairly extreme rainfall events, but the flow is of short duration, in the absence of baseflow. The "A" watercourse sections are the least sensitive watercourses in terms of impacts on water yield from the catchment.
- Section B reaches are in the zone of the fluctuating water table, baseflow is intermittent and dependant on the current height of the water table and as the channel bed is in contact with or in close proximity to the water table residual pools are often observed when flow ceases. The top end of the B Section is marked by the most headward extent of base flow in the channel during wet periods, when the water table is high, and the bottom end of the B Section is marked by the most downstream extent of zero flow during dry periods (when the water table is low). With regards to slope, the channel bed is flat enough to allow for the deposition of material and initial signs of flood plain development may be observed.
- Section C streams are perennial streams and thus always have contact with the zone of saturation (except during extreme drought conditions). These sections are very flat and a flood plain is usually present.

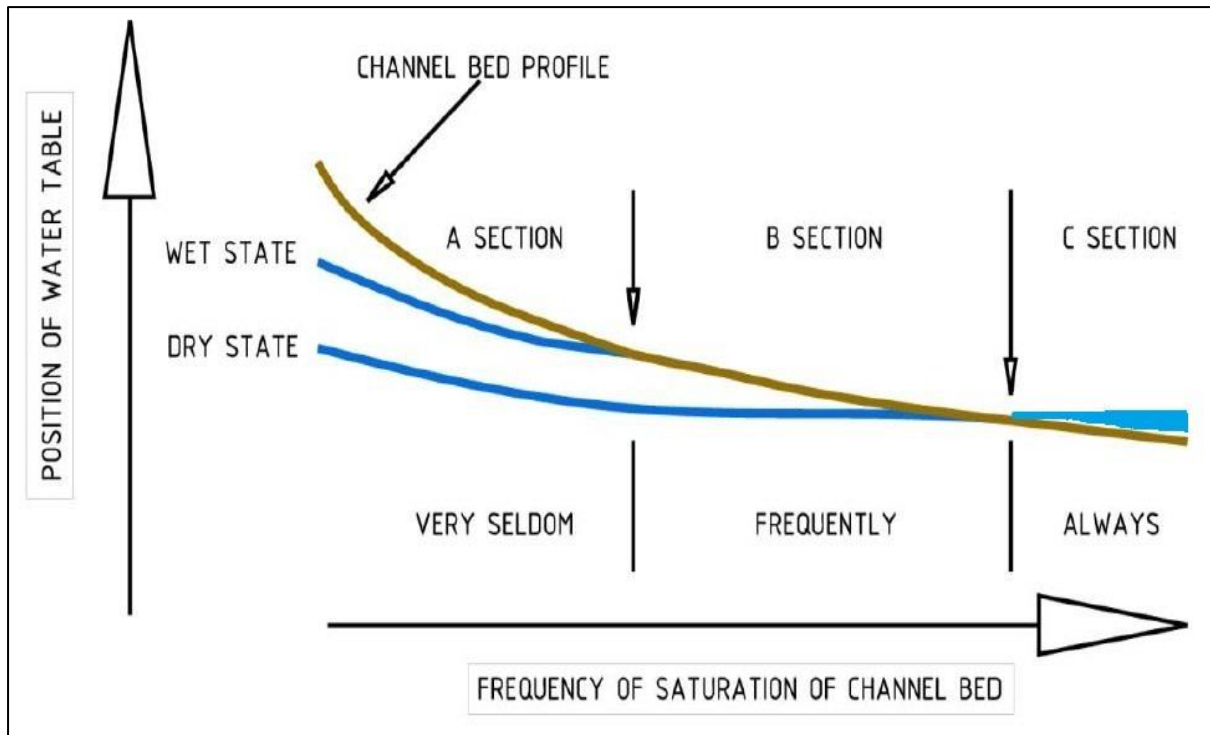


Figure 5-10: River classification (DWAF, 2005)

The Matlala River crosses the proposed Sylvania Northern prospecting right application area (Figure 5-6) and are preliminary classified as Section B watercourse, while the Seepabana directly to the north is classified as Section C due its classification as Perennial.

5.3.2 Normal Dry Weather Flow

No flow data is available for the Matlala and Seepabana Rivers. Monthly flow data in the Mogalakwene River was provided by DWS²⁵ for site A6H029 Glen Alpine Dam from 1 May 1975 till 28 February 2022 and is indicated in Figure 5-11 per month and in Figure 5-12 (Annual).

²⁵ Email correspondence dated 9 September 2022 from Nhlapo Elias

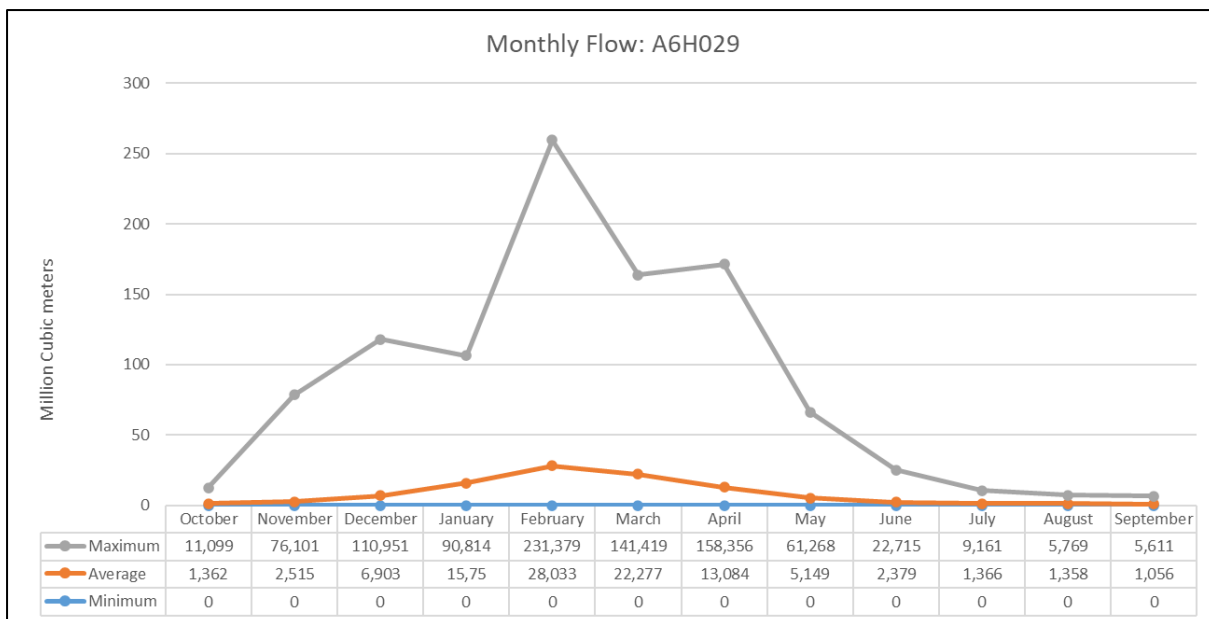


Figure 5-11: Mogalakwena River Monthly flow volume (million cubic meters)

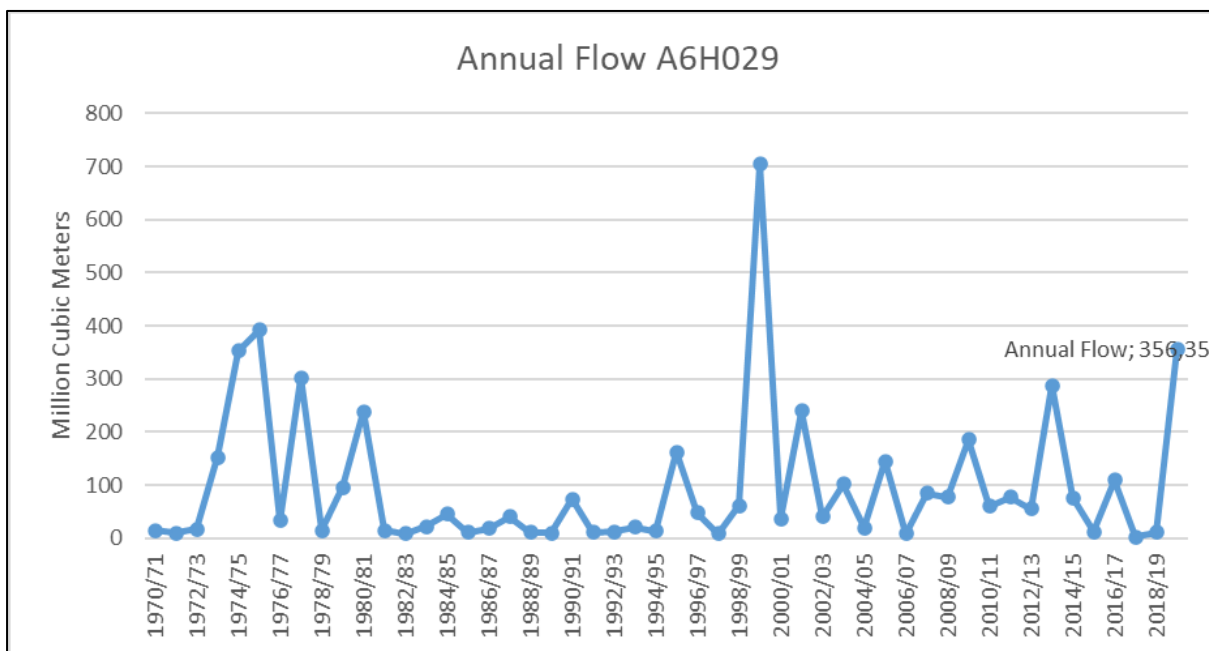


Figure 5-12: Total Annual flow in the Mogalakwena River (million cubic meters)

5.3.3 Drainage Density

The drainage density for the assessment area (106,2379 km²) was calculated as 0,919 km/km². The total length of the drainage lines across the study area is 97,66 km.

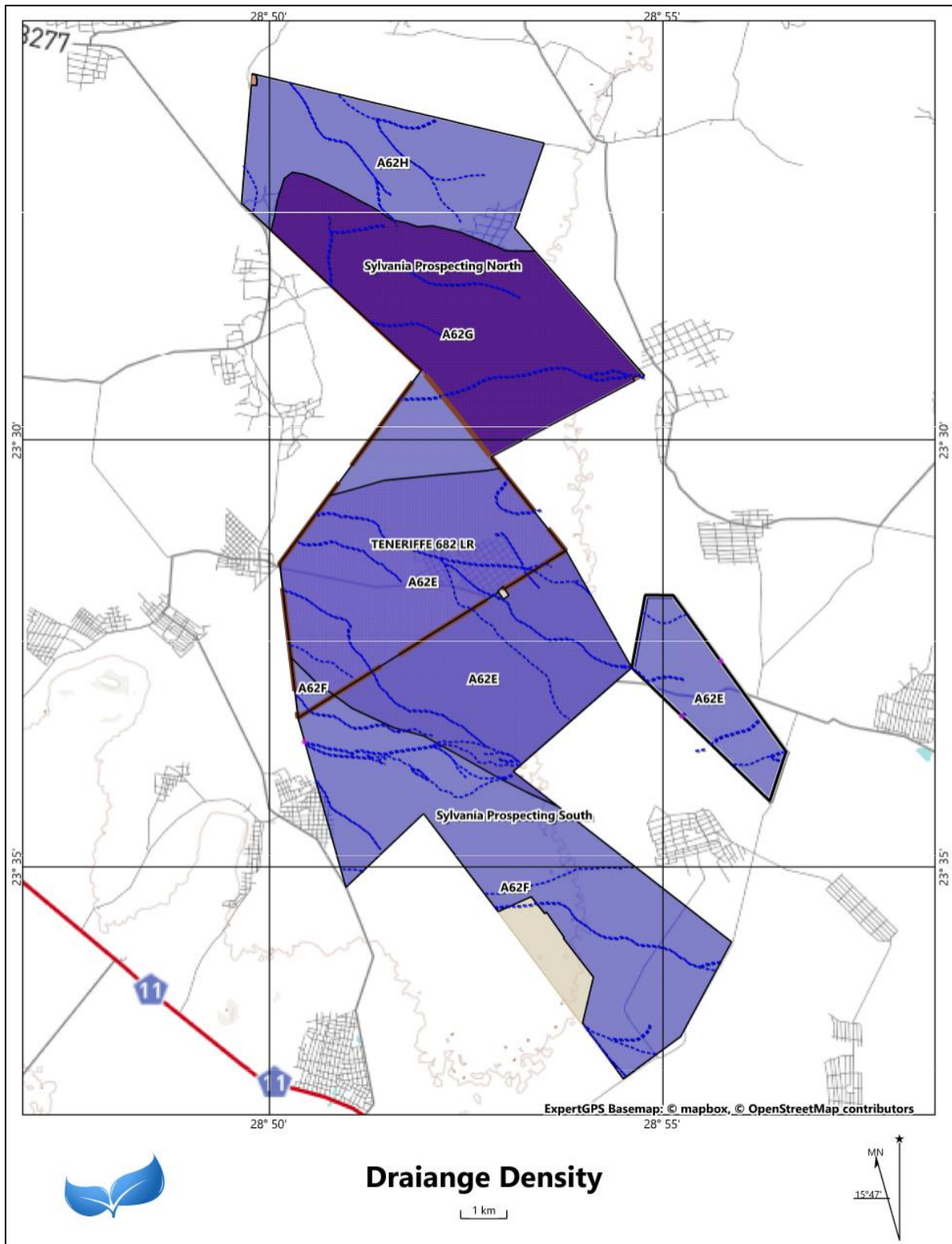


Figure 5-13: Location of surface drainage lines and surface water areas used to calculate the drainage density of the Prospecting Right application area

5.3.4 Flood Lines

Flood lines were sourced from assessment done for other prospecting right applications in the area, these include the Seepabana (**Element Consulting Engineers, 2014**) and Matlala Rivers (**Element Consulting Engineers, 2014**) and are indicated below.

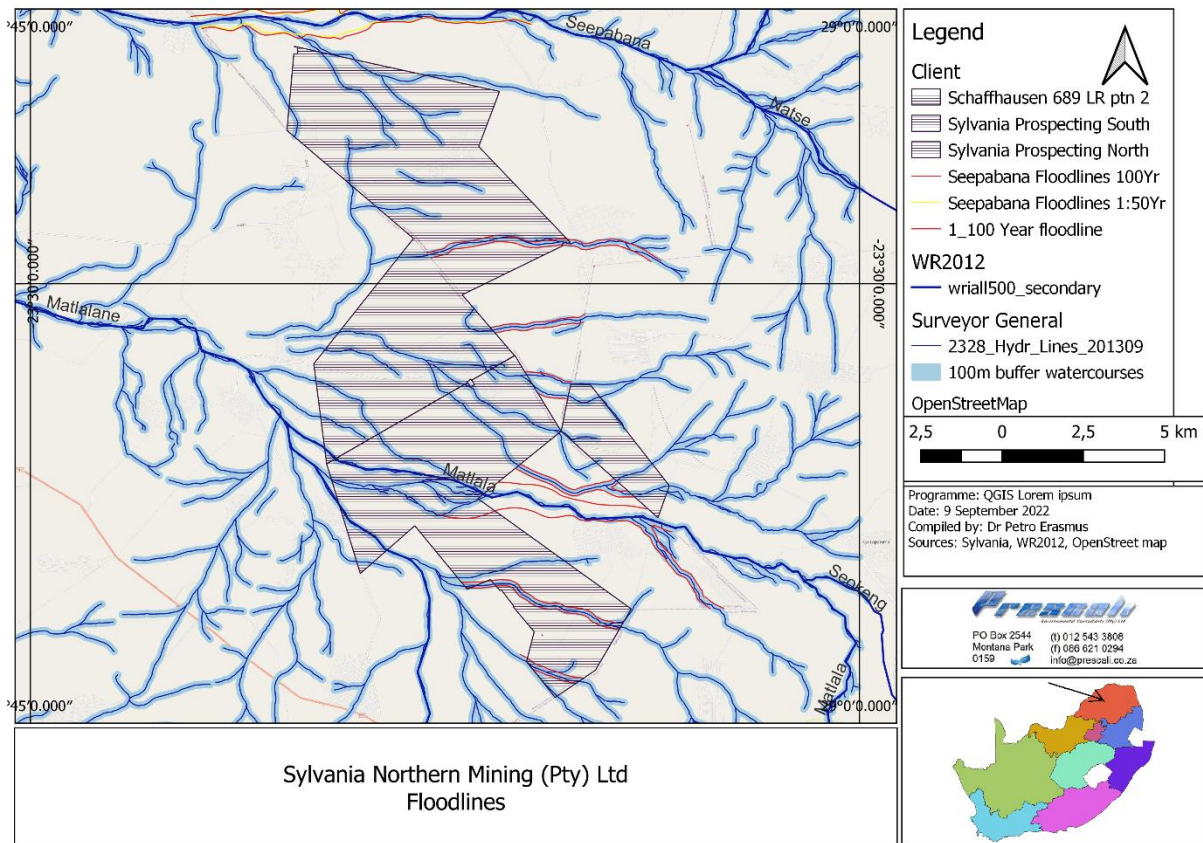


Figure 5-14: Flood lines

From the floodline report conducted for the Matlala River it is noted that in general the catchments of the tributaries are so small that the 100 m buffer is sufficient to encompass the 1 in 100-year flood line.

5.4 SENSITIVE AREAS AND SENSITIVITY OF SITES TO BE DEVELOPED

Environmentally sensitive (Forster, N., DeMeo, T., & Ditto, N.D., 1995) (Envirometrics and MetroGIS, 2009) areas defined as landscape elements or places which are vital to the long-term maintenance of biological diversity, soil, water or other natural resources both on the site and in a regional context, includes:

- Wildlife habitat areas inclusive of:
 - Focus areas for contributing to biodiversity thresholds that are likely to become future protected areas;
 - Private nature reserves, conservancies, core areas of biosphere reserves and other protected areas that are part of a stewardship programme or provincial protected area expansion strategy;
 - National and Provincial Parks and Reserves as defined in the National Environmental Management: Protected Areas Act, 2003 (Act NO. 57 of 2003), as amended;
 - National Parks view-shed protection areas that contain sensitive view areas around National Parks as identified by SANParks;
 - Priority areas in the vicinity of National Parks that have been identified for the long-term survival of biodiversity around the National Parks or upon which the long-term survival of the parks depend to a significant extent; and
 - Critically endangered and endangered ecosystems as identified by the South African National Biodiversity Institute;
- Steep slopes consisting of:
 - All areas with a slope of 8 degrees or steeper; and

- Important topographical features topographical features that were delineated using the 20 m contour interval terrain model of South Africa and based on the inherent scenic value of these features;
- Rivers, wetlands and other water bodies consisting of rivers with a potential zone of influence buffer of 32 metres on each side from the banks of the rivers, wetlands with a potential zone of influence of 10 metres from the edge of the wetlands and dams with a potential zone of influence of 10 metres from their high-water lines, please refer to the sections below; and
- Prime agricultural lands.

Also included in the sensitive features are the regulated areas as per the NWA:

- 1 in 100-year flood – Sensitivity ranking: Very High;
- 100 m buffer for watercourses (Sensitivity ranking High) and 500 m buffer for wetlands (Sensitivity ranking High); and
- Riparian area (Sensitivity ranking Very High).

The interconnectivity of these sensitive areas creates greenway corridors that consists of networks of linked landscape elements that provide ecological, recreational, and cultural benefits to a community. (Forster, N., DeMeo, T., & Ditto, N.D., 1995).

Information from the Screening tool relating to the aquatic environment was the same as for the 2018 wetland information reported in this report.

Based on the above assessment, the Very High and High sensitivity areas are thus as indicated in Figure 5-15.

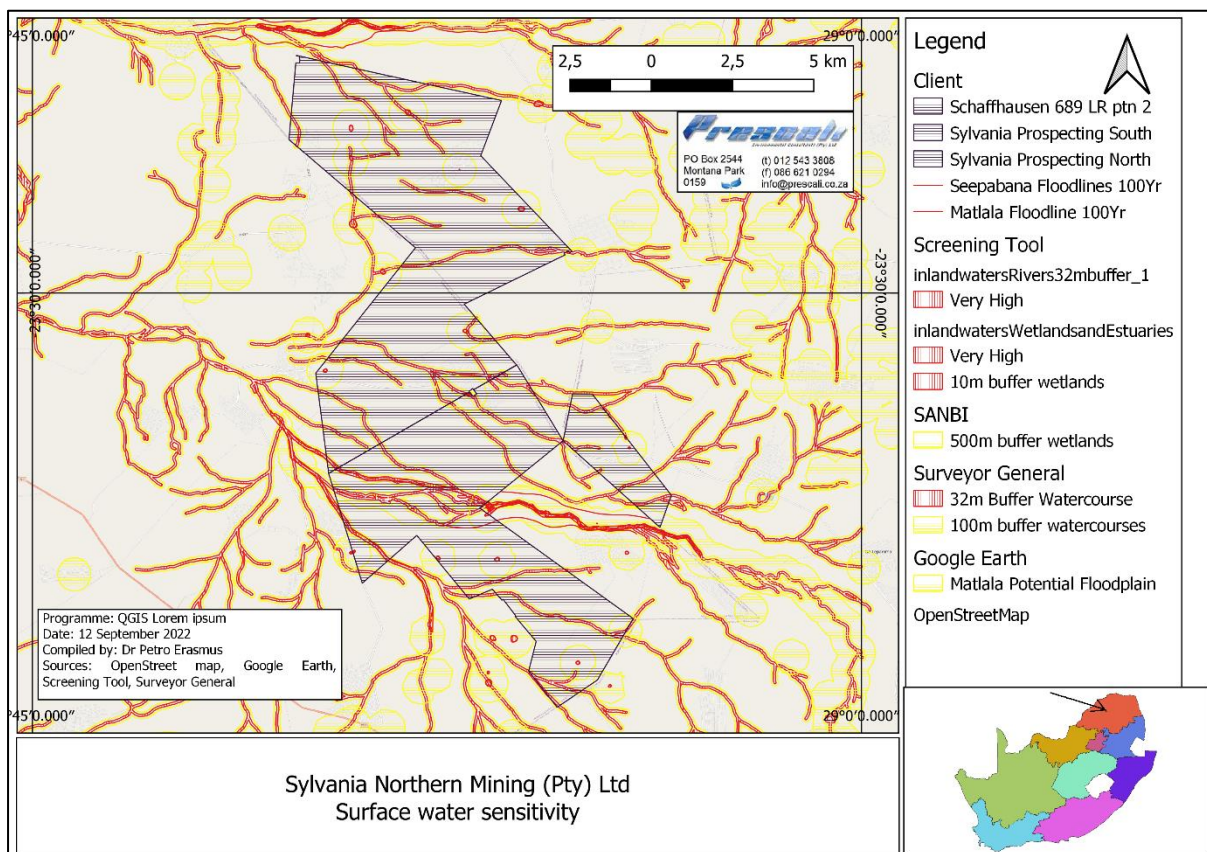


Figure 5-15: Sensitive features in the Prospecting Right application area

5.5 SURFACE WATER USES

The following potential surface water uses could take place: Ecological Reserve, agricultural activities (informal irrigation, livestock watering).

5.6 WATER AUTHORITY

The Department of Water and Sanitation (DWS) act as the Regional Water Authority through their office that is located in Polokwane.

5.7 WATER USE AUTHORISATION

No detail information is available however it is anticipated that a water use licence will be required provided that the prospecting activities are not located within the NWA regulated areas.

6 IMPACT ASSESSMENT METHODOLOGY

The main purpose of this assessment is to understand the significance of potential impacts and to develop strategies to ensure that impacts can be minimised or mitigated to an acceptable level. The identification of potential issues is broad and covers the construction, operational and decommissioning / closure phases of the proposed project.

The methodology used in the impact assessment is described in Section 4.4.

6.1 AREAS OF INFLUENCE

In order to assess the impact of the proposed activities and associated infrastructure on surface water resources as outlined in Section 2.2, various areas of potential impacts have been assessed. The first area is referred to as the “area of direct influence” (ADI) which is the area directly impacted upon by the proposed activities and associated infrastructure, i.e. the watercourses traversing the application area. The second area is referred to as the “area of indirect influence” (AII) which includes the broader catchment perspective, i.e. the Seepabana and Matlala Rivers and further downstream (Mogalakwena River).

6.1.1 Area of direct influence (ADI)

The ADI for water resources is determined by:

- Interception of watercourse and drainage areas due to the operational activities and associated infrastructure;
- Potential for pollution of surface water resources due to poor management of the activities and associated infrastructure e.g.
 - windblown waste,
 - incorrect design of pollution control infrastructure resulting in polluted water flowing to the unnamed tributary, and
 - incorrect liner design that will result in poor quality baseflow to the on-site watercourses.

In terms of the EIA methodology, the spatial extent of the ADI is referred to as “Local” and “Site Specific”.

6.1.2 Area of indirect influence (AII)

The AII is determined by the boundaries of the identified Sub-WMAs, with the main emphasis on the downstream surface water resources, i.e. Mogalakwena River. In terms of the EIA methodology, the spatial extent of the AII is referred to as “Regional”.



6.2 SIGNIFICANT ENVIRONMENTAL RATINGS

It is not the intention of this surface water environmental impact assessment to evaluate all potential environmental impacts associated with the project (e.g. fauna and flora, visual etc.). Environmental impacts are the change to the environment resulting from an environmental aspect or activity. The significant impacts are listed in Table 7-1.

6.3 RISK CLASSIFICATION

The risk associated with the processing activities was determined using the Golder guideline “Appendix A.3 - Identify Sector Activity Risk” of 2007. Based on this document the proposed prospecting activities is classified as Class C primary hazard class.

7 DESCRIPTION OF ENVIRONMENTAL ISSUES AND POTENTIAL IMPACTS INCLUDING CUMULATIVE IMPACTS

7.1 EXISTING IMPACTS AT THE PROPOSED DEVELOPMENT SITES

From Google Earth, a portion of the Prospecting Right application area has been impacted by agricultural activities in the form of fields (dry land) and villages.

7.2 POTENTIAL IMPACTS THAT COULD OCCUR

Potential activities and impacts that could occur as a result of the proposed activities and associated infrastructure development are indicated in Table 7-1.

Potential impacts that could occur was determined using the proposed activities as outlined in Section 2.2.

No impacts are foreseen for the non-invasive activities as these are all desktop based.

The invasive activities consist of the following:

Main Activity	Secondary activity
Ground geophysics and soil geochemical sampling	Vegetation removal Topsoil stockpiling General activities Replace topsoil
Trenching	Vegetation removal Topsoil stockpiling General activities Overburden stockpiling Containment of rainwater in trench Heavy machinery equipment on site Chemical toilets and sewage waste management General waste generation
Resource drilling	Heavy machinery equipment on site Drilling sludge General activities Vegetation removal Operation of drill pad sump Chemical toilets and sewage waste management Capping of Borehole Rip impacted area General waste generation

Access road	Vegetation removal Daily travelling to prospecting site Rip road area
Contractor camp	Vegetation removal Diesel storage Chemical toilets and sewage waste management Storage of material Storage of general and hazardous waste General activities Vehicle maintenance Removal of all infrastructures Rip impacted area Camp area (whole off)

Locations of prospecting activities and potential access roads (except contractor’s camp) are indicated in Figure 7-1.

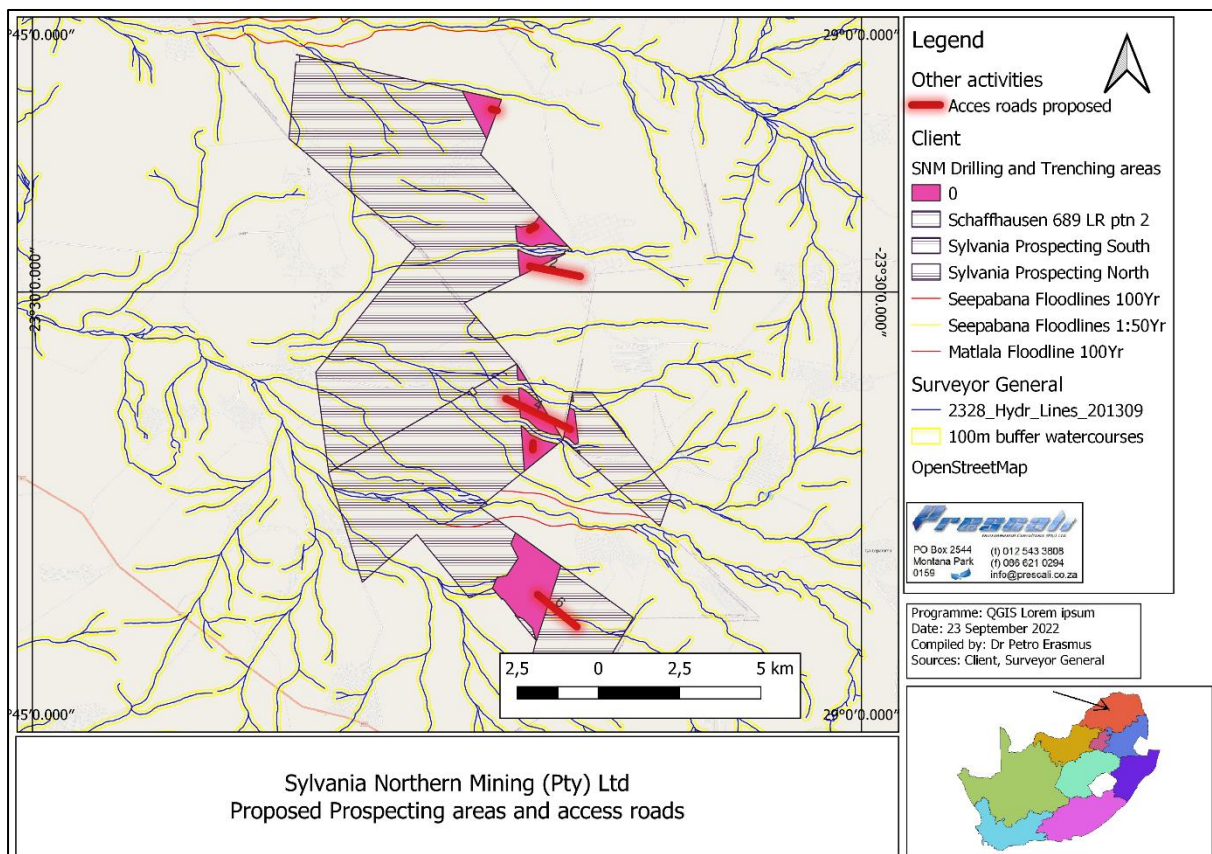


Figure 7-1: Assumed location of prospecting activities and access roads

From the impact assessment it can be seen that the proposed activities and infrastructures will have a low to medium impact before mitigation and a low impact following mitigation. The mitigation / management measures are outlined in Table 7-2 and the impact assessment following the implementation of the management measures are indicated in Table 7-3.

7.3 LEVELS OF ACCEPTABLE CHANGE

Due to the existing impacts that has already been noted in the present ecological status of the rivers, no change should occur in the PES.

Table 7-1: Impact assessment rating results without mitigation measures

(FR: Flow Regime; P&C: Physico²⁶- and Chemical; H: Habitat; B: Biota; S: Severity, SS: Spatial Scale; D: Duration; C: Consequence, FA: Frequency of Activity; FI: frequency of Impact; LI: Legal Issue; Dt: Detection; L: Likelihood, Si: Significance, RR: Risk rating, M: Moderate)

Main Activity	Secondary activity	Phase	Impact	Aspect	Severity				S	SS
					FR	P&C	H	B		
Ground geophysics and soil geochemical sampling	Vegetation removal	C	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which could impact on the biota, habitat, flow regime and the physico- and chemical quality of the water in the watercourse.	Surface water quality	1	1	1	1	1	1
	Topsoil stockpiling	C, O	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which could impact on the biota, habitat, flow regime and the physico- and chemical quality of the water in the watercourse.	Surface water quality	1	1	1	1	1	1
	Topsoil stockpiling/Vegetation removal & General activities	C, O	Dust generated from stockpile areas could impact on surface water quality, and biota should it reach watercourses and settle within this area.	Surface water quality	1	1	1	1	1	1
	Replace topsoil	R	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which could impact on the biota, habitat, flow regime and the physico- and chemical quality of the water in the watercourse.	Surface water quality	1	1	1	1	1	1
	Replace topsoil	R	Dust generated from stockpile areas could impact on surface water quality,	Surface water quality	1	1	1	1	1	1

²⁶ pH, temperature, turbidity, conductivity, total dissolved solids, total suspended solids, total alkalinity, biological oxygen demand, chemical oxygen demand, dissolved oxygen, total organic carbon, sulphate, nitrate, and phosphate



Main Activity	Secondary activity	Phase	Impact	Aspect	Severity				S	SS
					FR	P&C	H	B		
			and biota should it reach watercourses and settle within this area.							
Trenching	Vegetation removal	C	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which could impact on the biota, habitat, flow regime and the physico- and chemical quality of the water in the watercourse.	Surface water quality	1	3	3	2	2,25	1
	Topsoil stockpiling	C, O	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which could impact on the biota, habitat, flow regime and the physico- and chemical quality of the water in the watercourse.	Surface water quality	1	3	3	2	2,25	1
	Topsoil stockpiling/Vegetation removal & General activities	C, O	Dust generated from stockpile areas could impact on surface water quality, and biota should it reach watercourses and settle within this area.	Surface water quality	1	3	3	2	2,25	1
	Overburden stockpiling	C, O	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which could impact on the biota, habitat, flow regime and the physico- and chemical quality of the water in the watercourse.	Surface water quality	1	3	3	2	2,25	1
	Containment of rainwater in trench	O	Removal of run-off from the surface water resource could reduce surface flow in watercourses which in turn could impact on the habitat and biota within this area.	Surface water quantity	2	3	3	2	2,5	1
	Heavy machinery equipment on site	C, O	Soil contamination from hydrocarbon spills if not removed could impact on water quality should the hydrocarbons	Surface water quality	1	3	3	2	2,25	1



Main Activity	Secondary activity	Phase	Impact	Aspect	Severity				S	SS
					FR	P&C	H	B		
			enter the watercourses, this could impact on the biota and habitat as well.							
	Chemical toilets and sewage waste management	C, O	Contamination from spills from chemical toilets could impact on water quality should the spilled material enter any watercourse and this could impact on the biota.	Surface water quality	1	3	3	2	2,25	1
	General waste generation	C, O	General waste generation e.g. plastic bags, bottles etc. could impact on water quality and the habitat and biota in watercourses.	Surface water quality	1	3	3	2	2,25	1
Resource drilling: drill pad and sump	Heavy machinery equipment on site	C, O	Soil contamination from hydrocarbon spills if not removed could impact on water quality should the hydrocarbons enter the watercourses, this could impact on the biota and habitat as well.	Surface water quality	1	3	3	2	2,25	1
	Drilling sludge	O	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which could impact on the biota, habitat, flow regime and the physico-chemical quality of the water in the watercourse.	Surface water quality	1	3	3	2	2,25	1
	Vegetation removal & General activities	C, O	Dust generated could impact on surface water quality, and biota should it reach watercourses and settle within this area.	Surface water quality	1	3	3	2	2,25	1
	Vegetation removal	C	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which could impact on the biota, habitat, flow regime and the physico-chemical quality of the water in the watercourse.	Surface water quality	1	3	3	2	2,25	1



Main Activity	Secondary activity	Phase	Impact	Aspect	Severity				S	SS
					FR	P&C	H	B		
	Operation of drill pad sump	O	Removal of run-off from the surface water resource could reduce surface flow in watercourses which in turn could impact on the habitat and biota within this area.	Surface water quantity	2	3	3	2	2,5	1
	Chemical toilets and sewage waste management	C, O	Contamination from spills from chemical toilets could impact on water quality should the spilled material enter any watercourse and this could impact on the biota.	Surface water quality	1	3	3	2	2,25	1
	Capping of Borehole	R	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which could impact on the biota, habitat, flow regime and the physico-chemical quality of the water in the watercourse.	Surface water quality	1	3	3	2	2,25	1
	Rip impacted area	R	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which could impact on the biota, habitat, flow regime and the physico-chemical quality of the water in the watercourse.	Surface water quality	1	3	3	2	2,25	1
	Rip impacted area	R	Dust generated could impact on surface water quality, and biota should it reach watercourses and settle within this area.	Surface water quality	1	3	3	2	2,25	1
	General waste generation	C, O	General waste generation e.g. plastic bags, bottles etc. could impact on water quality and the habitat and biota in watercourses.	Surface water quality	1	3	3	2	2,25	1
Access road	Vegetation removal (all access roads combined)	C	Soil contamination from hydrocarbon spills if not removed could impact on water quality should the hydrocarbons	Surface water quality	1	2	2	2	1,75	1



Main Activity	Secondary activity	Phase	Impact	Aspect	Severity				S	SS
					FR	P&C	H	B		
			enter the watercourses, this could impact on the biota and habitat as well.							
	Daily travelling to prospecting site	C, O	Dust generated could impact on surface water quality, and biota should it reach watercourses and settle within this area.	Surface water quality	1	2	2	2	1,75	1
	Daily travelling to prospecting site	C, O	Soil contamination from hydrocarbon spills if not removed could impact on water quality should the hydrocarbons enter the watercourses, this could impact on the biota and habitat as well.	Surface water quality	1	2	2	2	1,75	1
	Rip road area	R	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which could impact on the biota, habitat, flow regime and the physico-chemical quality of the water in the watercourse.	Surface water quality	1	2	2	2	1,75	1
Contractor camp	Vegetation removal	C	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which could impact on the biota, habitat, flow regime and the physico-chemical quality of the water in the watercourse.	Surface water quality	1	2	2	2	1,75	1
	Diesel storage	O	Soil contamination from hydrocarbon spills if not removed could impact on water quality should the hydrocarbons enter the watercourses, this could impact on the biota and habitat as well.	Surface water quality	1	2	2	2	1,75	1
	Chemical toilets and sewage waste management	O	Contamination from spills from chemical toilets / emptying of septic tank (if applicable) could impact on water quality which in turn could impact on the biota and habitat as well.	Surface water quality	1	2	2	2	1,75	1



Main Activity	Secondary activity	Phase	Impact	Aspect	Severity				S	SS
					FR	P&C	H	B		
	Storage of material	O	Contaminated water from material storage area could detrimentally impact on watercourses quality, biota and habitat.	Surface water quality	1	2	2	2	1,75	1
	Storage of general and hazardous waste	O	Contaminated water from waste storage area could detrimentally impact on watercourses quality, biota and habitat.	Surface water quality	1	2	2	2	1,75	1
	Topsoil stockpiling/Vegetation removal & General activities	C, O	Dust generated could impact on surface water quality, and biota should it reach watercourses and settle within this area.	Surface water quality	1	2	2	2	1,75	1
	Vehicle maintenance	C, O	Hydrocarbon spills from vehicles and other equipment could negative impact water quality, habitat and biota.	Surface water quality	1	2	2	2	1,75	1
	Removal of all infrastructures	R	Potential for spills from e.g. hydrocarbon tanks, septic tank, chemical toilets could impact on the surface water resource quality, habitat and biota if not managed.	Surface water quality	1	2	2	2	1,75	1
	Rip impacted area	R	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which could impact on the biota, habitat, flow regime and the physico- and chemical quality of the water in the watercourse.	Surface water quality	1	2	2	2	1,75	1
	Camp area (whole off)	C, O	Removal of run-off from the surface water resource could reduce surface flow in watercourses which in turn could impact on the habitat and biota within this area.	Surface water quantity	2	2	2	2	2	1
Prospecting activities (all)	Cumulative impact: Big area (Areas 1, 2, 3 and 4)	C, O	The proposed prospecting activities could impact on surface water quality as a result of hydrocarbon spills and siltation from run-off.	Surface water quality	1	3	3	3	2,5	1



Main Activity	Secondary activity	Phase	Impact	Aspect	Severity				S	SS
					FR	P&C	H	B		
	Cumulative impact: Big area (Areas 1, 2, 3 and 4)	O	The proposed prospecting activities could impact on surface water quantity; however, it is expected that the boreholes and trenching will be done consecutively thus the impact severity should not increase from that of the individual activities.	Surface water quantity	2	2	2	2	2	1
	Cumulative impact: Big area (Areas 1, 2, 3 and 4)	R	During the rehabilitation phase water quality could be impacted as a result of hydrocarbon spills and from siltation from ripped areas that are not vegetated.	Surface water quality	1	3	3	3	2,5	1
Prospecting activities (all)	Cumulative impact: Schaffhausen	C, O	The proposed prospecting activities could impact on surface water quality as a result of hydrocarbon spills and siltation from run-off.	Surface water quality	1	3	3	3	2,5	2
	Cumulative impact: Schaffhausen	O	The proposed prospecting activities could impact on surface water quantity; however, it is expected that the boreholes and trenching will be done consecutively thus the impact severity should not increase from that of the individual activities.	Surface water quantity	2	3	3	3	2,75	2
	Cumulative impact: Schaffhausen	R	During the rehabilitation phase water quality could be impacted as a result of hydrocarbon spills and from siltation from ripped areas that are not vegetated.	Surface water quality	1	3	3	3	2,5	2

D: Duration; C: Consequence, FA: Frequency of Activity; FI: frequency of Impact; LI: Legal Issue; Dt: Detection; L: Likelihood, Si: Significance, RR: Risk rating, M: Moderate



Main Activity	Secondary activity	Phase	Impact	Aspect	D	C	FA	FI	LI	Dt	L	Si	RR
Ground geophysics and soil geochemical sampling	Vegetation removal	C	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which could impact on the biota, habitat, flow regime and the physico- and chemical quality of the water in the watercourse.	Surface water quality	1	3	1	2	1	4	8	24	Low
	Topsoil stockpiling	C, O	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which could impact on the biota, habitat, flow regime and the physico- and chemical quality of the water in the watercourse.	Surface water quality	1	3	1	2	1	4	8	24	Low
	Topsoil stockpiling/Vegetation removal & General activities	C, O	Dust generated from stockpile areas could impact on surface water quality, and biota should it reach watercourses and settle within this area.	Surface water quality	1	3	1	2	1	4	8	24	Low
	Replace topsoil	R	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which could impact on the biota, habitat, flow regime and the physico- and chemical quality of the water in the watercourse.	Surface water quality	1	3	1	2	1	4	8	24	Low
	Replace topsoil	R	Dust generated from stockpile areas could impact on surface water quality, and biota should it reach watercourses and settle within this area.	Surface water quality	1	3	1	2	1	4	8	24	Low
Trenching	Vegetation removal	C	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which could impact on the biota, habitat, flow regime and the physico- and chemical quality of the water in the watercourse.	Surface water quality	2	5,25	1	2	1	4	8	42	Low
	Topsoil stockpiling	C, O	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which could impact	Surface water quality	2	5,25	1	2	1	4	8	42	Low



Main Activity	Secondary activity	Phase	Impact	Aspect	D	C	FA	FI	LI	Dt	L	Si	RR
			on the biota, habitat, flow regime and the physico- and chemical quality of the water in the watercourse.										
	Topsoil stockpiling/Vegetation removal & General activities	C, O	Dust generated from stockpile areas could impact on surface water quality, and biota should it reach watercourses and settle within this area.	Surface water quality	2	5,25	1	2	1	4	8	42	Low
	Overburden stockpiling	C, O	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which could impact on the biota, habitat, flow regime and the physico- and chemical quality of the water in the watercourse.	Surface water quality	2	5,25	1	2	1	4	8	42	Low
	Containment of rainwater in trench	O	Removal of run-off from the surface water resource could reduce surface flow in watercourses which in turn could impact on the habitat and biota within this area.	Surface water quantity	2	5,5	1	2	1	4	8	44	Low
	Heavy machinery equipment on site	C, O	Soil contamination from hydrocarbon spills if not removed could impact on water quality should the hydrocarbons enter the watercourses, this could impact on the biota and habitat as well.	Surface water quality	2	5,25	1	2	1	4	8	42	Low
	Chemical toilets and sewage waste management	C, O	Contamination from spills from chemical toilets could impact on water quality should the spilled material enter any watercourse and this could impact on the biota.	Surface water quality	2	5,25	1	2	1	4	8	42	Low
	General waste generation	C, O	General waste generation e.g. plastic bags, bottles etc. could impact on water quality and the habitat and biota in watercourses.	Surface water quality	2	5,25	1	2	1	4	8	42	Low
Resource drilling: drill pad and sump	Heavy machinery equipment on site	C, O	Soil contamination from hydrocarbon spills if not removed could impact on water quality should the hydrocarbons enter the watercourses, this could impact on the biota and habitat as well.	Surface water quality	2	5,25	1	2	1	4	8	42	Low



Main Activity	Secondary activity	Phase	Impact	Aspect	D	C	FA	FI	LI	Dt	L	Si	RR
	Drilling sludge	O	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which could impact on the biota, habitat, flow regime and the physico- and chemical quality of the water in the watercourse.	Surface water quality	2	5,2 5	1	2	1	4	8	42	Low
	Vegetation removal & General activities	C, O	Dust generated could impact on surface water quality, and biota should it reach watercourses and settle within this area.	Surface water quality	2	5,2 5	1	2	1	4	8	42	Low
	Vegetation removal	C	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which could impact on the biota, habitat, flow regime and the physico- and chemical quality of the water in the watercourse.	Surface water quality	2	5,2 5	1	2	1	4	8	42	Low
	Operation of drill pad sump	O	Removal of run-off from the surface water resource could reduce surface flow in watercourses which in turn could impact on the habitat and biota within this area.	Surface water quantity	2	5,5	1	2	1	4	8	44	Low
	Chemical toilets and sewage waste management	C, O	Contamination from spills from chemical toilets could impact on water quality should the spilled material enter any watercourse and this could impact on the biota.	Surface water quality	2	5,2 5	1	2	1	4	8	42	Low
	Capping of Borehole	R	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which could impact on the biota, habitat, flow regime and the physico- and chemical quality of the water in the watercourse.	Surface water quality	2	5,2 5	1	2	1	4	8	42	Low
	Rip impacted area	R	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which could impact on the biota, habitat, flow regime and the physico- and chemical quality of the water in the watercourse.	Surface water quality	2	5,2 5	1	2	1	4	8	42	Low



Main Activity	Secondary activity	Phase	Impact	Aspect	D	C	FA	FI	LI	Dt	L	Si	RR
	Rip impacted area	R	Dust generated could impact on surface water quality, and biota should it reach watercourses and settle within this area.	Surface water quality	2	5,2 5	1	2	1	4	8	42	Low
	General waste generation	C, O	General waste generation e.g. plastic bags, bottles etc. could impact on water quality and the habitat and biota in watercourses.	Surface water quality	2	5,2 5	1	2	1	4	8	42	Low
Access road	Vegetation removal (all access roads combined)	C	Soil contamination from hydrocarbon spills if not removed could impact on water quality should the hydrocarbons enter the watercourses, this could impact on the biota and habitat as well.	Surface water quality	3	5,7 5	1	2	1	4	8	46	Low
	Daily travelling to prospecting site	C, O	Dust generated could impact on surface water quality, and biota should it reach watercourses and settle within this area.	Surface water quality	3	5,7 5	1	2	1	4	8	46	Low
	Daily travelling to prospecting site	C, O	Soil contamination from hydrocarbon spills if not removed could impact on water quality should the hydrocarbons enter the watercourses, this could impact on the biota and habitat as well.	Surface water quality	3	5,7 5	1	2	1	4	8	46	Low
	Rip road area	R	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which could impact on the biota, habitat, flow regime and the physico- and chemical quality of the water in the watercourse.	Surface water quality	3	5,7 5	1	2	1	4	8	46	Low
Contractor camp	Vegetation removal	C	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which could impact on the biota, habitat, flow regime and the physico- and chemical quality of the water in the watercourse.	Surface water quality	3	5,7 5	5	2	1	4	1 2	69	Medium
	Diesel storage	O	Soil contamination from hydrocarbon spills if not removed could impact on water quality should the hydrocarbons enter the watercourses,	Surface water quality	3	5,7 5	5	2	1	4	1 2	69	Medium



Main Activity	Secondary activity	Phase	Impact	Aspect	D	C	FA	FI	LI	Dt	L	Si	RR
			this could impact on the biota and habitat as well.										
	Chemical toilets and sewage waste management	O	Contamination from spills from chemical toilets / emptying of septic tank (if applicable) could impact on water quality which in turn could impact on the biota and habitat as well.	Surface water quality	3	5,7 5	5	2	1	4	1 2	69	Medium
	Storage of material	O	Contaminated water from material storage area could detrimentally impact on watercourses quality, biota and habitat.	Surface water quality	3	5,7 5	5	2	1	4	1 2	69	Medium
	Storage of general and hazardous waste	O	Contaminated water from waste storage area could detrimentally impact on watercourses quality, biota and habitat.	Surface water quality	3	5,7 5	5	2	1	4	1 2	69	Medium
	Topsoil stockpiling/Vegetation removal & General activities	C, O	Dust generated could impact on surface water quality, and biota should it reach watercourses and settle within this area.	Surface water quality	3	5,7 5	5	2	1	4	1 2	69	Medium
	Vehicle maintenance	C, O	Hydrocarbon spills from vehicles and other equipment could negative impact water quality, habitat and biota.	Surface water quality	3	5,7 5	5	2	1	4	1 2	69	Medium
	Removal of all infrastructures	R	Potential for spills from e.g. hydrocarbon tanks, septic tank, chemical toilets could impact on the surface water resource quality, habitat and biota if not managed.	Surface water quality	3	5,7 5	5	2	1	4	1 2	69	Medium
	Rip impacted area	R	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which could impact on the biota, habitat, flow regime and the physico- and chemical quality of the water in the watercourse.	Surface water quality	3	5,7 5	5	2	1	4	1 2	69	Medium
	Camp area (whole off)	C, O	Removal of run-off from the surface water resource could reduce surface flow in watercourses which in turn could impact on the habitat and biota within this area.	Surface water quantity	3	6	5	2	1	4	1 2	72	Medium



Main Activity	Secondary activity	Phase	Impact	Aspect	D	C	FA	FI	LI	Dt	L	Si	RR
Prospecting activities (all)	Cumulative impact: Big area (Areas 1, 2, 3 and 4)	C, O	The proposed prospecting activities could impact on surface water quality as a result of hydrocarbon spills and siltation from run-off.	Surface water quality	3	6,5	5	4	1	4	1 4	91	Medium
	Cumulative impact: Big area (Areas 1, 2, 3 and 4)	O	The proposed prospecting activities could impact on surface water quantity; however, it is expected that the boreholes and trenching will be done consecutively thus the impact severity should not increase from that of the individual activities.	Surface water quantity	3	6	5	3	1	4	1 3	78	Medium
	Cumulative impact: Big area (Areas 1, 2, 3 and 4)	R	During the rehabilitation phase water quality could be impacted as a result of hydrocarbon spills and from siltation from ripped areas that are not vegetated.	Surface water quality	3	6,5	5	4	1	4	1 4	91	Medium
Prospecting activities (all)	Cumulative impact: Schaffhausen	C, O	The proposed prospecting activities could impact on surface water quality as a result of hydrocarbon spills and siltation from run-off.	Surface water quality	3	7,5	5	4	1	4	1 4	105	Medium
	Cumulative impact: Schaffhausen	O	The proposed prospecting activities could impact on surface water quantity; however, it is expected that the boreholes and trenching will be done consecutively thus the impact severity should not increase from that of the individual activities.	Surface water quantity	3	7,7 5	5	3	1	4	1 3	101	Medium
	Cumulative impact: Schaffhausen	R	During the rehabilitation phase water quality could be impacted as a result of hydrocarbon spills and from siltation from ripped areas that are not vegetated.	Surface water quality	3	7,5	5	4	1	4	1 4	105	Medium

Table 7-2: Proposed Management Measures (PRH – Prospecting right holder; ECO- Environmental control officer)

Main Activity	Secondary activity	Phase	Control Measures	Frequency	Responsibility
Ground geophysics and	Vegetation removal	C	Clear vegetation only if needed and if no alternative site is available close by.	As needed	Contractor / ECO / PRH
	Topsoil stockpiling	C, O	Conduct sampling in dry season as far as possible.	As needed	Contractor / ECO / PRH



Main Activity	Secondary activity	Phase	Control Measures	Frequency	Responsibility
soil geochemical sampling	Topsoil stockpiling/Vegetation removal & General activities	C, O	Place a tarp over topsoil stockpile during windy conditions.	As needed	Contractor / ECO / PRH
	Replace topsoil	R	If possible wet topsoil once off to assist with vegetations establishment and to reduce dust generation.	As needed	Contractor / ECO / PRH
	Replace topsoil	R	If possible wet topsoil once off to assist with vegetations establishment and to reduce dust generation.	As needed	Contractor / ECO / PRH
Trenching	Vegetation removal	C	Conduct sampling in dry season as far as possible.	As needed	Contractor / ECO / PRH
	Topsoil stockpiling	C, O	Conduct sampling in dry season as far as possible.	As needed	Contractor / ECO / PRH
	Topsoil stockpiling/Vegetation removal & General activities	C, O	If stockpiles will be in use for more than 1 month, see if vegetation can be established. Implement dust suppression during high wind times.	As needed	Contractor / ECO / PRH
	Overburden stockpiling	C, O	Conduct sampling in dry season as far as possible.	As needed	Contractor / ECO / PRH
	Containment of rainwater in trench	O	Place overburden stockpiles on the upstream side of the trench to prevent storm water ingress into the trench. Conduct trenching in the dry season as far as possible.	As needed	Contractor / ECO / PRH
				As needed	Contractor / ECO / PRH
	Heavy machinery equipment on site	C, O	Clean any spills immediately and place in special marked bag for hazardous waste. Dispose hazardous waste at registered landfill site. Keep safe disposal certificates on file.	As needed	Contractor / ECO / PRH
				As needed	Contractor / ECO / PRH
Chemical toilets and sewage waste management	C, O	Maintain chemical toilets. Clean up any spills immediately and place in special marked bag for hazardous waste. Dispose hazardous waste at registered landfill site. Keep safe disposal certificates on file.	As needed	Contractor / ECO / PRH	
			As needed	Contractor / ECO / PRH	
General waste generation	C, O	Have a waste bag on site that can be kept in one of the vehicles and dispose all general waste therein.	As needed	Contractor / ECO / PRH	



Main Activity	Secondary activity	Phase	Control Measures	Frequency	Responsibility
			Remove daily from site. Dispose at suitable landfill site / of the volume is little dispose in a local waste bin / skip.	As needed As needed	Contractor / ECO / PRH Contractor / ECO / PRH
Resource drilling: drill pad and sump	Heavy machinery equipment on site	C, O	Clean any spills immediately and place in special marked bag for hazardous waste. Dispose hazardous waste at registered landfill site. Sub-soil under drill rig to be protected by either spill kits under it / placement of PVD material topped with soil that can be removed if contaminated. Keep safe disposal certificates on file.	As needed As needed As needed	Contractor / ECO / PRH Contractor / ECO / PRH Contractor / ECO / PRH
	Drilling sludge	O	Contain sludge in a suitably constructed area.	As needed	Contractor / ECO / PRH
	Vegetation removal & General activities	C, O	Only clear area that is needed. If dust is noted during high winds implement dust suppression.	As needed	Contractor / ECO / PRH
	Vegetation removal	C	Only clear area that is needed. Conduct activity in dry season.	As needed	Contractor / ECO / PRH
	Operation of drill pad sump	O	Ensure that sludge is contained.	As needed	Contractor / ECO / PRH
	Chemical toilets and sewage waste management	C, O	Maintain chemical toilets. Clean up any spills immediately and place in special marked bag for hazardous waste. Dispose hazardous waste at registered landfill site. Keep safe disposal certificates on file.	As needed As needed As needed	Contractor / ECO / PRH Contractor / ECO / PRH Contractor / ECO / PRH
	Capping of Borehole	R	Conduct activity in dry season.	As needed	Contractor / ECO / PRH
	Rip impacted area	R	Conduct activity in dry season.	As needed	Contractor / ECO / PRH
	Rip impacted area	R	Wet affected area to assist with vegetation establishment and to reduce potential for dust generation in the short term.	As needed	Contractor / ECO / PRH
	General waste generation	C, O	Have a waste bag on site that can be kept in one of the vehicles and dispose all general waste therein. Remove daily from site.	As needed As needed	Contractor / ECO / PRH Contractor / ECO / PRH

Main Activity	Secondary activity	Phase	Control Measures	Frequency	Responsibility
			Dispose at suitable landfill site / of the volume is little dispose in a local waste bin / skip.	As needed	Contractor / ECO / PRH
Access road	Vegetation removal (all access roads combined)	C	Clean any spills immediately and place in special marked bag for hazardous waste.	As needed	Contractor / ECO / PRH
			Dispose hazardous waste at registered landfill site.	As needed	Contractor / ECO / PRH
			Keep safe disposal certificates on file.	As needed	Contractor / ECO / PRH
	Daily travelling to prospecting site	C, O	Implement dust suppression if complaints are received.	As needed	Contractor / ECO / PRH
			Implement speed limit suitable to access road and as prescribed by existing provincial road notices.	As needed	Contractor / ECO / PRH
Daily travelling to prospecting site	C, O	Clean any spills immediately and place in special marked bag for hazardous waste.	As needed	Contractor / ECO / PRH	
		Dispose hazardous waste at registered landfill site.	As needed	Contractor / ECO / PRH	
		Keep safe disposal certificates on file.	As needed	Contractor / ECO / PRH	
	Rip road area	R	Wet affected area to assist with vegetation establishment and to reduce potential for dust generation in the short term.	As needed	Contractor / ECO / PRH
Contractor camp	Vegetation removal	C	Clear vegetation only if needed and if no alternative site is available close by.	As needed	Contractor / ECO / PRH
			Implement sump to capture silt if needed.		
	Diesel storage	O	Comply with relevant legislation and SANS standards,	As needed	Contractor / ECO / PRH
	Chemical toilets and sewage waste management	O	Maintain chemical toilets.	As needed	Contractor / ECO / PRH
Clean up any spills immediately and place in special marked bag for hazardous waste.			As needed	Contractor / ECO / PRH	
Dispose hazardous waste at registered landfill site.			As needed	Contractor / ECO / PRH	
		Keep safe disposal certificates on file.	As needed	Contractor / ECO / PRH	
Storage of material	O	Comply with relevant legislation and SANS standards.	As needed	Contractor / ECO / PRH	
		Implement storm water sump if needed.	As needed	Contractor / ECO / PRH	



Main Activity	Secondary activity	Phase	Control Measures	Frequency	Responsibility
	Storage of general and hazardous waste	O	Comply with relevant legislation and SANS standards. Implement storm water sump if needed.	As needed As needed	Contractor / ECO / PRH Contractor / ECO / PRH
	Topsoil stockpiling/Vegetation removal & General activities	C, O	Implement dust suppression if complaints are received.	As needed	Contractor / ECO / PRH
	Vehicle maintenance	C, O	Clean any spills immediately and place in special marked bag for hazardous waste. Dispose hazardous waste at registered landfill site. Keep safe disposal certificates on file. Vehicle parking bays sub-soil to be protected by either spill kits under each vehicle / placement of PVD material topped with soil that can be removed if contaminated.	As needed	Contractor / ECO / PRH
				As needed	Contractor / ECO / PRH
				As needed	Contractor / ECO / PRH
				As needed	Contractor / ECO / PRH
	Removal of all infrastructures	R	Follow the waste hierarchy: Re-Use, Reduce, recycle as far as possible. Comply with any relevant legislation and standards.	As needed	Contractor / ECO / PRH
As needed				Contractor / ECO / PRH	
Rip impacted area	R	Wet affected area to assist with vegetation establishment and to reduce potential for dust generation in the short term. Follow up 1 year after ripping to determine extend of vegetation establishment.	As needed	Contractor / ECO / PRH	
			As needed	Contractor / ECO / PRH	
Camp area (whole off)	C, O	Have upstream clean water diversion channel in place. Keep "dirty" footprint area as small as possible.	As needed	Contractor / ECO / PRH	
			As needed	Contractor / ECO / PRH	
Prospecting activities (all)	Cumulative impact: Big area (Areas 1, 2, 3 and 4)	C, O	Implement as above. Conduct prospecting activities consecutively and rehabilitate areas immediately after the prospecting activities have been finalised and is moved to the next area.	As needed	Contractor / ECO / PRH
				As needed	Contractor / ECO / PRH
	Cumulative impact: Big area (Areas 1, 2, 3 and 4)	O	Implement as above. Conduct prospecting activities consecutively and rehabilitate areas immediately after the	As needed As needed	Contractor / ECO / PRH Contractor / ECO / PRH

Main Activity	Secondary activity	Phase	Control Measures	Frequency	Responsibility
			prospecting activities have been finalised and is moved to the next area.		
	Cumulative impact: Big area (Areas 1, 2, 3 and 4)	R	Implement as above. Conduct prospecting activities consecutively and rehabilitate areas immediately after the prospecting activities have been finalised and is moved to the next area.	As needed As needed	Contractor / ECO / PRH Contractor / ECO / PRH
Prospecting activities (all)	Cumulative impact: Schaffhausen	C, O	Implement as above. Conduct prospecting activities consecutively and rehabilitate areas immediately after the prospecting activities have been finalised and is moved to the next area.	As needed As needed	Contractor / ECO / PRH Contractor / ECO / PRH
	Cumulative impact: Schaffhausen	O	Implement as above. Conduct prospecting activities consecutively and rehabilitate areas immediately after the prospecting activities have been finalised and is moved to the next area.	As needed As needed	Contractor / ECO / PRH Contractor / ECO / PRH
	Cumulative impact: Schaffhausen	R	Implement as above. Conduct prospecting activities consecutively and rehabilitate areas immediately after the prospecting activities have been finalised and is moved to the next area.	As needed As needed	Contractor / ECO / PRH Contractor / ECO / PRH

Table 7-3: Impact assessment following the implementation of management measures

(FR: Flow Regime; P&C: Physico- and Chemical; H: Habitat; B: Biota; S: Severity, SS; Spatial Scale; D: Duration; C: Consequence, FA: Frequency of Activity; FI: frequency of Impact; LI: Legal Issue; Dt: Detection; L: Likelihood, Si: Significance, RR: Risk rating, M: Moderate)

Main Activity	Secondary activity	Phase	Impact	Aspect	Se					SS	D	Co	FA	FI	LI	De	Li	Si	RR
					FR	PC	Ha	Bi	S										
Ground geophysics and soil geochemical sampling	Vegetation removal	C	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which	Surface water quality	1	1	1	1	1	1	1	3	1	1	1	4	7	21	Low



Main Activity	Secondary activity	Phase	Impact	Aspect	Se					SS	D	Co	FA	FI	LI	De	Li	Si	RR
					FR	PC	Ha	Bi	S										
			could impact on the biota, habitat, flow regime and the physico- and chemical quality of the water in the watercourse.																
	Topsoil stockpiling	C, O	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which could impact on the biota, habitat, flow regime and the physico- and chemical quality of the water in the watercourse.	Surface water quality	1	1	1	1	1	1	1	3	1	1	1	4	7	21	Low
	Topsoil stockpiling/ Vegetation removal & General activities	C, O	Dust generated from stockpile areas could impact on surface water quality, and biota should it reach watercourses and settle within this area.	Surface water quality	1	1	1	1	1	1	1	3	1	1	1	4	7	21	Low
	Replace topsoil	R	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which could impact on the biota, habitat, flow	Surface water quality	1	1	1	1	1	1	1	3	1	1	1	4	7	21	Low



Main Activity	Secondary activity	Phase	Impact	Aspect	Se					SS	D	Co	FA	FI	LI	De	Li	Si	RR
					FR	PC	Ha	Bi	S										
			regime and the physico- and chemical quality of the water in the watercourse.																
	Replace topsoil	R	Dust generated from stockpile areas could impact on surface water quality, and biota should it reach watercourses and settle within this area.	Surface water quality	1	1	1	1	1	1	1	3	1	1	1	4	7	21	Low
Trenching	Vegetation removal	C	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which could impact on the biota, habitat, flow regime and the physico- and chemical quality of the water in the watercourse.	Surface water quality	1	2	2	1	2	1	2	4,5	1	1	1	4	7	32	Low
	Topsoil stockpiling	C, O	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which could impact on the biota, habitat, flow regime and the physico- and	Surface water quality	1	2	2	1	2	1	2	4,5	1	1	1	4	7	32	Low



Main Activity	Secondary activity	Phase	Impact	Aspect	Se					SS	D	Co	FA	FI	LI	De	Li	Si	RR
					FR	PC	Ha	Bi	S										
			chemical quality of the water in the watercourse.																
	Topsoil stockpiling/ Vegetation removal & General activities	C, O	Dust generated from stockpile areas could impact on surface water quality, and biota should it reach watercourses and settle within this area.	Surface water quality	1	2	2	1	2	1	2	4,5	1	1	1	4	7	32	Low
	Overburden stockpiling	C, O	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which could impact on the biota, habitat, flow regime and the physico- and chemical quality of the water in the watercourse.	Surface water quality	1	2	2	1	2	1	2	4,5	1	1	1	4	7	32	Low
	Containment of rainwater in trench	O	Removal of run-off from the surface water resource could reduce surface flow in watercourses which in turn could impact on the habitat and biota within this area.	Surface water quantity	2	2	2	1	2	1	2	4,8	1	1	1	4	7	33	Low
	Heavy machinery	C, O	Soil contamination from hydrocarbon spills if not removed	Surface water quality	1	2	2	1	2	1	2	4,5	1	1	1	4	7	32	Low



Main Activity	Secondary activity	Phase	Impact	Aspect	Se					SS	D	Co	FA	FI	LI	De	Li	Si	RR
					FR	PC	Ha	Bi	S										
	equipment on site		could impact on water quality should the hydrocarbons enter the watercourses, this could impact on the biota and habitat as well.																
	Chemical toilets and sewage waste management	C, O	Contamination from spills from chemical toilets could impact on water quality should the spilled material enter any watercourse and this could impact on the biota.	Surface water quality	1	2	2	1	2	1	2	4,5	1	1	1	4	7	32	Low
	General waste generation	C, O	General waste generation e.g. plastic bags, bottles etc. could impact on water quality and the habitat and biota in watercourses.	Surface water quality	1	2	2	1	2	1	2	4,5	1	1	1	4	7	32	Low
Resource drilling: drill pad and sump	Heavy machinery equipment on site	C, O	Soil contamination from hydrocarbon spills if not removed could impact on water quality should the hydrocarbons enter the watercourses, this could impact on the biota and habitat as well.	Surface water quality	1	2	2	1	2	1	2	4,5	1	1	1	4	7	32	Low



Main Activity	Secondary activity	Phase	Impact	Aspect	Se					SS	D	Co	FA	FI	LI	De	Li	Si	RR
					FR	PC	Ha	Bi	S										
	Drilling sludge	O	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which could impact on the biota, habitat, flow regime and the physico- and chemical quality of the water in the watercourse.	Surface water quality	1	2	2	1	2	1	2	4,5	1	1	1	4	7	32	Low
	Vegetation removal & General activities	C, O	Dust generated could impact on surface water quality, and biota should it reach watercourses and settle within this area.	Surface water quality	1	2	2	1	2	1	2	4,5	1	1	1	4	7	32	Low
	Vegetation removal	C	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which could impact on the biota, habitat, flow regime and the physico- and chemical quality of the water in the watercourse.	Surface water quality	1	2	2	1	2	1	2	4,5	1	1	1	4	7	32	Low
	Operation of drill pad sump	O	Removal of run-off from the surface water resource could	Surface water quantity	2	2	2	1	2	1	2	4,8	1	1	1	4	7	33	Low



Main Activity	Secondary activity	Phase	Impact	Aspect	Se					SS	D	Co	FA	FI	LI	De	Li	Si	RR
					FR	PC	Ha	Bi	S										
			reduce surface flow in watercourses which in turn could impact on the habitat and biota within this area.																
	Chemical toilets and sewage waste management	C, O	Contamination from spills from chemical toilets could impact on water quality should the spilled material enter any watercourse and this could impact on the biota.	Surface water quality	1	2	2	1	2	1	2	4,5	1	1	1	4	7	32	Low
	Capping of Borehole	R	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which could impact on the biota, habitat, flow regime and the physico- and chemical quality of the water in the watercourse.	Surface water quality	1	2	2	1	2	1	2	4,5	1	1	1	4	7	32	Low
	Rip impacted area	R	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which could impact on the	Surface water quality	1	2	2	1	2	1	2	4,5	1	1	1	4	7	32	Low



Main Activity	Secondary activity	Phase	Impact	Aspect	Se					SS	D	Co	FA	FI	LI	De	Li	Si	RR
					FR	PC	Ha	Bi	S										
			biota, habitat, flow regime and the physico- and chemical quality of the water in the watercourse.																
	Rip impacted area	R	Dust generated could impact on surface water quality, and biota should it reach watercourses and settle within this area.	Surface water quality	1	2	2	1	2	1	2	4,5	1	1	1	4	7	32	Low
	General waste generation	C, O	General waste generation e.g. plastic bags, bottles etc. could impact on water quality and the habitat and biota in watercourses.	Surface water quality	1	2	2	1	2	1	2	4,5	1	1	1	4	7	32	Low
Access road	Vegetation removal (all access roads combined)	C	Soil contamination from hydrocarbon spills if not removed could impact on water quality should the hydrocarbons enter the watercourses, this could impact on the biota and habitat as well.	Surface water quality	1	1	1	1	1	1	3	5	1	1	1	4	7	35	Low
	Daily travelling to prospecting site	C, O	Dust generated could impact on surface water quality, and biota should it reach	Surface water quality	1	1	1	1	1	1	3	5	1	1	1	4	7	35	Low



Main Activity	Secondary activity	Phase	Impact	Aspect	Se					SS	D	Co	FA	FI	LI	De	Li	Si	RR
					FR	PC	Ha	Bi	S										
			watercourses and settle within this area.																
	Daily travelling to prospecting site	C, O	Soil contamination from hydrocarbon spills if not removed could impact on water quality should the hydrocarbons enter the watercourses, this could impact on the biota and habitat as well.	Surface water quality	1	1	1	1	1	1	3	5	1	1	1	4	7	35	Low
	Rip road area	R	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which could impact on the biota, habitat, flow regime and the physico- and chemical quality of the water in the watercourse.	Surface water quality	1	1	1	1	1	1	3	5	1	1	1	4	7	35	Low
Contractor camp	Vegetation removal	C	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which could impact on the biota, habitat, flow regime and the	Surface water quality	1	1	1	1	1	1	3	5	5	1	1	4	11	55	Low



Main Activity	Secondary activity	Phase	Impact	Aspect	Se					SS	D	Co	FA	FI	LI	De	Li	Si	RR
					FR	PC	Ha	Bi	S										
			physico- and chemical quality of the water in the watercourse.																
	Diesel storage	O	Soil contamination from hydrocarbon spills if not removed could impact on water quality should the hydrocarbons enter the watercourses, this could impact on the biota and habitat as well.	Surface water quality	1	1	1	1	1	1	3	5	5	1	1	4	11	55	Low
	Chemical toilets and sewage waste management	O	Contamination from spills from chemical toilets / emptying of septic tank (if applicable) could impact on water quality which in turn could impact on the biota and habitat as well.	Surface water quality	1	1	1	1	1	1	3	5	5	1	1	4	11	55	Low
	Storage of material	O	Contaminated water from material storage area could detrimentally impact on watercourses quality, biota and habitat.	Surface water quality	1	1	1	1	1	1	3	5	5	1	1	4	11	55	Low
	Storage of general and	O	Contaminated water from waste storage area could	Surface water quality	1	1	1	1	1	1	3	5	5	1	1	4	11	55	Low



Main Activity	Secondary activity	Phase	Impact	Aspect	Se					SS	D	Co	FA	FI	LI	De	Li	Si	RR
					FR	PC	Ha	Bi	S										
	hazardous waste		detrimentally impact on watercourses quality, biota and habitat.																
	Topsoil stockpiling/ Vegetation removal & General activities	C, O	Dust generated could impact on surface water quality, and biota should it reach watercourses and settle within this area.	Surface water quality	1	1	1	1	1	1	3	5	5	1	1	4	11	55	Low
	Vehicle maintenance	C, O	Hydrocarbon spills from vehicles and other equipment could negative impact water quality, habitat and biota.	Surface water quality	1	1	1	1	1	1	3	5	5	1	1	4	11	55	Low
	Removal of all infrastructures	R	Potential for spills from e.g. hydrocarbon tanks, septic tank, chemical toilets could impact on the surface water resource quality, habitat and biota if not managed.	Surface water quality	1	1	1	1	1	1	2	4	5	1	1	4	11	44	Low
	Rip impacted area	R	Silt generation during rainfall events could reach surface water resources resulting in siltation of the watercourse which could impact on the biota, habitat, flow regime and the physico- and	Surface water quality	1	1	1	1	1	1	2	4	5	1	1	4	11	44	Low



Main Activity	Secondary activity	Phase	Impact	Aspect	Se					SS	D	Co	FA	FI	LI	De	Li	Si	RR
					FR	PC	Ha	Bi	S										
			chemical quality of the water in the watercourse.																
	Camp area (whole off)	C, O	Removal of run-off from the surface water resource could reduce surface flow in watercourses which in turn could impact on the habitat and biota within this area.	Surface water quantity	1	1	1	1	1	1	2	4	5	1	1	4	11	44	Low
Prospecting activities (all)	Cumulative impact: Big area (Areas 1, 2, 3 and 4)	C, O	The proposed prospecting activities could impact on surface water quality as a result of hydrocarbon spills and siltation from run-off.	Surface water quality	1	2	2	2	2	1	2	4,8	5	1	1	3	10	48	Low
	Cumulative impact: Big area (Areas 1, 2, 3 and 4)	O	The proposed prospecting activities could impact on surface water quantity; however, it is expected that the boreholes and trenching will be done consecutively thus the impact severity should not increase from that of the individual activities.	Surface water quantity	2	2	2	2	2	1	2	5	5	1	1	3	10	50	Low



Main Activity	Secondary activity	Phase	Impact	Aspect	Se					SS	D	Co	FA	FI	LI	De	Li	Si	RR
					FR	PC	Ha	Bi	S										
	Cumulative impact: Big area (Areas 1, 2, 3 and 4)	R	During the rehabilitation phase water quality could be impacted as a result of hydrocarbon spills and from siltation from ripped areas that are not vegetated.	Surface water quality	1	2	2	2	2	1	2	4,8	5	1	1	3	10	48	Low
Prospecting activities (all)	Cumulative impact: Schaffhausen	C, O	The proposed prospecting activities could impact on surface water quality as a result of hydrocarbon spills and siltation from run-off.	Surface water quality	1	2	2	2	2	1	2	4,8	5	1	1	3	10	48	Low
	Cumulative impact: Schaffhausen	O	The proposed prospecting activities could impact on surface water quantity; however, it is expected that the boreholes and trenching will be done consecutively thus the impact severity should not increase from that of the individual activities.	Surface water quantity	2	2	2	2	2	1	2	5	5	1	1	3	10	50	Low
	Cumulative impact: Schaffhausen	R	During the rehabilitation phase water quality could be impacted as a	Surface water quality	1	2	2	2	2	1	2	4,8	5	1	1	3	10	48	Low



Main Activity	Secondary activity	Phase	Impact	Aspect	Se					SS	D	Co	FA	FI	LI	De	Li	Si	RR
					FR	PC	Ha	Bi	S										
			result of hydrocarbon spills and from siltation from ripped areas that are not vegetated.																



8 ENVIRONMENTAL MANAGEMENT PROGRAMME

The applicant needs to develop an Environmental Management Programme / Plan which describe in detail how identified impacts will be managed on site to ensure that impacts are minimised.

The EMP must then be approved by the relevant government agencies. The management measures as indicated in Table 7-2 must be implemented where applicable.

8.1 MONITORING PROGRAMME

As the proposed activities will be located outside of the regulated areas and the watercourses nearest to the proposed activities are non-perennial no watercourse surface water quality or quantity monitoring is proposed.

9 LIMITATIONS AND ASSUMPTIONS

This report and assessment are based on available information as provided by Sylvania Northern Mining (Pty) Ltd Investments as outlined in Section 2.1 and throughout Section 5. No specific points for drilling / areas for trenching was provided thus assumptions with regards to access roads were made.

It is assumed that the information sourced from open source data is correct.

10 CONCLUSION AND RECOMMENDATIONS

The proposed prospecting activities should not impact on the surface water resource as the activities will be outside of the regulated area.

Recommendations are the following:

- The management measures as outlined in this report must be implemented.

If the management measures and recommendation as outlined in this report is implemented it is recommended that the proposed Prospecting Right be approved.

11 APPENDICES

Appendix 1: The expertise of the EAP to carry out the procedures

Appendix 2: Declaration of Independence

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Appendix 1
The expertise of the EAP to carry out the procedures

Table of content

	Page
1 Objectives.....	2
2 Contact details.....	2
3 Personal Information.....	2
4 Personal Data	3
5 Work Experience	3
6 Education.....	5
7 Short Courses / Workshops / Training Seminars Attended	6
8 Professional Registrations	7
9 Peer Reviewed Publications	7
10 Dissertations / Thesis / Reports.....	7
11 Conference Proceedings	8
12 Popular Articles	8
13 Interests.....	8
14 References.....	8
15 General information on clients (not comprehensive)	9
16 Client Industry outline.....	11
17 Detailed information on ISO14001:2015 Audits conducted.....	15
18 Other Regulatory Audits (2008 to Current)	18
19 Detailed information on training provided.....	31
20 Other Projects outline (2008 to Current)	33

Christina Petronella Erasmus (Petro)

1 Objectives

Objectives that I have set for myself and are constantly working towards are:

- Work in combinations of the following areas: auditing, research, environment and education.
- Continuously increase and update my knowledge with regards to environmental aspects and find ways of sharing the experience that I have with clients, interested parties and students.
- Obtain registrations with various environmental registration bodies that will serve as testimony to the fact that I am an expert in my field.

Furthermore, I would also like to be known as an environmental specialist that conducts her work with integrity and objectivity and that I speak truth to the impacts that any project that I work may have on the environment.

2 Contact details

- Email: petro@prescali.co.za
- Snail mail: P.O. Box 11, Mooinooi, 0325
- Phone (cell): +27 (072) 237 7305

3 Personal Information

I am a dedicated employee and will always give my best to my employer, clients and students. That being said I have been employed in the educational, government and consulting services as discussed below.

During my post graduate studies (1996 – 2003) I have worked as a laboratory assistant and in 2004 I lectured at the University of Port Elizabeth (now Nelson Mandela Metropolitan University). I have found the lecturing truly rewarding and enjoyed disseminating my knowledge to the young minds of our future work force. Subjects in which training was provided included the Bridging course for first year exchange students or students that did not have biology in high school and the physiology of the brain for nursing students.

My environmental background includes being involved in an Environmental field either as a student or in a working environment. From March 2006 – April 2008 I was involved in Water Management with the Department of Water Affairs and Forestry (DWAF, pre-2009). My duties included evaluation (evaluation, commenting and recommendation) of various regulatory required documents (such as Environmental Management Programs (EMPR's), Water Licence Applications and Environmental Impact Assessments), as well as the compilation of these documents. This work has been done for waste water management, mining and industrial sectors, as well as for private developers (e.g., residential) and business. In addition, as I have graduated in an Environmental Field (Zoology, specifically marine pollution) I have a great understanding of the water related environmental systems.

From May 2008 till January 2018, I have worked as an Environmental Consultant at the firm M2 Environmental Connections (MENCO). During this time, I was assisting Prescali Environmental Consultants with various projects focusing on auditing, environmental impact assessments, environmental management plans, water use licence applications and related aspects.

As of February 2018, I am full time employed by Prescali and have increased the number of training sessions that I have presented relating to Environmental Legal Awareness. A list of all projects that I have worked on since 2008 is provided in the attached at the end of the CV and detailed information on auditing and training is provided as well. During my time at Menco and Prescali I have gained experience in the mining, industrial, health and development sectors.

In addition to the above, I have experience in an agricultural (game) field, for work that I did for the Terrestrial Ecological Research Unit at the then University of Port Elizabeth. Another speciality area is waste management and I have drafted waste management reports, classification reports as well sewage management reports.

One of my favourite work fields are surface water assessment including the description of the surface water baseline environment due to the complex nature and interaction of these systems with the surrounding environment.

Since I passed the ISO14001:2015 Lead Auditor Exam through PECB in 2018, I have started to accumulate hours auditing this Management System and found it a very rewarding field as I can implement all the experience that I have gained throughout the years in determining conformance to the system. As a certified PECB Trainer for ISO14001:2015 I have also been approached to conduct training on the ISO14001:2015 standard and on Environmental Law (South Africa) providing me the way to share the experience that I have with other parties and thus fulfilling one of my goals.

I also take pride in the fact that I am registered with the South African Council for Natural Scientific Professions (SACNASP) in the Ecological and Environmental Scientific fields and that I am a Member of the Water Institute of South Africa (WISA). I have also been registered as an Environmental Assessment Practitioner with the Environmental Assessment Practitioners Association of South Africa (EAPASA).

4 Personal Data

Identity Number 740502 0050 088
 Date of Birth 2 May 1974
 Sex Female
 Driver's license Code 08 / EB
 Nationality South African
 Home Language Afrikaans (speak, read and write)
 Other Languages: English (speak, read and write)

5 Work Experience

A full list of projects is attached at the end of this CV.

2018 - Current	PRESCALI	PRETORIA
Duties include compiling technical documentation (EMPR / EMP, Water Balance, Surface Impact Report, WULA, IWRMP/IWWMP), Public Participation, Administrative duties (Invoicing; Quotations) & mentoring new employees, ISO14001 training, Legislative training, Auditing compliance with legislation, licences and management reports.		

Client list include:

<i>University of Mpumalanga</i>	<i>Hacra Mining and Exploration Company (Pty) Ltd</i>
<i>Pan Palladium South Africa (Pty) Ltd</i>	<i>Sylvania Metals (Pty) Ltd</i>
<i>Apollo Brick (Pty) Ltd</i>	<i>Illita Mining (Pty) Ltd</i>
<i>Grasvally Chrome Mine (Pty) Ltd</i>	<i>Chromex Mining (Pty) Ltd</i>
<i>Gudani Consulting (Pty) Ltd</i>	<i>Red Kite Environmental Solutions (Pty) Ltd</i>
<i>Sky Chrome Mining (Pty) Ltd</i>	<i>International Ferro Metals (South Africa) (Pty) Ltd</i>
<i>Corobrik (Pty) Ltd</i>	<i>Glenover Phosphate</i>
<i>Sail Group</i>	<i>Inlexo Innovative Solutions</i>
<i>Salene Manganese (Pty) Ltd</i>	
<i>Reinhard Transportation Group (Pty) Ltd</i>	<i>Venetia Diamond Mine</i>

Details on the Clients and their respective industries are provided in Section 15.

2008 - 2018	MENCO / PRESCALI	PRETORIA
Duties include compiling technical documentation (EMPR / EMP, Water Balance, Surface Impact Report, WULA, IWRMP/IWWMP), Sampling (Harties Metsi A Me project), Public Participation, Administrative duties (Invoicing; Quotations), Auditing licences & Mentoring new employees.		

Short client list includes:

<i>Vesuvius South Africa (Pty) Ltd</i>	<i>Richmond Mining and Exploration</i>
<i>Samancor (Eastern and Western Chrome Mines)</i>	<i>Virtual Consulting Engineers</i>
<i>Andalusite Resources (Pty) Ltd</i>	<i>Samancor Ferrometals</i>
<i>Coastal Fuels (Pty) Ltd</i>	

Details on the Clients and their respective industries are provided in Section 15.

2007- April 2008	DWAF¹	HARTBEESPOORT
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Senior Water Pollution Control Officer

Knowledge of water policies and strategies relating to Integrated Water Resource Management was a requirement and I had to ensure that all water users complied with legal and technical principles. Other duties included Integrated Water Use Licenses and in providing specialist input into waste disposal facilities applications. In addition, I was involved in facilitating integrated monitoring programmes in terms of water quality, microbial, biology and other aspects of river health as well as general administrative duties. I was also the Health and Safety officer for our office.

2006(MARCH – DES)	DWAF	EAST LONDON
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Water Pollution Control Officer

Duties included site inspections of waste water treatment plant, potable water treatment plants and other businesses and mines that could negative impact on water quality for compliance with the National Water Act, 1998 (Act 36 of 1998). Registration and licensing of water uses, taking of water samples and interpretation of analyses results, investigation of pollution incidents. I also assisted with SASS monitoring for the regional River Health Programme

Other duties included correspondence with clients, following up on complaints, attending committees and awareness creation among stakeholders.

2005 – 2006	NICO ROUX GAME ENTERPRISES	RUSTENBURG
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General Administration clerk.

Responsible for general administration which included obtaining permits for import and export of game (both internationally and provincially). Other duties included helping to organise game auctions, web site updating and payroll administration.

2004	UPE²	PORT ELIZABETH
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Laboratory Assistant UPE Advancement Program Biology laboratory

Semester 1 and 2: helping to set up a new biology laboratory. Duties included making microscope slides, and setting up practical equipment.

2004 (Feb – Jun)

Research Assistant, Terrestrial Ecology Research Unit, Zoology Department

Contacting game-farmers and game farm managers to update an existing database, as well as generating information on the information needs and sources of information utilised by game farmers and game farms managers. This formed part of the STEP (subtropical thicket ecosystem planning) project.

2004 (Jul – Des)

Contract Lecturer for the UPE Advancement Program & the Department of Biochemistry and Physiology

- UPE Advancement Programme: Lecturing the full second semester course on biology consisting of animal classification, human and animal physiology and ecology.
- Department of Biochemistry and Physiology: Lecturing the second part of BWV203 (The human nervous systems) and the whole of BWV204 (The human brain and spinal cord) for nursing students.

1 Department of Water Affairs and Forestry – Now Department of Water and Sanitation

2 University of Port Elizabeth: From January 2005 The following institutions amalgamated in January 2005 to for the Nelson Mandela Metropolitan University (NMMU): UPE, Vista PE and PE Technicon

For both of these I was responsible for setting up November exams papers and January Sick exam papers as well as grading the answer sheets.

2001 – 2003

Practical Assistant UPE Advancement Program

- Semester 1: preparation and presentation of practical experiments. Assistant lecturer.
- Semester 2: presentation of practical experiments and tutorials.
- Zoology 240 (Ecotoxicology) lecturer. Lectured the second-year course in ecotoxicology consisting of 10 lectures and 2 practical sessions. Duties also included setting up and marking examination papers as well as updating the lecture notes.

2001

Supplemental Instruction (SI)

- Assistant coordinator SI (Sciences) and Editor for The Ripple (SI UPE newsletter).
- Committee member Zoological Society South Africa Conference UPE. Portfolio: transport and accommodation

2000

Supplemental Instruction

SI leader: first year zoology students.

1998 – 2000

Zoology Practical Demonstrator

- 1998: Practical demonstrator for first year zoology students. Modules covered: general taxonomy (invertebrates) and an introduction to histology.
- 1999 – 2000: Practical demonstrator for second year zoology students. Modules covered: statistics, physiology, vertebrate anatomy, histology.

1996

PU FOR CHE³

POTCHEFSTROOM

Zoology Practical Demonstrator

Practical demonstrator for first year zoology students. Some of the modules covered during the year included: general taxonomy (vertebrates and invertebrates), evolution.

6 Education

1993 – 1995

PU FOR CHE

POTCHEFSTROOM

Baccalareus scientiae.

Graduated with third year subjects Zoology and Biochemistry.

1996

PU FOR CHE

POTCHEFSTROOM

Baccalareus scientiae (honoris) in Zoology. Received cum laude.

During this year various disciplines within Zoology were covered, such as Parasitology, Genetics, Ecology, Histology, Computers, Biostatistics, Environmental Impact Studies and many more.

The project was histology based and increased my knowledge on how to make microscope slides and how to use immunocytochemistry to mark relevant tissue areas. The results from my study were published in the Onderstepoort Journal of Veterinary Science.

1998 - 1999

UPE

PORT ELIZABETH

Magister Scientiae in Zoology, Received cum laude.

Supervisor: Dr. G. J. Rossouw.

The project was histology based and focused on the retinal cells of sharks. As a result, my knowledge in the field of histology increased as I learned how to use a transmission electron microscope and a scanning electron microscope. Computer statistical skills also improved due to the number of statistical tests that had to be completed.

2000 – 2003

UPE

PORT ELIZABETH

Philosophiae Doctorae in Zoology.

³ Potchefstroom University for Christian Higher Education, now the North-West University.

Promoter: Dr. G.J. Rossouw; Co-promoter: Prof. D. Baird.

This study focused on ecotoxicology. The concentration of 10 different metals in various tissue types of sharks that were caught along the south eastern coast of South Africa were investigated. During the course of this study, I became familiar with digestion of tissue samples using acid, and working with an ICP-MS. Part of the study focussed on the metallothioneins (a metal binding protein) in the liver of sharks. This part of the study taught me how to isolate different proteins (using a hydrophobic column), work with a spectrophotometer and I also become familiar with gel-electrophoresis (SDS-PAGE gels). Once again, I increased my statistical background due to the numerous comparisons and tests that had to be completed on the relevant data sets.

7 Short Courses / Workshops / Training Seminars Attended

Year	Course	Presented by and Location
1999	Practical Demonstrator Training Workshop	UPE: Department of Zoology
2000	Supplemental Instruction / Leader Training Workshop	UPE: National SI Centre
2000	Supplemental Instruction Supervisors / Leader Training Workshop	UPE: National SI Centre
2001	Ifaw Shark Conservation Workshop	IFAW: Cape Town
2006	Estuary Management	WRC, Buffalo City, U-KZN: East London
2006	Policy and Methods of Disposing Abattoir Waste, Hygiene in Abattoir Cutting Plants, Hygiene Management System, Animal Disease Reporting	Department of Agriculture: Amathole DM: East London
2006	Environmental Impact Assessment: The NEMA Regulations – A Practical Approach	CEM: Potchefstroom
2007	Water Quality Management Orientation Course	DWAF: Roodeplaat
2007	Improving Legal and Regulatory Efficiency for Water Resource Management in Southern Africa	IDLO: Pretoria
2007	Environmental Law for Environmental Managers	CEM: Potchefstroom
2010	Flood hydrology and urban Runoff modelling	University of Pretoria: Pretoria
2013	Applied Fluvial Geomorphology	Wildland Hydrology: Fayetteville, AR, USA
2014	IWRM, The NWA, and Water Use Authorisations, focussing on Water Use License Applications – Procedures, Guidelines, IWWMP's and Monitoring	Carin Bosman, Pretoria
2015	Environmental Impact Assessment (EIA) 2014 Legal Regime Workshop	Imbewu: Cape Town
2015	River Morphology and Applications	Wildland Hydrology, Bend, OR, USA
2015	WRSM2000(Pitman)/WR2012 Water Resources Two Day Course	Royal Haskoning DHV, Pretoria
2016	Financial Provision Regulations and mine closure requirements legal training workshop	IMBEWU, Johannesburg
2017	ISO 14001: 2015 Environmental Management Systems – Introductory 3-day course	EOH, Pretoria – No certificate provided
2017	Southern African Geomorphology Pure and Applied Conference	University of Swaziland
2017	ISO 14001: 2015 Lead Auditor course	PECB - EOH Pretoria (Self-study)
2018	Environmental Law Update Workshop	IMBEWU, Johannesburg
2019	WISA Workshop on water re-use (IFAT)	Gallagher Estate, Midrand
2019	Environmental Law Update Workshop	IMBEWU, Johannesburg
2020	OHS Legal Liability training	Inlexo – Online e-course
2020	Various Webinars as presented by WISA: Water meter performance (21/07/2020) River Health Restoration through community based monitoring and management (03/08/2020) Water re-use – concerns and guidelines (3/11/2020) Faecal sludge management toolbox (12/11/2020)	WISA – Online e-course – No certificates provided

Year	Course	Presented by and Location
2020	Various online certificated for CPD points using the SACNASP online portal: How to Manage your CPD activities: 0,1 CPD Category 3 Hydropedological Classification of South African Hillslopes: 0,2 CPD The science of hydropedology - linking soil morphology with hydrological processes: 0,1 CPD The contribution of hydropedological assessment to the availability and sustainable management of water, for all: 0,2 CPD Hydropedology in South Africa: Advances, applications and research opportunities: 0,2 CPD Soil Indicators of Hillslope Hydrology: 0,2 CPD The Three commandments of Presenting: 0,1 CPD Hydropedological grouping of South African Soil forms: 0,1 CPD"	SACNASP
2021	WISA Webinar: Sustainable and resilient water management in South Africa – ongoing research Blue and Green Drop Keeping Hope Alive Integrated Biological System for Concurrent Wastewater Treatment, Solids Reduction and Resource Recovery from Tannery Wastewater	WISA
2021	Various online certificated for CPD points using the SACNASP online portal: ISO/IEC 17025-2017 Clause 4.1, 4.2 & 5 ISO/IEC 17025-2017 Clause 6 ISO/IEC 17025-2017 Clause 7.1, 7.2, 7.3 & 7.6 ISO/IEC 17025-2017 Clause 7.4, 7.5 & 7.7 ISO/IEC 17025-2017 Clause 8.1 & 8.2 ISO/IEC 17025-2017 Clause 8.3 & 8.4 ISO/IEC 17025-2017 Clause 8.5 & 8.6 ISO/IEC 17025-2017 Clause 8.7 & 8.8 ISO/IEC 17025-2017 Clause 8.9 ISO/IEC 17025-2017 Clause 7.8, 7.9, 7.10 & 7.11 Update your portfolio of evidence (2020)	SACNASP

8 Professional Registrations

- Water Institute of South Africa (WISA): Member
- South African Council for Natural Scientific Professions (SACNASP): Ecological Science & Environmental Science
- EAPASA: Environmental Assessment Practitioner
- PECB: Lead Auditor ISO14001
- PECB: Certified Trainer

9 Peer Reviewed Publications

C.P. Erasmus & G. Van Aswegen. 1997. The endocrine pancreas of the cape fur seal, *Arctocephalus pusillus* (Schreber, 1776): an immunocytochemical study. *Onderstepoort Journal of Veterinary Research*, 64: 239 – 242.

10 Dissertations / Thesis / Reports

- C.P. Erasmus. 2000. The retinal cells of different elasmobranch species. M.Sc. Dissertation. University of Port Elizabeth, Port Elizabeth, South Africa.
- C.P. Erasmus. 2004. The concentration of ten metals in the tissues of shark species *Squalus megalops* and *Mustelus mustelus* (Chondrichthyes) occurring along the south-eastern coast of South Africa. Ph.D Thesis. University of Port Elizabeth, Port Elizabeth, South Africa. (Supervisors: Dr. G.J. Rossouw & Prof. D. Baird)

- P. Erasmus & G. Kerley. 2004. Ecological information needs of game farmers and land managers to sustainably manage subtropical thicket. TERU Report 49. 33pp.

11 Conference Proceedings

- C.P. Erasmus & G. Rossouw. 1998. The photoreceptors of different elasmobranch species in relation to their habitat. Electron microscopy – paper presented at IECM 14, symposium II, Volume IV, 1998: 81 – 82. (ICEM, Cancun, Mexico, 31 August – 4 September 1998).
- C.P. Erasmus & G.J. Rossouw. 1999. The rods and cones of some elasmobranchs. Microscopy Society Of South Africa - Proceedings, 29: 96 (Sams, Bloemfontein, December 1999).
- C.P. Erasmus, D. Baird & G.J. Rossouw. 2003. Metal concentration in the muscle of *Mustelus mustelus* (Linnaeus 1758) caught off St. Francis Bay. Joint conference of SASAQS & ZSSA, Cape Town 30 June – 4 July 2003.
- C.P. Erasmus, C.L. Frost & D. Baird. 2003. Metallothioneins in the liver of dogfish (*Squalus megalops*) caught off Algoa Bay, South Africa. SASBMB 18th Congress, Pretoria, 6 – 9 July 2003.

12 Popular Articles

- P. Erasmus. 2004. Changing land use trends in the subtropical thicket (valley bushveld) biome: feedback and the way forward. ECGMA Pelea news. March 2004: 35 – 36.
- P. Erasmus & G. Kerley. 2004. Spesifieke informasie behoeftes van wildplaas eienaars en – bestuurders in die Oos-Kaap. Game & Hunt (Wild en Jag). October/Oktober 2004 10: 47 – 49.

13 Interests

My interests are broad and can be categorised into the following:

- River morphology
- Game drives and Bird watching
- Reading
- Hand and Needlework

14 References

Riekie van den Berg

- Organization: Inlexo Innovative Legal Solutions
- Contact no: +27 82 552 3659
- Email: Riekie.vdBerg@inlexso.co.za
- Occupation/ Relationship: She is a client for which I do training and ISO14001 audits and have known her for at least ±4 years.

Setenane Nkopane

- Organization: Gudani Environmental Consulting
- Contact: +27 82 828 3412
- Email: setenane@gudaniconsulting.co.za
- Occupation/ Relationship: He is a client for which I have done various surface water impact assessment and I have known him for ±10 years.

Nicole Upton

- Organization: Red Kite Environmental Solutions (Pty) Ltd
- Contact no: +27 79 555 2433
- Email: nicole@redkiteconsulting.co.za
- Occupation/ Relationship: She is a client for which we do compliance audits and water balances. Before she started her own company she used to work with me at M2 Environmental. She is also a specialist I appoint occasionally for impact assessments and I have known her for ±9 year.

Morné de Jager

- Organization: M2 Environmental Connections / Environmental Acoustic Research
- Contact: +27 82 565 4059
- Email: morne@menco.co.za / morne@eares.co.za
- Occupation/ Relationship: He was a colleague at M2 Environmental connections and one of the company owners and I have known him for ±14 years.

15 General information on clients (not comprehensive)

Company	Background information
Andalusite Resources (Pty) Ltd	This is an opencast Andalusite mine with beneficiation occurring on site.
Apollo Brick (Pty) Ltd	Apollo brick is a clay mining and clay brick production operation.
Chromex Mining (Pty) Ltd	Chromex operates the opencast chrome mine on Vlakpoort. This was recently handed over to Destiny Springs.
Coastal Fuels (Pty) Ltd	This company owned and operated coal mines in Mpumalanga.
Corobrik (Pty) Ltd	Corobrik is a clay mining and clay brick production operation.
Glenover Phosphate	Glenover phosphate will be an opencast phosphate mine with processing on site.
Grasvally Chrome Mine (Pty) Ltd	Grasvally Chrome mine is a 100% owned subsidiary of Sylvania Platinum and currently is removing existing waste rock to produce chrome and platinum group metals. Approval has already been received for an opencast mine.
Gudani Consulting (Pty) Ltd	Gudani is an Environmental and Social impact assessment company. The work that I have done for them is surface water impact assessments.
Hacra Mining and Exploration Company (Pty) Ltd i.e. Ironveld Mining (Pty) Ltd	Hacra Mining is a new venture opencast iron mine that will be located in the Limpopo Province.
Illita Mining (Pty) Ltd	Illita operates the Stellite opencast chrome near Rustenburg.
Inlexo Innovative Legal Solutions / EOH	The work that I have done for this company consists of Environmental legal awareness training, ISO14001:2015 transitional training and Second party audits.
International Ferro Metals (South Africa) (Pty) Ltd	IFMSA was an underground chrome mine and Chrome Furnace that produced chrome ingots as the final product. The company has closed.
Pan Palladium South Africa (Pty) Ltd i.e. Lapon Mining (Pty) Ltd	Pan palladium is a new venture opencast iron mine that will be located in the Limpopo Province.
Phoenix Platinum (Pty) Ltd	Phoenix retreats current arising and tailings from tailings dams to produce chrome and platinum group metals. Phoenix Platinum is now a 100% owned subsidiary of Sylvania Metals.
Red Kite Environmental Solutions (Pty) Ltd	Red Kite is an Environmental impact assessment company. The work that I have done for them is audit and water / Salt balances.
Reinhard Transport (Pty) Ltd	This is an ISO14001:2015 certified company that transports chrome and coal for various companies.
Richmond Mining and Exploration	This is a mineral exploration mining company. The work that was done for them focussed on environmental authorisations and impact assessments.
Sail Group	The Sail group is a company that specialises in chrome mining and production and has various operational areas.
Salene Manganese	Salene started a new iron and manganese mine near Kathu in the Northern Cape. It is a small opencast operation and beneficiation of the Manganese and iron run of mine is proposed as a new expansion.
Samancor (Eastern and Western Chrome Mines)	Samancor is a Chrome mining company using opencast and underground operations. Beneficiation of the Run of mine also occurs on site.
Samancor Ferro Metals	This is a chrome furnace operation and the work conducted focussed on

Company	Background information
	external audits of the water use - and waste management licences.
Sky Chrome Mining (Pty) Ltd	Sky chrome was an opencast chrome mine and is currently under care and maintenance.
Sylvania Metals (Pty) Ltd	Sylvania owns and operates several facilities in Limpopo and the North West that retreats current arising and tailings from tailings dams to produce chrome and platinum group metals.
University of Mpumalanga	This is an educational establishment and I drafted a Waste Management Plan for the Mbombela campus
Venetia diamond mine	This is an opencast diamond mine located in the Limpopo Province
Vesuvius South Africa (Pty) Ltd	This international company's operation in South Africa produces refractory products and burnt dolomite (Doloma) for supply to various industries in South Africa. Vesuvius has four rotary kilns at their Olifantsfontein site.
Virtual Consulting Engineers	This is an engineering company, the work conducted for them focussed on environmental authorisations and impact assessments for various sewage treatment plants.

16 Client Industry outline

Company	Industry		Aspect	Documents compiled
Afarak	Mining	Chrome	Audits	WUL Audits
Altius 345 (Pty) Ltd: Imbabala Colliery	Mining	Coal	Water management	IWWMP, Surface Water Assessments, Legislation requirements
Andalusite Resources (Pty) Ltd	Mining	Andalusite	Water management	IWWMP, Surface Water Assessments, Legislation requirements, Monitoring, water and salt balances
Apollo Brick (Pty) Ltd	Mining	Clay	Water management Audits Environmental Management	Integrated Water and Waste Management Plans, Monitoring, WUL Audits, EIA/EMP documentation
Assmang: Khumani Mine (subcontracted through GPT)	Mining	Iron	Water management	Water balance
Bauba (sub-contracted by Red Kite)	Mining	PGM	Water management Audits	Surface Water Assessments, Legislation requirements, WUL Audits
Chromex mining (Pty) Ltd (Mecklenburg Chrome Mine)	Mining	Chrome	Water management	IWWMP
Coastal Fuels (Pty) Ltd	Mining	Coal	Environmental Management Water Management	EIA/EMP d& IWWMP documentations
Corobrik (Pty) Ltd	Industry	Brick Making Kiln	Environmental Management Public Participation Waste Management	EIA/EMP documentations, Facilitating Public participation, Waste Classification
Corridor Mining Resources project: Fumani Gold Mine	Mining	Gold	Water management Waste Management	Surface water assessment, Water and Salt balance
Department of Public Works (Sub contracted through Shawshank constructions): Ncome Prison upgrade project	Sewage	Sewage	Environmental Management Sewage Management	EIA/EMP documentations, Environmental Control Officer, WQMR
Department of Public Works (Sub-contracted through MAGWA): Ekuseni Youth Centre Upgrade project	Sewage	Sewage	Environmental Management Sewage Management	EIA/EMP documentations, Environmental Control Officer, WQMR
Department of Public Works (Swartkopfontein border post)	Sewage	Sewage	Environmental Management Sewage Management	Section 24(g) application, WQMR
Department of Public Works (Zonderwater prison)	Sewage	Sewage	Environmental Management Sewage Management	EIA/EMP documentations, WQMR
Department of Public Works: Appointed through Virtual consulting: Nerston Port of entry	Sewage	Sewage	Environmental Management Sewage Management	EIA/EMP documentations, WQMR

CHRISTINA PETRONELLA ERASMUS

Company	Industry		Aspect	Documents compiled
Department of Water Affairs and SRK: Rustenburg Local Municipality	Sewage	Sewage	Legislation	Water use licence application
Department of Water Affairs: Harties Metsi A Me project	Monitoring	Monitoring	Water management	Monitoring and Interpretation
Eco-elementum: Vunene Mining	Mining	Coal	Water management	Surface water assessment
EOH	Environmental	Training	Training	ISO14001:2015, Environmental law
EOH: Arengo Plastics	Industry	Packaging	Audit	ISO14001:2015
EOH: Clearline protection services	Industry	Electrical	Audit	ISO14001:2015
ERWAT (sub-contracted by Maziya)	Sewage	Sewage	Sewage management	WQMR
Glover Phosphate	Mining	Phosphate	Environmental Management Public Participation Water management	EIA/EMP documentations, IWWMP
Grasvally Chrome Mine (Pty) Ltd	Mining	Chrome	Water management Audits	Integrated Water and Waste Management Plans, WUL Audit
Gudani Consulting (Pty) Ltd: 3 applications (Mokolo River)	Quarry	Sand	Water management	Surface Water Assessments, Legislation requirements
Gudani Consulting (Pty) Ltd: 7 Seas Capital	Quarry	Granite	Water management	Surface Water Assessments, Legislation requirements
Gudani Consulting (Pty) Ltd: Thaba Chue	Quarry	Quartz/Silica	Water management	Surface Water Assessments, Legislation requirements
Gudani Consulting (Pty) Ltd: Township Development (3 Applications: Ekurhuleni)	Residential / Holiday accommodation		Water management	Surface Water Assessments, Legislation requirements
Hacra Mining and Exploration Company (Pty) Ltd	Mining	Iron	Water management	IWWMP, Surface Water Assessments, Legislation requirements, Monitoring, water and salt balances
Hacra Mining and Exploration Company (Pty) Ltd	Mining	PGE	Water management	IWWMP, Surface Water Assessments, Legislation requirements, Monitoring, water and salt balances
Illita Mining (Pty) Ltd	Mining	Chrome	Audits	WUL Audits
Inlexo Innovative Solutions	Medical (6 sites)		Environmental Management	ISO14001:2015 audits
International Ferro Metals (South Africa) (Pty) Ltd	Mining	Chrome	Legislation Water management Waste management Audits	Section 24(g) application, IWWMP, Surface Water Assessments, Legislation requirements, Monitoring, water and salt balances, Waste management documentation, WUL Audits

CHRISTINA PETRONELLA ERASMUS

Company	Industry		Aspect	Documents compiled
International Ferro Metals (South Africa) (Pty) Ltd	Industry	Chrome Smelting	Water management Waste Management Audits	IWWMP, Surface Water Assessments, Legislation requirements, Monitoring, water and salt balances, Waste management documentation, WUL Audits
Ironveld Smelting (Pty) Ltd	Smelter	Iron	Water management	IWWMP, Surface Water Assessments, Legislation requirements, Monitoring, water and salt balances
Kingdom Development Company (Pty) Ltd (Appointed through M2 Environmental Connections)	Residential / Holiday accommodation		Water management Audits	IWWMP, Surface Water Assessments, Legislation requirements, Monitoring, water and salt balances, WUL Audit
MTC Minerals	Mining	Chrome	Water management	IWWMP, Surface Water Assessments, Legislation requirements, Monitoring, water and salt balances
Nouvall	Residential / Holiday accommodation		Water management	Rehabilitation strategy, Water use licence application
Palm Chrome	Mining	Chrome	Water management	Surface water assessment
Pan Palladium South Africa (Pty) Ltd	Mining	Iron	Water management	IWWMP, Surface Water Assessments, Legislation requirements, Monitoring, water and salt balances
Pan Palladium South Africa (Pty) Ltd	Mining	PGE	Water management	IWWMP, Surface Water Assessments, Legislation requirements, Monitoring, water and salt balances
Phoenix Platinum (Pty) Ltd	Mining	Chrome Tailings Retreatment	Waste Management Water Management	Tailings Storage Facility, IWWMP, Legal requirements, Monitoring and Interpretation
Piet Greyling	Quarry	Granite	Waste Management	Waste Management
Polmaise Colliery Middelburg	Mining	Coal	Water management	Water and salt balances
Richmond Mining & Exploration (Middelpunt)	Mining	Diamond	Water management	Emergency Rehabilitation, IWWMP
Ruighoek chrome mine	Mining	Chrome	Water management	Water and salt balances
Sail group	Mining	Chrome	Legislation	Environmental Due Diligence
Samancor Chrome Ltd: Eastern Chrome Mines	Mining	Chrome	Water management	IWWMP, Surface Water Assessments, Legislation requirements, Monitoring, water and salt balances
Samancor Chrome Ltd: Eastern Chrome Mines	Mining	Chrome	Audit	WUL, Environmental Authorisations
Samancor Chrome Ltd: Eastern Chrome Mines	Mining	Chrome	Environmental Management	EIA/EMP documentations
Samancor Chrome Ltd: Eastern Chrome	Mining	Chrome	Waste Management	Waste Management Documentation

CHRISTINA PETRONELLA ERASMUS

Company	Industry		Aspect	Documents compiled
Mines				
Samancor Chrome Ltd: Ferrometals	Industry	Chrome Smelting	Audit	WUL, Environmental Authorisations, Waste Licences
Samancor Chrome Ltd: Western Chrome Mines	Mining	Chrome	Water management	IWWMP, Surface Water Assessments, Legislation requirements, Monitoring, water and salt balances
Samancor Chrome Ltd: Western Chrome Mines	Mining	Chrome	Audit	WUL, Environmental Authorisations
Samancor Chrome Ltd: Western Chrome Mines	Mining	Chrome	Environmental Management	EIA/EMP documentations
Samancor Chrome Ltd: Western Chrome Mines	Mining	Chrome	Waste Management	Waste Management Documentation
Sandberg / Mona Mona	Quarry	Sand	Water management	Surface water assessment
Sefateng Chrome Mine (sub-contracted by Red Kite)	Mining	Chrome	Water management	Water and salt balances
Sky Chrome Mining (Pty) Ltd	Mining	Chrome	Audits	EMP Performance assessments / WUL Audits
Sky Chrome Mining (Pty) Ltd	Mining	Chrome	Water management	IWWMP, Legal requirements, Monitoring and Interpretation
Sylvania (Pty) Ltd	Mining	Chrome Tailings Retreatment	Waste Management	Closure quantum
Umnotho we-Sizwe Resources	Mining	Chrome	Water management	IWWMP, Surface Water Assessments, Legislation requirements, Monitoring, water and salt balances
Vaalplan Regional and Town planners (Wilgeblare Beleggings)	Residential / Holiday accommodation		Water management	Surface water assessment
Venetia Mine	Mining	Diamond	Water management	WCDMP and Water Balance
Vesuvius South Africa (Pty) Ltd	Industry		Water management	Storm water plan, IWWMP

17 Detailed information on ISO14001:2015 Audits conducted

Project	Audit Outline	Organisation	Address	Contact person	Contact details	Type	Date	On site (day)	Off Site (day)	Role (L / A)
2018: ISO14001:2015	ISO14001:2015 2nd Party Audit log for Canon Sa	Arengo Plastics (Pty) Ltd	72 Regency Drive, Route 21 Corporate Park, Irene, 0157, South Africa	Riekie van den Bergh	+27 87 405 1818 Riekie.vdBerg@eoh.com	Audit	07- Aug- 18	2	1	Auditor
2018: ISO14001:2015	ISO14001:2015 2nd Party Audit log for Canon Sa	Clearline Protection Systems	72 Regency Drive, Route 21 Corporate Park, Irene, 0157, South Africa	Riekie van den Bergh	+27 87 405 1818 Riekie.vdBerg@eoh.com	Audit	13- Aug- 18	2	0,5	Auditor
2018: ISO14001:2015	ISO14001:2015 2nd Party Audit log for Canon Sa	Microtonixs	72 Regency Drive, Route 21 Corporate Park, Irene, 0157, South Africa	Riekie van den Bergh	+27 87 405 1818 Riekie.vdBerg@eoh.com	Audit	04- Oct-18	2	0,5	Auditor
2019: ISO14001:2015	Conducted a second party audit at Netcare Occupational Health and Travel Clinic in Boksburg.	Inlexo Innovative solutions	PO Box 76391, Lynnwoodridge, 0040	Riekie van den Bergh	+27 82 552 3659	Audit	25- Sep- 19	1	0,5	Auditor
2019: ISO14001:2015	Conducted a second party audit at the Medicross Medical clinic in Benoni	Inlexo Innovative solutions	PO Box 76391, Lynnwoodridge, 0040	Riekie van den Bergh	+27 82 552 3659	Audit	30- Sep- 19	1	0,5	Auditor
2019: ISO14001:2015	Conducted a second party audit at the Medicross Medical clinic in	Inlexo Innovative solutions	PO Box 76391, Lynnwoodridge, 0040	Riekie van den Bergh	+27 82 552 3659	Audit	02- Oct-19	1	0,5	Auditor

CHRISTINA PETRONELLA ERASMUS

Project	Audit Outline	Organisation	Address	Contact person	Contact details	Type	Date	On site (day)	Off Site (day)	Role (L / A)
	Silverton (Pretoria)									
2019: ISO14001:2015	Conducted a gap audit at Reinhardt transport an ISO14001:2015 certified company	Reinhardt Transport Group	29 Station Avenue, Pretoriusstad, Nigel, Gauteng	Johan Theron	+27 82 884 9402	Audit	11-Oct-19	1	0,5	Auditor
2019: ISO14001:2015	Conducted a second party audit at the Medicross Medical clinic in Randburg	Inlexo Innovative solutions	PO Box 76391, Lynnwoodridge, 0040	Riekie van den Bergh	+27 82 552 3659	Audit	22-Oct-19	1	0,5	Auditor
2019: ISO14001:2015	Conducted a second party audit at the Medicross Medical clinic in Kembirch (Ekurhuleni)	Inlexo Innovative solutions	PO Box 76391, Lynnwoodridge, 0040	Riekie van den Bergh	+27 82 552 3659	Audit	13-Nov-19	1	0,5	Auditor
2019: ISO14001:2015	Conducted a second party audit at the Medicross Medical clinic in Rustenburg	Inlexo Innovative solutions	PO Box 76391, Lynnwoodridge, 0040	Riekie van den Bergh	+27 82 552 3659	Audit	28-Nov-19	1	0,5	Auditor
2019: ISO14001:2015	Conducted a second party audit at Netcare Occupational Health and Travel Clinic in Boksburg.	Inlexo Innovative solutions	PO Box 76391, Lynnwoodridge, 0040	Riekie van den Bergh	+27 82 552 3659	Audit	06-Dec-19	1	0,5	Auditor
2020: ISO14001:2015	Conducted a second party audit at Omnia Fertilisers -	Inlexo Innovative solutions	PO Box 76391, Lynnwoodridge, 0040	Riekie van den Bergh	+27 82 552 3659	Audit	20-Feb-20	1	0,5	Auditor

CHRISTINA PETRONELLA ERASMUS

Project	Audit Outline	Organisation	Address	Contact person	Contact details	Type	Date	On site (day)	Off Site (day)	Role (L / A)
	Sasolburg - Railway									
2020: ISO14001:2015	Conducted a second party audit at Omnia Fertilisers - Dryden	Inlexo Innovative solutions	PO Box 76391, Lynnwoodridge, 0040	Riekie van den Bergh	+27 82 552 3659	Audit	23-Feb-20	2	0,5	Auditor
2020: ISO14001:2015	Conducted a second party audit at Omnia Fertilisers - Sasolburg - Mechanical North	Inlexo Innovative solutions	PO Box 76391, Lynnwoodridge, 0040	Riekie van den Bergh	+27 82 552 3659	Audit	03-Mar-20	1	0,5	Auditor
2021: ISO14001: 2015	Conducted a Stage 1 Audit at Masmagnet	PECB		Riekie van den Bergh	+27 82 552 3659	Audit	19-Apr-21	1	1	Auditor
2021: ISO14001: 2015	Conducted a Stage 2 Audit at Masmagnet	PECB		Riekie van den Bergh	+27 82 552 3659	Audit	21-Apr-21	2	1	Auditor
2021: ISO14001: 2015	Conducted a Stage 1 Audit for FullServe	Prescali	746 Wiedrigh street, Moreleta Park	Elaine van der Linde	+27 12 543 3808	Audit	12-Oct-21	0	1	Auditor

18 Other Regulatory Audits (2008 to Current)

Project	Outline	Organisation	Contact person	Contact details	Date	On site (day)	Off Site (day)	Role (L / A)	Type (Regulatory)	Details (WUL / EMPR/ Licence/ Legal)
M2 Environmental Connections (Pty) Ltd: Mr Morne de Jager (c) 082 565 4059										
2011: Environmental Authorisation Audit	Audit on the Environmental Authorisation for the Samancor Lannex New Tailings storage facility	Samancor Chrome Ltd: Eastern Chrome Mines:	Ms Elsie Mashishi	+27 13 230 7027 / +27 72 203 0990 elsie.mashishi@samancorcr.com	20-Mar-12	1	0,5	A	Regulatory	Licence
2012: Legislation audit	Tweefontein Section: Conducted an audit on legislative compliance of the mine (NEMA, NWA, NEMWA)	Samancor Chrome Ltd: Eastern Chrome Mines:	Ms Elsie Mashishi	+27 13 230 7027 / +27 72 203 0990 elsie.mashishi@samancorcr.com	11-Sep-12	2	2	L	Regulatory	Legal
2012: NEMA/NEMWA Audits	Conducted an internal legal audit on the Doornbosch/Steelpoort sections activities.	Samancor Chrome Ltd: Eastern Chrome Mines:	Ms Elsie Mashishi	+27 13 230 7027 / +27 72 203 0990 elsie.mashishi@samancorcr.com	18-20 January 2012	1	1	L	Regulatory	Legal
2012: NEMA/NEMWA Audits	Conducted a legal audit on the sections activities for Lannex Section	Samancor Chrome Ltd: Eastern Chrome Mines:	Ms Elsie Mashishi	+27 13 230 7027 / +27 72 203 0990 elsie.mashishi@samancorcr.com	18-20 January 2012	1	1	L	Regulatory	Legal
2012: WUL Audit	Conducted an external audit on the licensee's compliance with the water use licence conditions for Lannex Section	Samancor Chrome Ltd: Eastern Chrome Mines:	Ms Elsie Mashishi	+27 13 230 7027 / +27 72 203 0990 elsie.mashishi@samancorcr.com	18-20 January 2012	0,5	1	L	Regulatory	Licence
2012: WUL Audit	Conducted an external audit on the licensee's compliance with the water use licence conditions for Doornbosch/Steelpoort	Samancor Chrome Ltd: Eastern Chrome Mines:	Ms Elsie Mashishi	+27 13 230 7027 / +27 72 203 0990 elsie.mashishi@samancorcr.com	18-20 January 2012	0,5	1	L	Regulatory	Licence

CHRISTINA PETRONELLA ERASMUS

Project	Outline	Organisation	Contact person	Contact details	Date	On site (day)	Off Site (day)	Role (L / A)	Type (Regulatory)	Details (WUL / EMPR/ Licence/ Legal)
2012: WUL Audit	Conducted a legal audit on the compliance with the WUL for Lannex Section	Samancor Chrome Ltd: Eastern Chrome Mines:	Ms Elsie Mashishi	+27 13 230 7027 / +27 72 203 0990 elsie.mashishi@samancorcr.com	18-20 January 2012	0,5	1	L	Regulatory	Licence
2013: WUL Audit	Conducted an external audit on the licensee's compliance with the water use licence conditions for Doornbosch/Steelpoort	Samancor Chrome Ltd: Eastern Chrome Mines:	Ms Elsie Mashishi	+27 13 230 7027 / +27 72 203 0990 elsie.mashishi@samancorcr.com	9 - 11 December 2013	1,5	1	L	Regulatory	Licence
2013: WUL Audit	Conducted an external audit on the licensee's compliance with the water use licence conditions for Lannex Section	Samancor Chrome Ltd: Eastern Chrome Mines:	Ms Elsie Mashishi	+27 13 230 7027 / +27 72 203 0990 elsie.mashishi@samancorcr.com	10 - 11 December 2013	1,5	1	L	Regulatory	Licence
2015: Water use license audit	Conducted an external audit on the licensee's compliance with the water use licence conditions for Doornbosch/Steelpoort	Samancor Chrome Ltd: Eastern Chrome Mines:	Ms Elsie Mashishi	+27 13 230 7027 / +27 72 203 0990 elsie.mashishi@samancorcr.com	7 - 9 April 2015	1,5	1	L	Regulatory	Licence
2015: Water use license audit	Conducted an external audit on the licensee's compliance with the water use licence conditions for Lannex Section	Samancor Chrome Ltd: Eastern Chrome Mines:	Ms Elsie Mashishi	+27 13 230 7027 / +27 72 203 0990 elsie.mashishi@samancorcr.com	7 - 9 April 2015	1,5	1	L	Regulatory	Licence
2016: WUL Audit	Conducted the External Water Use Licence audit for Lannex Section	Samancor Chrome Ltd: Eastern Chrome Mines:	Ms Elsie Mashishi	+27 13 230 7027 / +27 72 203 0990 elsie.mashishi@samancorcr.com	25 - 29 April 2016	1	1	L	Regulatory	Licence

CHRISTINA PETRONELLA ERASMUS

Project	Outline	Organisation	Contact person	Contact details	Date	On site (day)	Off Site (day)	Role (L / A)	Type (Regulatory)	Details (WUL / EMPR/ Licence/ Legal)
2016: WUL Audit	Conducted the External Water Use Licence audit for Spitskop Section	Samancor Chrome Ltd: Eastern Chrome Mines:	Ms Elsie Mashishi	+27 13 230 7027 / +27 72 203 0990 elsie.mashishi@samancorcr.com	25 - 29 April 2016	1	1	L	Regulatory	Licence
2016: WUL Audit	Conducted the External Water Use Licence audit for Tweefontein Section	Samancor Chrome Ltd: Eastern Chrome Mines:	Ms Elsie Mashishi	+27 13 230 7027 / +27 72 203 0990 elsie.mashishi@samancorcr.com	07-Sep-16	2	1	L	Regulatory	Licence
2016: WUL Audit	Conducted the External Water Use Licence audit for Doornbosch/Steelpoort Section	Samancor Chrome Ltd: Eastern Chrome Mines:	Ms Elsie Mashishi	+27 13 230 7027 / +27 72 203 0990 elsie.mashishi@samancorcr.com	24-Apr-17	1	1	L	Regulatory	Licence
2017: Environmental Authorisation audit	Conducted on audit on the compliance with the Environmental authorisation for the new tailings dam at Lannex	Samancor Chrome Ltd: Eastern Chrome Mines:	Ms Elsie Mashishi	+27 13 230 7027 / +27 72 203 0990 elsie.mashishi@samancorcr.com	01-Mar-17	1	1	L	Regulatory	Licence
2017: Waste management Licence audit	Conducted a performance assessment on compliance with the Waste management licence for the new slimes dam	Samancor Chrome Ltd: Ferrometals	Ms Prenisha Chetty	+27 13 693 7438 / +27 72 575 2957 prenisha.chetty@samancorcr.com	23-May-17	1	2	L	Regulatory	Licence
2017: Waste management Licence audit	Conducted a performance assessment on compliance with the Waste management licence for the new slimes dam	Samancor Chrome Ltd: Ferrometals	Ms Prenisha Chetty	+27 13 693 7438 / +27 72 575 2957 prenisha.chetty@samancorcr.com	29-Nov-17	1	2	L	Regulatory	Licence

CHRISTINA PETRONELLA ERASMUS

Project	Outline	Organisation	Contact person	Contact details	Date	On site (day)	Off Site (day)	Role (L / A)	Type (Regulatory)	Details (WUL / EMPR/ Licence/ Legal)
2017: Waste Management licence audit	Conducted a performance assessment on compliance with the Waste management licence for the Decommissioning of the Northern Slimes dam	Samancor Chrome Ltd: Ferrometals	Ms Prenisha Chetty	+27 13 693 7438 / +27 72 575 2957 prenisha.chetty@samancorcr.com	13-Sep-17	1	2	L	Regulatory	Licence
2017: Waste Management licence audit	Conducted a performance assessment on compliance with the Waste management licence for the Decommissioning of the Various Slimes dams	Samancor Chrome Ltd: Ferrometals	Ms Prenisha Chetty	+27 13 693 7438 / +27 72 575 2957 prenisha.chetty@samancorcr.com	13-Sep-17	1	1	L	Regulatory	Licence
2017: Waste Management licence audit	Conducted a performance assessment on compliance with the Waste management licence for the Slag dump	Samancor Chrome Ltd: Ferrometals	Ms Prenisha Chetty	+27 13 693 7438 / +27 72 575 2957 prenisha.chetty@samancorcr.com	29-Nov-17	1	2	L	Regulatory	Licence
2017: WUL Audit	Conducted a Water use licence audit.	Samancor Chrome Ltd: Ferrometals	Ms Elsie Mashishi	+27 13 230 7027 / +27 72 203 0990 elsie.mashishi@samancorcr.com	30-Nov-17	1	1	L	Regulatory	Licence
2017: WUL Audit	Conducted the External Water Use Licence audit for Lannex Section	Samancor Chrome Ltd: Eastern Chrome Mines:	Ms Elsie Mashishi	+27 13 230 7027 / +27 72 203 0990 elsie.mashishi@samancorcr.com	8 - 11 May 2017	1	1	L	Regulatory	Licence

CHRISTINA PETRONELLA ERASMUS

Project	Outline	Organisation	Contact person	Contact details	Date	On site (day)	Off Site (day)	Role (L / A)	Type (Regulatory)	Details (WUL / EMPR/ Licence/ Legal)
2017: WUL Audit	Conducted the External Water Use Licence audit for Spitskop Section	Samancor Chrome Ltd: Eastern Chrome Mines:	Ms Elsie Mashishi	+27 13 230 7027 / +27 72 203 0990 elsie.mashishi@samancorcr.com	14-16 March 2017	1	1	L	Regulatory	Licence
2017: WUL Audit	Conducted the External Water Use Licence audit for Tweefontein Section	Samancor Chrome Ltd: Eastern Chrome Mines:	Ms Elsie Mashishi	+27 13 230 7027 / +27 72 203 0990 elsie.mashishi@samancorcr.com	9 - 10 May 2017	2	1	L	Regulatory	Licence
2017: WUL Audit	Conducted the External Water Use Licence audit for Doornbosch/Steelpoort Section	Samancor Chrome Ltd: Eastern Chrome Mines:	Ms Elsie Mashishi	+27 13 230 7027 / +27 72 203 0990 elsie.mashishi@samancorcr.com	14-16 March 2017	1	1	L	Regulatory	Licence
2017: WUL Audit	Conducted the External Water Use Licence audit for Lwala Section	Samancor Chrome Ltd: Eastern Chrome Mines:	Ms Elsie Mashishi	+27 13 230 7027 / +27 72 203 0990 elsie.mashishi@samancorcr.com	28-Feb-17	1	1	L	Regulatory	Licence
Prescali Environmental Consultants (Pty) Ltd: Ms Elaine van der Linde (c) 082 853 4170										
2010: Environmental Authorisation Audit	Conducted the audit on the Environmental Authorisation for the Samancor Lannex New Tailings storage facility	Samancor Chrome Ltd: Eastern Chrome Mines:	Ms Elsie Mashishi	+27 13 230 7027 / +27 72 203 0990 elsie.mashishi@samancorcr.com	05-Oct-10	1	1	L	Regulatory	Licence
2011: Environmental Authorisation Audit	Conducted an audit on the compliance with the requirements of the EMPR	IFMSA	Sonja Lemmer	+27 82 334 0778	15-Dec-10	1	1	A	Regulatory	EMPR
2011: Environmental Authorisation Audit	Audit on the Environmental Authorisation for the Samancor Lannex New Tailings storage facility	Samancor Chrome Ltd: Eastern Chrome Mines:	Ms Elsie Mashishi	+27 13 230 7027 / +27 72 203 0990 elsie.mashishi@samancorcr.com	02-May-11	1	0,5	A	Regulatory	Licence

CHRISTINA PETRONELLA ERASMUS

Project	Outline	Organisation	Contact person	Contact details	Date	On site (day)	Off Site (day)	Role (L / A)	Type (Regulatory)	Details (WUL / EMPR/ Licence/ Legal)
2011: GN704 Audit	Conducted a GN704 audit on the existing activities at the mine	Andalusite Resources (Pty) Ltd	Tienie de Jager	+147860061 tienie@maroeloes.co.za	17-Jun-11	1	1	L	Regulatory	Legal
2011: GN704 Audit	Audit on the Environmental Authorisation for the Samancor Lannex New Tailings storage facility	Samancor Chrome Ltd: Eastern Chrome Mines:	Ms Elsie Mashishi	+27 13 230 7027 / +27 72 203 0990 elsie.mashishi@samancorcr.com	09-Sep-11	1	0,5	A	Regulatory	Licence
2011: WUL Audit	Conducted the External Water Use Licence audit for Apollo brick	Apollo Brick	Omphemetse Plaatjies	+11 848 2017 / +27 71 681 6363 she.abg@apollobrick.com	16-Sep-11	1	1	A	Regulatory	Licence
2011: WUL Audit	Conducted a GN704 audit on the existing activities at the mine	Andalusite Resources (Pty) Ltd	Tienie de Jager	+147860061 tienie@maroeloes.co.za	21-Sep-11	1	1	L	Regulatory	Legal
2011: Environmental Performance Assessment	Conducted the External Water Use Licence audit for Apollo brick	Apollo Brick	Omphemetse Plaatjies	+11 848 2017 / +27 71 681 6363 she.abg@apollobrick.com	20-Jul-12	1	1	A	Regulatory	Licence
2012: WUL Audit	Conducted an external audit on the licensee's compliance with the water use licence conditions.	IFMSA	Sonja Lemmer	+27 82 334 0778	22-Aug-12	1	1	A	Regulatory	Licence
2013: WUL Audit	Conducted an external audit on the Mining right holders compliance with the EMPR.	Sky Chrome Mining	Sonja Lemmer	+27 82 334 0778	09-May-13	1	0,5	A	Regulatory	EMPR
2012: WUL Audit	Conducted the External Water Use Licence audit for Apollo brick	Apollo Brick	Omphemetse Plaatjies	+11 848 2017 / +27 71 681 6363 she.abg@apollobrick.com	05-Jul-13	1	1	A	Regulatory	Licence

CHRISTINA PETRONELLA ERASMUS

Project	Outline	Organisation	Contact person	Contact details	Date	On site (day)	Off Site (day)	Role (L / A)	Type (Regulatory)	Details (WUL / EMPR/ Licence/ Legal)
2013: WUL audit	Conducted an external audit on the licensee's compliance with the water use licence conditions.	IFMSA	Sonja Lemmer	+27 82 334 0778	05-Sep-13	1	1	A	Regulatory	Licence
2014: EMPR audit	Conducted the External Water Use Licence audit	Andalusite Resources (Pty) Ltd	Tienie de Jager	+147860061 tienie@maroeloes.co.za	03-Dec-13	1	1	L	Regulatory	Licence
2014: EMPR audit	Conducted an external audit on the Mining right holders compliance with the EMPR.	Sky Chrome Mining	Sonja Lemmer	+27 82 334 0778	11-Jun-14	1	0,5	L	Regulatory	EMPR
2014: WUL Audit	Conducted an external audit on the licensee's compliance with the water use licence conditions.	IFMSA	Sonja Lemmer	+27 82 334 0778	12-Sep-14	1	1	L	Regulatory	Licence
2014: EMPR audit	Conducted the External Water Use Licence audit for Apollo brick	Apollo Brick	Omphemetse Plaatjies	+11 848 2017 / +27 71 681 6363 she.abg@apollobrick.com	21-Oct-14	1	1	A	Regulatory	Licence
2014: WUL Audit	Conducted an external audit on the Mining right holders compliance with the EMPR.	IFMSA	Sonja Lemmer	+27 82 334 0778	18-Nov-14	1	0,5	A	Regulatory	EMPR
2014: WUL Audit	Conducted an external Water use licence audit	IFMSA	Sonja Lemmer	+27 82 334 0778	18-Nov-14	1	0,5	A	Regulatory	Licence
2015: EMPR audit	Conducted an external audit on the Mining right holders compliance with the EMPR.	Sky Chrome Mining	Sonja Lemmer	+27 82 334 0778	29-Apr-15	1	1	A	Regulatory	EMPR

CHRISTINA PETRONELLA ERASMUS

Project	Outline	Organisation	Contact person	Contact details	Date	On site (day)	Off Site (day)	Role (L / A)	Type (Regulatory)	Details (WUL / EMPR/ Licence/ Legal)
2015: WUL Audit	Conducted an external audit on the licensee's compliance with the water use licence conditions.	Phoenix Platinum	Carla Reinecke	+27 83 701 9328 phsco@sylvania.co.za	09-Oct-15	1	1	A	Regulatory	Licence
2015: WUL Audit	Conducted an external audit on the licensee's compliance with the water use licence conditions.	Apollo Brick (Pty) Ltd	Omphemetse Plaatjies	+11 848 2017 / +27 71 681 6363 she.abg@apollobrick.com	19-Oct-15	1	1	A	Regulatory	Licence
2015: WUL Audit	Conducted an external audit on the licensee's compliance with the water use licence conditions.	Illitha Mining	Jacques Prinsloo	+27 79 525 9255 jprinsloo@afarak.co.za	22-Oct-15	1	1	L	Regulatory	Licence
2016: WUL Audit	Conducted the External Water Use Licence audit for Mecklenburg	Afarak	Jacques Prinsloo	+27 79 525 9255 jprinsloo@afarak.co.za	26-May-16	1	0,5	L	Regulatory	Licence
2016: WUL Audit	Conducted an external audit on the licensee's compliance with the water use licence conditions.	Apollo Brick (Pty) Ltd	Omphemetse Plaatjies	+11 848 2017 / +27 71 681 6363 she.abg@apollobrick.com	22-Sep-16	1	1	L	Regulatory	Licence
2016: WUL Audit	Conducted an external audit on the licensee's compliance with the water use licence conditions.	Phoenix Platinum	Carla Reinecke	+27 83 701 9328 phsco@sylvania.co.za	20-Oct-16	1	1	L	Regulatory	Licence
2017: NEMA listed activities audit	Conducted an audit to determine if Diesel tanks installation required an Environmental Authorisation	Sylvania Lannex Section	Albert Jordaan	+27 82 307 7364 albert@sylvania.co.za	12-May-17	1	1	L	Regulatory	Legal
2017: Performance assessment	Conducted a Water use licence audit.	Phoenix Platinum	Carla Reinecke	+27 83 701 9328 phsco@sylvania.co.za	11-Sep-17	1	1	L	Regulatory	Licence

CHRISTINA PETRONELLA ERASMUS

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2017: WUL Audit	Conducted a performance assessment on the EMPR for the tailings dam.	Phoenix Platinum	Carla Reinecke	+27 83 701 9328 phsco@sylvania.co.za	10-Nov-17	1	1	L	Regulatory	EMPR
2018: WULA Audit	Water use licence audit for Moeijelijk Mine: Bauba	Red Kite Environmental Solutions (Pty) Ltd	Nicole Upton	+27 79 555 2433 nicole@redkiteconsulting.co.za	13-Apr-18	1	1	L	Regulatory	WUL
2018: WUL Audit	External Water Use Licence audit for the Kingdom Development Company	M2 Environmental Connections (Pty) Ltd	Hanjo Fourie	+27 012 004 0362 hanjo@menco.co.za	09-Aug-18	1	0,5	L	Regulatory	WUL
2018: WUL Audit	Internal audit on the WUL for Phoenix Platinum	Phoenix Platinum	Carla Reinecke	+27 83 701 9328 phsco@sylvania.co.za	20-Aug-18	1	0,5	A	Regulatory	WUL
2018: WUL Audit	Conducted an external audit on the licensee's compliance with the water use licence conditions.	Brakkefontein Clay Pridcyts (PTY) Ltd trading as Apollo Brick (Pty) Ltd	Omphemetse Plaatjies	+11 848 2017 / +27 71 681 6363 she.abg@apollobrick.com	11-Sep-18	1	0,5	A	Regulatory	WUL
2018: WUL Audit	Water use licence audit for Moeijelijk Mine: Bauba	Red Kite Environmental Solutions (Pty) Ltd	Nicole Upton	+27 79 555 2433 nicole@redkiteconsulting.co.za	12-Sep-18	1	1	L	Regulatory	WUL
2018: Performance assessment	Conducted an audit and a performance assessment on the approved EIA/EMP	Matutu Clay mine (Pty) Ltd	Dewald Haasbroek	+27769674280 dewald@matutu.co.za	13-Nov-18	0,5	1,5	L	Regulatory	EIA/EMP
2018: WUL Audit	Conducted an external audit on the licensee's compliance with the water use licence conditions: Sefateng Chrome Mine (Pty) Ltd	Red Kite Environmental Solutions (Pty) Ltd	Nicole Upton	+27 79 555 2433 nicole@redkiteconsulting.co.za	29-Nov-18	0,5	1,5	L	Regulatory	WUL

CHRISTINA PETRONELLA ERASMUS

Project	Outline	Organisation	Contact person	Contact details	Date	On site (day)	Off Site (day)	Role (L / A)	Type (Regulatory)	Details (WUL / EMPR/ Licence/ Legal)
2018: WUL Audit	Conducted an external audit on the licensee's compliance with the water use licence conditions: Chevron SA - Millies	M2 Environmental Connections (Pty) Ltd	Hanjo Fourie	+27 012 004 0362 hanjo@menco.co.za	11-Dec-18	0,5	1,5	L	Regulatory	WUL
2018: WUL Audit	Conducted an external audit on the licensee's compliance with the water use licence conditions: Omnia Fertilisers - Rustenburg	EOH	Riekie van den Bergh	+27 87 405 1818 Riekie.vdBerg@eoh.com	22-Jan-19	1	1	Lead	Regulatory	WUL
2018: WUL Audit	Conducted an external audit on the licensee's compliance with the water use licence conditions: Omnia Fertilisers - Sasolburg	EOH	Riekie van den Bergh	+27 87 405 1818 Riekie.vdBerg@eoh.com	15-Jan-19	1	1	Lead	Regulatory	WUL
2018: WUL Audit	Conducted an external audit on the licensee's compliance with the water use licence conditions: Grasvally Chrome Mine	Sylvania	Albert Jordaan	+27 82 307 7364 albert@sylvania.co.za	05 June 2019	1	1	Lead	Regulatory	WUL
2019: Performance Assessment	Conducted an audit and a performance assessment on the approved EIA/EMP: Bauba - Moeijelijk Chrome Mine	Bauba (sub-contracted by Red Kite)	Nicole Upton	+27 79 555 2433 nicole@redkiteconsulting.co.za	14-Aug-19	1	1	Lead	Regulatory	EMPR
2019: WUL Audit	Conducted an external audit on the licensee's compliance with the water use licence conditions: Bauba - Moeijelijk Chrome Mine	Bauba (sub-contracted by Red Kite)	Nicole Upton	+27 79 555 2433 nicole@redkiteconsulting.co.za	01-Aug-19	1	1	Lead	Regulatory	WUL

CHRISTINA PETRONELLA ERASMUS

Project	Outline	Organisation	Contact person	Contact details	Date	On site (day)	Off Site (day)	Role (L / A)	Type (Regulatory)	Details (WUL / EMPR/ Licence/ Legal)
2019: WUL Audit	Assisted in conducting the WUL audit for Apollo Brick	Apollo Brick	Omphemetse Plaatjies	+11 848 2017 / +27 71 681 6363 she.abg@apollobrick.com	02-Oct-19	1	1	Auditor	Regulatory	WUL
Assisted in conducting the WUL audit for Apollo Brick	Assisted in conducted an external audit on the licensee's compliance with the water use licence conditions: Omnia Fertilisers - Sasolburg	Inlexo Innovative solutions	Riekie van den Bergh	+27 82 552 3659	09-Dec-19	1	1	Auditor	Regulatory	WUL
2019: WUL Audit	Assisted in conducting the WUL audit for Phoenix Platinum	Phoenix Platinum	Oupa Chidi	phsco@sylvania.co.za	28 November 2019	1	1	Auditor	Regulatory	WUL
2020: WUL Audit	Conducted an external audit on the licensee's compliance with the water use licence conditions: Bauba - Moeijelijk Chrome Mine	Bauba (sub-contracted by Red Kite)	Nicole Upton	+27 79 555 2433 nicole@redkiteconsulting.co.za	29-Jan-20	1	1	Lead	Regulatory	WUL
2020: WUL Audit	Conducted an external audit on the licensee's compliance with the water use licence conditions: Grasvally Chrome Mine	Sylvania	Albert Jordaan	+27 82 307 7364 albert@sylvania.co.za	27 January 2020	1	1	Lead	Regulatory	WUL
2020: Performance Assessment	Conducted an audit and a performance assessment on the approved EIA/EMP: Bauba - Moeijelijk Chrome Mine	Bauba (sub-contracted by Red Kite)	Nicole Upton	+27 79 555 2433 nicole@redkiteconsulting.co.za	27 January 2020	1	1	Auditor	Regulatory	EMPR
2020: WUL Audit	Conducted the Water use licence compliance audit for Moeijelijk Chrome Mine	Bauba (sub-contracted by Red Kite)	Nicole Upton	+27 79 555 2433 nicole@redkiteconsulting.co.za	24 August 2020	1	1	Lead	Regulatory	WUL

CHRISTINA PETRONELLA ERASMUS

Project	Outline	Organisation	Contact person	Contact details	Date	On site (day)	Off Site (day)	Role (L / A)	Type (Regulatory)	Details (WUL / EMPR/ Licence/ Legal)
2020: Performance Assessment	Assisted in the Performance assessment for Moejelijk Chrome Mine	Bauba (sub-contracted by Red Kite)	Nicole Upton	+27 79 555 2433 nicole@redkiteconsulting.co.za	24 August 2020	1	1	Auditor	Regulatory	EMPR
2020: Performance Assessment	Conducted the performance assessment on the approved EIA/EMP for the Vlakpoort Chrome mine	Destiny Springs Investments 11 (Pty) Ltd (subsidiary of Illitha Mining)	Moffet Mabelane	+27 82 294 2449 moffet@ilithamining.co.za	12 November 2020	0,5	1	Auditor	Regulatory	EMPR
2020: WUL Audit	Conducted the water use licence compliance audit for Omnia Sasolburg	Inlexo Innovative solutions	Riekie van den Bergh	+27 82 552 3659	09 December 2020	1,5	0,5	Auditor	Regulatory	WUL
2020: Performance Assessment	Conducted the performance assessment on the approved EIA/EMP for the Macarthy Manganese Mine	Salene Manganese	Jan Gerber	+27 83 795 1653 jgerber@salenemanganese.com	02 November 2020	1	1	Auditor	Regulatory	EMPR
2021: WUL Audit	Conducted the water use licence compliance audit for Omnia Sasolburg	Inlexo Innovative solutions	Riekie van den Bergh	+27 82 552 3659	08 December 2021	1,5	0,5	Auditor	Regulatory	WUL
2021: WUL Audit	Conducted the Water use licence compliance audit for Moejelijk Chrome Mine	Bauba (sub-contracted by Red Kite)	Nicole Upton	+27 79 555 2433 nicole@redkiteconsulting.co.za	14 September 2021	1	1	Lead	Regulatory	WUL
2021: EMPr performance	Conducted the EMPr performance assessment for the Thutsi Mine	Thutsi			04 August 2021	1	1	Auditor	Regulatory	EMPR
2022: WUL Audit	Conducted the Annual external water use licence audit for Grasvally Chrome Mine	Sylvania	Rob Steen	rob@sylvania.co.za	18 January 2022	1	1	Lead	Regulatory	WUL

CHRISTINA PETRONELLA ERASMUS

Project	Outline	Organisation	Contact person	Contact details	Date	On site (day)	Off Site (day)	Role (L / A)	Type (Regulatory)	Details (WUL / EMPR/ Licence/ Legal)
2022: WUL Audit	Conducted the Annual External Water Use Licence Audit for Umgeni Waters: Howick	Umgeni Water Board	Lesailane Mphafudi	lesailane.mphafudi@umgeni.co.za	23 March 2022	1	1	Lead	Regulatory	WUL
2022: WUL Audit	Conducted the Annual External Water Use Licence Audit for Umgeni Waters: Darvill	Umgeni Water Board	Lesailane Mphafudi	lesailane.mphafudi@umgeni.co.za	22 March 2022	1	1	Lead	Regulatory	WUL
2022: WUL Audit	Conducted the Annual External Water Use Licence Audit for Umgeni Waters: Mtwalume	Umgeni Water Board	Lesailane Mphafudi	lesailane.mphafudi@umgeni.co.za	05 April 2022	1	1	Lead	Regulatory	WUL
2022: WUL Audit	Conducted the Annual External Water Use Licence Audit for Umgeni Waters: Amanzimtoti	Umgeni Water Board	Lesailane Mphafudi	lesailane.mphafudi@umgeni.co.za	06 April 2022	1	1	Lead	Regulatory	WUL

19 Detailed information on training provided

Project	Outline	Organisation	Contact	Date
2018: Environmental Legislation awareness	Environmental Law (NEMA) for Protechnic a division of ARMSCOR	EOH	Riekie van den Berg '+27 82 552 3659	24-May-18
2018: Environmental Legislation awareness	Environmental Law (NEMA) for Protechnic a division of ARMSCOR	EOH	Riekie van den Berg '+27 82 552 3659	29-May-18
2018: ISO14001:2015 Transition	Training Omnia Fertiliser on ISO14001: 2015 transitional requirements	EOH	Riekie van den Berg '+27 82 552 3659	22-May-18
2018: ISO14001:2015 Transition	Training Omnia Fertiliser on ISO14001: 2015 transitional requirements	EOH	Riekie van den Berg '+27 82 552 3659	30-May-18
2018: ISO14001:2015 Transition	Training Omnia Fertiliser on ISO14001: 2015 transitional requirements	EOH	Riekie van den Berg '+27 82 552 3659	20-Sep-18
2018: ISO14001:2015 Transition	2 Day ISO14001:2015 transition	PECB	Riekie van den Berg '+27 82 552 3659	08-Oct-18
2018: ISO14001:2015 Implementation	2 Day ISO14001:2015 implementation	EOH	Riekie van den Berg '+27 82 552 3659	20-Nov-18
2019: Environmental Legislation awareness	Environmental Law for Omnia Fertilisers (Delmas, Durban, Wesselsbron and Cape Town)	Inlexo Innovative Solutions	Riekie van den Berg '+27 82 552 3659	22 August 2019 29 August 2019 19 September 2019 6 November 2019
2020: Environmental Legislation awareness	Environmental Law for Omnia Fertilisers: Sasolburg	Inlexo Innovative Solutions	Riekie van den Berg '+27 82 552 3659	21-22 October 2020 18-19 November 2020
2021: Environmental Legislation awareness	Environmental Law for Omnia Fertilisers: Sasolburg	Inlexo Innovative Solutions	Riekie van den Berg '+27 82 552 3659	17-18 February 2021
2021: Environmental Legislation awareness	Environmental Law for BMW South Africa	Inlexo Innovative Solutions	Riekie van den Berg '+27 82 552 3659	28 May 2021 30 May 2021 19 June 2021 21 June 2021
2021: ISO14001	ISO14001: Lead Auditor	PECB	Riekie van den Berg	6 - September 2021

CHRISTINA PETRONELLA ERASMUS

Project	Outline	Organisation	Contact	Date
			'+27 82 552 3659	22 - 23 September 2021
2021: Environmental Awareness in project planning	Compilation of training material and presentation for BMW Rosslyn	Inlexo Innovative Solutions	Riekie van den Berg '+27 82 552 3659	10-Dec-21
2022: Environmental Legislation awareness	Environmental Law for Omnia Fertilisers: Sasolburg	Inlexo Innovative Solutions	Riekie van den Berg '+27 82 552 3659	01-Feb-22

20 Other Projects outline (2008 to Current)

Outline	Company	Section	Type	Completion date
Determine the water requirements for the mine and detail the water balance as per the Department of Water Affairs requirements.	Ruighoek chrome mine	Ruighoek	Water balance	07 August 2008
Drafting a Storm water Management report that complies with Department of the Water Affairs requirements to outline management aspects and storm water catchment at the clients site.	Vesuvius SA	Clayville	Storm water	04 November 2008
Compiled the Integrated Water and Resource Management plan for the mine that was used as supporting information in the Water use licence application. Elandsfontein	Apollo Brick (Pty) Ltd	Elandsfontein	IWWMP	02 February 2009
Compiled the EIA and EMP for the mine as part of the Mining right conversion for the Buffelsfontein Sections	Samancor Western Chrome Mines	Buffelsfontein	EIA/EMP	05 May 2009
Compiled the EIA and EMP for the mine as part of the Mining right conversion for the Mooinooi Sections	Samancor Western Chrome Mines	Mooinooi	EIA/EMP	05 May 2009
Drafted the Scoping Report for the EIA/EMP for Jagdlust Section	Samancor Eastern Chrome Mines	Jagdlust	Scoping Report	19 May 2009
Compiled the EIA and EMP for the mine as part of the Mining right conversion, also compiled the EIA and EMP for new mining right on additional properties. Portion 7 and 10 of Elandsfontein	Apollo Brick (Pty) Ltd	Elandsfontein	EIA/EMP	20 May 2009
Compiled the Integrated Water and Resource Management plan for the mine that was used as supporting information in the Water use licence application for the Nerston Port of Entry	Virtual Consulting Engineers	Nerston port of entry	IWWMP	17 July 2009
Conducted the surface water assessment for the Twyfelaar Chrome Mine.	MTC Minerals / CMR	Twyfelaar	Surface water	30 July 2009
Conducted and compiled the Basic Assessment for the upgrade of the Waste water treatment works at the Nerston Port of Entry.	Virtual Consulting Engineers	Nerston port of entry	Basic Assessment	03 August 2009
Compiled the Emergency Rehabilitation Plan for the activities that occurred on the farm Middelpunt, Mpumalanga	Richmond Mining & Exploration	Middelpunt	Emergency Rehabilitation	18 September 2009
Drafted the Salt Balance for the Sefateng Chrome Mine.	MTC Minerals / CMR	Sefateng	Salt balance	13 October 2009
Drafted the water Balance for the Sefateng Chrome Mine.	MTC Minerals / CMR	Sefateng	Water balance	13 October 2009
Assisted with the finalisation of the application for a water use licence for the Rustenburg Waste Water Treatment works.	SRK	Rustenburg Local Municipality	WULA	15 October 2009
Compiled the Salt Balance report for the existing operations	Andalusite Resources (Pty) Ltd	Maroeloesfontein	Salt balance	19 November 2009

CHRISTINA PETRONELLA ERASMUS

Outline	Company	Section	Type	Completion date
Compiled the EIA and EMP for the mine as part of the Mining right conversion for the Elandsdrift Section	Samancor Western Chrome Mines	Elandsfontein	EIA/EMP	26 November 2009
Drafted the Salt Balance for the Twyfelaar Chrome Mine.	MTC Minerals / CMR	Twyfelaar	Salt balance	01 December 2009
Drafted the water Balance for the Twyfelaar Chrome Mine.	MTC Minerals / CMR	Twyfelaar	Water balance	01 December 2009
Compiled the Integrated Water and Resource Management plan for the Twyfelaar Chrome mine	MTC Minerals / CMR	Twyfelaar	IWWMP	02 December 2009
Water use licence application process for the Twyfelaar Chrome Mine	MTC Minerals / CMR	Twyfelaar	WULA	02 December 2009
Compiled the Integrated Water and Resource Management plan for the Lannex Section's New Tailings dam	Samancor Eastern Chrome Mines	Lannex	IWWMP	14 January 2010
Compiled the Integrated Water and Resource Management plan for the Middelpunt mine (Mpumalanga) that was used as supporting information in the Water use licence application.	Ibhubesi Ore and Exploration (Pty) Ltd (Richmond Mining & Exploration)	Middelpunt	IWWMP	01 March 2010
Conducted the surface water assessment for the Fumani Mine.	Corridor Mining Resources	Fumani Gold Mine	Surface water	01 March 2010
Drafted the Salt Balance for the Fumani Mine.	Corridor Mining Resources	Fumani Gold Mine	Water and Salt Balance	01 March 2010
Water use licence application process for the Middelpunt activities.	Ibhubesi Ore and Exploration (Pty) Ltd (Richmond Mining & Exploration)	Middelpunt	WULA	01 March 2010
Compiled the Integrated Water and Resource Management plan small scale mining activities at Sefateng Chrome Mine	MTC Minerals / CMR	Sefateng	IWWMP	05 March 2010
Compiled the Integrated Water and Resource Management plan for Andalusite Resource Maroeloefontein Mine	Andalusite Resources (Pty) Ltd	Maroeloefontein	IWWMP	09 March 2010
Compiled the Integrated Water and Resource Management plan for Andalusite Resource Maroeloefontein Mine	Andalusite Resources (Pty) Ltd	Maroeloefontein	WULAR	09 March 2010
Conducted the surface water assessment for the Sefateng Chrome Mine.	MTC Minerals / CMR	Sefateng	Surface water	09 April 2010
Compilation of an IWWMP for the Water use licence process	Corridor Mining Resources	Fumani Gold Mine	IWWMP	06 May 2010
Compilation of a WULAR for the Water use licence process	Corridor Mining Resources	Fumani Gold Mine	WULAR	24 May 2010
Conducted a surface water assessment at Imbabala Colliery	Altius 345 (Pty) Ltd	Imbabala Colliery	Water and Salt Balance	05 June 2010
Facilitated the Water use licence application process for the Maroeloefontein operation	Andalusite Resources (Pty) Ltd	Maroeloefontein	Project Management	25 June 2010
Compiled the Integrated Water and Resource Management plan for the mine that was used as supporting information in the Water use licence application.	Sky Chrome Mining (Pty) Ltd	Bapong	IWWMP	14 July 2010

CHRISTINA PETRONELLA ERASMUS

Outline	Company	Section	Type	Completion date
Compiled the Integrated Water and Resource Management plan for the Buffelsfontein Sections	Samancor Western Chrome Mines	Buffelsfontein	IWWMP	12 August 2010
Compiled the Integrated Water and Resource Management plan for the Mooinooi Sections	Samancor Western Chrome Mines	Mooinooi	IWWMP	12 August 2010
Water use licence application process for the Buffelsfontein Sections	Samancor Western Chrome Mines	Buffelsfontein	WULA	12 August 2010
Water use licence application process for the Mooinooi Section	Samancor Western Chrome Mines	Mooinooi	WULA	12 August 2010
Compiled the Integrated Water and Waste Management plan for the Buffelsfontein Section	Samancor Western Chrome Mines	Buffelsfontein	IWWMP	13 August 2010
Compiled the Integrated Water and Waste Management plan for the Mooinooi Section	Samancor Western Chrome Mines	Mooinooi	IWWMP	13 August 2010
Conducted a surface water assessment at Imbabala Colliery	Altius 345 (Pty) Ltd	Imbabala Colliery	Surface water assessment	13 August 2010
Compiled the Integrated Water and Resource Management plan for the Sefateng Chrome mine	MTC Minerals / CMR	Sefateng	IWWMP	30 August 2010
Water use licence application process for the Sefateng Chrome Mine	MTC Minerals / CMR	Sefateng	WULA	30 August 2010
Compiled the Integrated Water and Resource Management plan for the Imbabala Colliery	Altius 345 (Pty) Ltd	Imbabala Colliery	IWWMP	06 September 2010
Compiled a IWWMP for the operations	Hoyohoyo Mining (Pty) Ltd	Klipfontein Colliery	IWWMP	09 September 2010
Conducted a surface water assessment for the Klipfontein Colliery	Hoyohoyo Mining (Pty) Ltd	Klipfontein Colliery	Surface water	20 September 2010
Ad-hock assistance with conducting water monitoring for the project.	Department of Water Affairs	Harties Metsi A Me project	Monitoring	31 December 2010
Reviewed an audit on the compliance with the requirements of the EMPR	IFMSA	Buffelsfontein	Review	05 January 2011
Compiled a section 24(g) application under NEMA.	IFMSA	Buffelsfontein	Section 24(g)	10 February 2011
Compiled the Water Quality Management Report as per the DWS guideline as part of the Water use licence.	Virtual Consulting Engineers	Ekuseni Youth Centre (DPW) MAGWA	IWWMP	18 February 2011
Compiled the Water Quality Management Report as per the DWS guideline as part of the Water use licence.	Virtual Consulting Engineers	Ncome Prison (DPW: Shawshank)	IWWMP	18 February 2011
Compiled an EIA/EMP for the operations	Hoyohoyo Mining (Pty) Ltd	Klipfontein Colliery	EIA/EMP	22 February 2011
Review of the water use licence application report	City of Johannesburg	Zola	Review	24 February 2011
Compiled the Integrated Water and Waste Management plan for the Millsell and Waterkloof Sections	Samancor Western Chrome Mines	Millsell/Waterkloof	IWWMP	14 March 2011

Outline	Company	Section	Type	Completion date
Water use licence application process for Millsell and Waterkloof Sections	Samancor Western Chrome Mines	Millsell/Waterkloof	WULA	14 March 2011
Compiled the water and Salt Balance	Coastal Fuels (Pty) Ltd	Droogvallei & Paardeplaats	Water and Salt Balance	17 May 2011
Compiled the Scoping and EIA/EMP Documents for the waste act application to re-use slag.	IFMSA	Buffelsfontein	Waste Management	19 May 2011
Compiled the Scoping and EIA/EMP Documents for the waste act application to re-use slag.	IFMSA	Buffelsfontein	Waste Management	19 May 2011
Review of the Avifauna report for the WPB Colliery	William Patrick Bower	Groenvlei	Reviewed	22 July 2011
Conducted the surface water assessment for the proposed solar energy facility	ACED Renewables de Aar (Pty) Ltd	De Aar	Surface water assessment	22 July 2011
Compilation of an EIA/EMP for proposed coal mining activities	William Patrick Bower	Groenvlei	EIA/EMP	26 July 2011
Reviewed the WUL Audit report for the Maroeloesfontein Operations	Andalusite Resources (Pty) Ltd	Maroeloesfontein	Review	29 September 2011
Calculated the closure quantum for the Elandsdrift Section as per the DMR guideline.	Samancor Western Chrome Mines	Buffelsfontein	Closure quantum	16 November 2011
Calculated the closure quantum for the Millsell/Waterkloof Sections as per the DMR guideline.	Samancor Western Chrome Mines	Elandsdrift	Closure quantum	16 November 2011
Calculated the closure quantum for the Mooinooi Sections as per the DMR guideline.	Samancor Western Chrome Mines	Millsell/Waterkloof	Closure quantum	16 November 2011
Calculated the closure quantum for the Mooinooi, Millsell/Waterkloof, Elandsdrift and Buffelsfontein Sections as per the DMR guideline.	Samancor Western Chrome Mines	Mooinooi	Closure quantum	16 November 2011
Compiled the EIA / EMP report for the NEMA applications.	Virtual Consulting Engineers	Ncome Prison (DPW: Shawshank)	EIA/EMP	24 November 2011
Compilation of a WULAR for Section 21(c) and (i) activities for township development	Nungu Trading 691 (Pty) Ltd	Orchards	WULAR	09 December 2011
Calculated the closure quantum as per the DMR guideline.	Porta Plant	Middelburg	Closure quantum	31 January 2012
Compilation of a closure plan for the Paardeplaats Section	Coastal Fuels (Pty) Ltd	Paardeplaats	Closure plan	01 March 2012
Compilation of a risk assessment for the closure of the Paardeplaats Section	Coastal Fuels (Pty) Ltd	Paardeplaats	Risk assessment	01 March 2012
Compilation of closure documentation for Paardeplaats	Coastal Fuels (Pty) Ltd	Paardeplaats	Closure application	09 March 2012
Drafted the EIA and EMP for the EMPR amendment as part of the Mining right conversion process.	Coastal Fuels (Pty) Ltd	Droogvallei	EIA/EMP	13 March 2012

CHRISTINA PETRONELLA ERASMUS

Outline	Company	Section	Type	Completion date
Compiled a pollution incident report	Coastal Fuels (Pty) Ltd	Witrand	Pollution incident report	13 April 2012
Compiled the Integrated Water and Waste Management plan for the mine that was used as supporting information in the Water use licence application.	Vesuvius SA	Clayville	IWWMP	10 May 2012
Facilitated the Water use licence amendment process for the Maroeloesfontein operation	Andalusite Resources (Pty) Ltd	Maroeloesfontein	Project Management	23 May 2012
Compiled a water and salt balance as per the DWS requirements for the Colliery.	Polmaise Colliery Middelburg	Polmaise Colliery	Water balance	25 May 2012
Compiled the static water and salt balance for the proposed new mining activities	Samancor Eastern Chrome Mines	Spitskop	Water and Salt Balance	30 May 2012
Compiled the surface water assessment and related impact prediction for the new mining activities	Samancor Eastern Chrome Mines	Spitskop	Surface water assessment	01 June 2012
Compiled a static water and salt balance as per the DWS requirements for the new mining activities	Samancor Eastern Chrome Mines	Lwala	Salt balance	07 June 2012
Compiled the waste management plan with classification for the new mining activities.	Samancor Eastern Chrome Mines	Spitskop	Waste Management	07 June 2012
Conducted a surface water assessment to determine impacts and current status	Polmaise Colliery Middelburg	Polmaise Colliery	Surface water assessment	14 June 2012
Reviewed the Environmental Due Diligence and Liability report for portion 155 of the farm Elandskraal 469 JQ	Phoenix Platinum	Elandskraal / Minco	Review	27 August 2012
Reviewed the EIA/EMP used in the mining right application	Samancor Eastern Chrome Mines	Jagdlust	Review	15 September 2012
Conducted a surface water assessment and impact assessment for the proposed mine.	Samancor Eastern Chrome Mines	Jagdlust	Surface water	16 September 2012
Reviewed the addendum to the approved EMP for the opencast sections	Samancor Eastern Chrome Mines	Tweefontein	Review	21 September 2012
Compiled the Integrated Water and Waste Management plan for the mine that was used as supporting information in the Water use licence application	Samancor Eastern Chrome Mines	Tweefontein	IWWMP	01 November 2012
Compiled the static water and salt balance for the existing operations.	Samancor Eastern Chrome Mines	Tweefontein	Water and Salt Balance	02 November 2012
Compiled the Integrated water and waste management plan for the Water use licence application	Samancor Eastern Chrome Mines	Spitskop	IWWMP	06 December 2012
Reviewed the WUL Audit report for the Maroeloesfontein Operations	Andalusite Resources (Pty)	Maroeloesfontein	Review	20 January 2013

Outline	Company	Section	Type	Completion date
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Conducted a surface water assessment and impact assessment for the proposed mine.	Samancor Eastern Chrome Mines	Lwala	Surface water	2013/01/22
Compiled a static water and salt balance as per the DWS requirements for the new mining activities.	Samancor Eastern Chrome Mines	Lwala	Water balance	12 February 2013
Compiled the Integrated Water and Waste Management plan for the mine that was used as supporting information in the Water use licence application.	Samancor Eastern Chrome Mines	Lwala	IWWMP	2013/03/02
Drafted the Scoping Report for the EIA/EMP for Tweefontein Section	Samancor Eastern Chrome Mines	Tweefontein	Scoping Report	08 April 2013
Review of the Hydrological report for the proposed phot-voltaic solar power generation plan	Aurora Power Solutions (Pty) Ltd	Padrooi	Review	24 April 2013
Compiled the Integrated Water and Waste Management plan for the mine that was used as supporting information in the Water use licence application.	Phoenix Platinum	Buffelsfontein	IWWMP	03 May 2013
Conducted the surface water impact and resource assessment for the proposed activities.	Chromex mining / Afarak / Ruuki	Mecklenburg Chrome Mine	Surface water	06 May 2013
Review of the EIA report for the IPP waterberg power station	Savanna Environmental (Pty) Ltd	Waterberg Power Station	Review	14 May 2013
Compiled the Integrated Water and Waste Management plan for the mine that was used as supporting information in the Water use licence application.	Chromex mining / Afarak / Ruuki	Mecklenburg Chrome Mine	IWWMP	25 May 2013
Compiled the Water quality management report for the upgrade of the Waste Water Treatment works.	Virtual Consulting Engineers	Zonderwater prison (DPW)	Project Management	29 May 2013
Compiled the Water quality management report for the upgrade of the Waste Water Treatment works.	Virtual Consulting Engineers	Zonderwater prison (DPW)	WQMR	29 May 2013
Review of the EMP for the Knopjeslaagte Fuel station development	Alza Corporation	Knojeslaagte	Review	08 July 2013
Compiled the Water quality management report for the upgrade of the Waste Water Treatment works.	Virtual Consulting Engineers	Swartkopfontein Border Post (DPW)	Section 24(g)	10 July 2013
Review of the annually updated IWWMP for Andalusite Resources	Andalusite Resources (Pty) Ltd	Maroeloefontein	Review	15 July 2013
Managed the Water Use Licence Application Process	Samancor Eastern Chrome Mines	Spitskop	Project Management	15 July 2013
Compiled the Salt Balance report for the existing operations	Andalusite Resources (Pty) Ltd	Maroeloefontein	Salt balance	30 July 2013
Review of the Noise assessment report	Aurecon	Enia	Review	01 September 2013

CHRISTINA PETRONELLA ERASMUS

Outline	Company	Section	Type	Completion date
Compiled the EIA/EMP documentation for the upgrade of the Waste Water Treatment works.	Virtual Consulting Engineers	Zonderwater prison (DPW)	EIA/EMP	18 September 2013
Compiled the Section 24(g) application documentation for the upgrade of the Waste Water Treatment works.	Virtual Consulting Engineers	Swartkopfontein Border Post (DPW)	24G Application	25 October 2013
Lannex Section: Drafted the scoping and EIA/EMP documents for the amendment of the existing mining rights.	Samancor Eastern Chrome Mines	Lannex	EIA/EMP	14 December 2013
Facilitated and compiled additional documentation for the WUL submitted in 2008	Coastal Fuels (Pty) Ltd	Droogvallei	Project Management	01 January 2014
Reviewed the care and maintenance plan for Droogvallei	Coastal Fuels (Pty) Ltd	Droogvallei	Review	03 March 2014
Compiled a surface water assessment of the rivers that could be impacted by the proposed expansion activities.	Vunene Mining	Vunene (Eco Elementum)	Surface water	17 March 2014
Review of the Biomonitoring assessment for the coal expansion project	Vunene Mining	Vunene (Eco Elementum)	Review	01 April 2014
Reviewed the EIA/EMP for the amendment of the Tweefontein section	Samancor Eastern Chrome Mines	Tweefontein	Review	15 April 2014
Reviewed the EMPR performance assessment for the Stellite operations	Chromex mining / Afarak / Ruuki	Illitha / Stellite	Review	07 July 2014
Reviewed the WUL audit for the Stellite operations	Chromex mining / Afarak / Ruuki	Illitha / Stellite	Review	07 July 2014
Updated the 2013 IWWMP report and drafted a Water balance for the licensee.	IFMSA	Buffelsfontein	Water balance	09 July 2014
Updated the existing IWWMP and water use licence application, this included drafting water balances.	Samancor Western Chrome Mines	Mooinooi	Water balance	2014/07/18
Review of the amendment of the existing EMPr for the Coal siding	Coastal Fuels (Pty) Ltd	Coal siding	Review	22 July 2014
Drafted the IWWMP for the new Saldanha operations	AfriSam	Saldanha	IWWMP	25 July 2014
Compilation of the Water Use Licence Application Report	AfriSam	Saldanha	WULAR	25 July 2014
Review of the WULAR for the new Moeijelijk Chrome Mine	Bauba	Moeijelijk Chrome Mine	Review	11 August 2014
Compiled a surface water assessment of the rivers that could be impacted by the proposed Iron Smelting Activities	Pan Palladium South Africa (Pty) Ltd	Altona Smelter	Surface water assessment	13 August 2014
Updated the existing IWWMP and water use licence application, this included drafting water balances.	Samancor Western Chrome Mines	Millsell/Waterkloof	IWWMP	2014/08/18
Updated the existing IWWMP and water use licence application, this included drafting water balances.	Samancor Western Chrome Mines	Millsell/Waterkloof	Water balance	2014/09/02
Compiled a surface water assessment of the rivers that could be impacted by the proposed activities.	Pan Palladium South Africa (Pty) Ltd	Magnetite mine	Surface water	03 September 2014

CHRISTINA PETRONELLA ERASMUS

Outline	Company	Section	Type	Completion date
Updated the 2013 IWWMP report and drafted a Water balance for the licensee.	IFMSA	Buffelsfontein	IWWMP	09 September 2014
Conducted the surface water assessment for the Fumani Mine.	Corridor Mining Resources	Fumani Gold Mine	Surface water	10 September 2014
Compilation of a static water balance report	Corridor Mining Resources	Fumani Gold Mine	Water balance	10 September 2014
Updated the existing IWWMP and water use licence application, this included drafting water balances.	Samancor Western Chrome Mines	Mooinooi	IWWMP	2014/09/26
Compiled the IWWMP for the Water use licence amendment	Andalusite Resources (Pty) Ltd	Maroeloesfontein	IWWMP	29 September 2014
Managed the WULA process	AfriSam	Saldanha	Project Management	07 October 2014
Review of the wetland delineation study	Savanna Environmental (Pty) Ltd	Transalloys power plant Witbank	Review	09 October 2014
Review of the Surface water assessment	Savanna Environmental (Pty) Ltd	Transalloys power plant Witbank	Review	11 October 2014
Review of the Integrated Mine Water Management Plan	AfriSam	Olifantsfontein	Review	07 November 2014
Short report on drainage channels at Mecklenburg	Chromex mining / Afarak / Ruuki	Mecklenburg Chrome Mine	Surface water	12 November 2014
Facilitated the Water use licence amendment process for the Maroeloesfontein operation	Andalusite Resources (Pty) Ltd	Maroeloesfontein	Project Management	25 November 2014
Opinion on impacts of re-use of treated sewage effluent from Waterval WWTW if not released to surface water resource	Gudani Consulting	Ekurhuleni Waterval	Surface water	28 November 2014
Review of the Water use registration report	Inkanyiso Trust	Vaalbank	Review	02 December 2014
Compiled documentation for the application to delist residue stockpiles	Andalusite Resources (Pty) Ltd	Maroeloesfontein	Waste Management	04 December 2014
Compiled a water and salt balance for the iron mine.	Assmang Khumani Mine (GPT)	Khumani mine	Salt balance	05 December 2014
Review of the WULAR for the residential development	Crimson King Properties	Mogale Ext 10	Review	17 December 2014
Reviewed the WUL Audit report for the Maroeloesfontein Operations	Andalusite Resources (Pty) Ltd	Maroeloesfontein	Review	07 January 2015
Reviewed and assessed reports on alien invasive plant species and management plans: Millsell/Waterkloof, Mooinooi, Elandsdrift, Buffelsfontein East and West	Samancor Western Chrome Mines	Buffelsfontein East	Review	2015/01/13
Reviewed and assessed reports on alien invasive plant species and management plans: Millsell/Waterkloof, Mooinooi, Elandsdrift, Buffelsfontein East and West	Samancor Western Chrome Mines	Buffelsfontein West	Review	2015/01/13

CHRISTINA PETRONELLA ERASMUS

Outline	Company	Section	Type	Completion date
Compiled a rehabilitation plan for the Witkranz colliery area	Coastal Fuels (Pty) Ltd	Witkranz	Rehabilitation plan	13 January 2015
Compilation of the Work Method Statement for the Bok River	AfriSam	Saldanha	Work Method Statement	23 March 2015
Reviewed and assessed reports on alien invasive plant species and management plans: Millsell/Waterkloof, Mooinooi, Elandsdrift, Buffelsfontein East and West	Samancor Western Chrome Mines	Mooinooi	Review	2015/04/14
Compiled the Integrated Water and Waste Management plan for the Altona Smelter	Pan Palladium South Africa (Pty) Ltd	Altona Smelter	IWWMP	17 April 2015
Compiled a surface water assessment of the rivers that could be impacted by the existing activities of Lannex Section	Samancor Eastern Chrome Mines	Lannex	Surface water	2015/05/12
Review of the WULAR for the development	Avizon (Pty) Ltd	Alra Park	Review	13 May 2015
Reviewed and assessed reports on alien invasive plant species and management plans: Millsell/Waterkloof, Mooinooi, Elandsdrift, Buffelsfontein East and West	Samancor Western Chrome Mines	Millsell/Waterkloof	Review	2015/06/04
Reviewed and assessed the flora assessment report.	Sylvania	Grasvally Chrome mine	Review	2015/06/10
Assisted with the compilation of a surface water assessment of the rivers that could be impacted by the existing activities of Doornbosch/Steelpoort Section	Samancor Eastern Chrome Mines	Doornbosch/Steelpoort	Surface water	2015/06/22
Reviewed and assessed reports on alien invasive plant species and management plans: Millsell/Waterkloof, Mooinooi, Elandsdrift, Buffelsfontein East and West	Samancor Western Chrome Mines	Elandsdrift	Review	2015/06/29
Reviewed and assessed the fauna assessment report.	Sylvania	Grasvally Chrome mine	Review	2015/07/03
Updated the IWRMP into the IWWMP format and applied for an amendment to the existing Water use licence. Elandsfontein	Apollo Brick (Pty) Ltd	Elandsfontein	IWWMP	03 July 2015
Review of annual external water use licence audit	Coastal Fuels (Pty) Ltd	Various	Review	20 July 2015
Review of the IWWMP for the South Block Extension	AEMFC (Gudani)	Vlakfontein South	Review	20 September 2015
Compiled the water monitoring plan for the mine that was used as supporting information in the Water use licence application.	Pan Palladium South Africa (Pty) Ltd: PGE Project	Magnetite mine	Water monitoring programme	09 November 2015
Compiled the Wetland Rehabilitation and management Plan for the Hacra PGE mining project	Hacra Mining and Exploration Company (Pty) Ltd	PGE and PGM Mine	RSIP	2015/11/20
Reviewed the EIA/EMP for the proposed Commissie kraal colliery by Tholie Logistics.	Lonmin Water user association	Commissie Kraal Colliery (Tholie Logistics)	Review	25 November 2015

CHRISTINA PETRONELLA ERASMUS

Outline	Company	Section	Type	Completion date
Reviewed the WUL Audit report for the Maroeloesfontein Operations	Andalusite Resources (Pty) Ltd	Maroeloesfontein	Review	05 December 2015
Compiled the water monitoring plan for the mine that was used as supporting information in the Water use licence application.	Pan Palladium South Africa (Pty) Ltd: PGE Project	PGE and PGM Mine	Water monitoring programme	17 December 2015
Compiled the water balance report for the mine that was used as supporting information in the Water use licence application.	Pan Palladium South Africa (Pty) Ltd: PGE Project	PGE and PGM Mine	Water balance	21 December 2015
Compiled the Work Method Statement for the Magnetite mining project	Hacra Mining and Exploration Company (Pty) Ltd	Magnetite mine	Work Method Statement	21 December 2015
Compiled the work method statement for the mine that was used as supporting information in the Water use licence application.	Pan Palladium South Africa (Pty) Ltd: PGE Project	Magnetite mine	Work Method Statement	21 December 2015
Compiled the work method statement for the mine that was used as supporting information in the Water use licence application.	Pan Palladium South Africa (Pty) Ltd: PGE Project	PGE and PGM Mine	Work Method Statement	21 December 2015
Compiled the Wetland Rehabilitation and management Plan for the Magnetite mining project	Hacra Mining and Exploration Company (Pty) Ltd	Magnetite mine	RSIP	08 January 2016
Compiled the Wetland Rehabilitation and management for the Magnetite mining project based on available studies and information to support a water use licence application	Pan Palladium South Africa (Pty) Ltd	Magnetite mine	RSIP	12 January 2016
Compiled the Integrated Water and Waste Management plan for the mine that was used as supporting information in the Water use licence application.	Pan Palladium South Africa (Pty) Ltd	PGE and PGM Mine	IWWMP	28 January 2016
Compiled the water balance report for the mine that was used as supporting information in the Water use licence application.	Pan Palladium South Africa (Pty) Ltd	Magnetite mine	Water balance	28 January 2016
Reviewed the Environmental Due Diligence and Liability report for portion 155 of the farm Elandskraal 469 JQ	Phoenix Platinum	Elandskraal / Minco	Review	29 January 2016
Compiled the Integrated Water and Waste Management plan for the mine that was used as supporting information in the Water use licence application.	Pan Palladium South Africa (Pty) Ltd	Magnetite mine	IWWMP	29 January 2016
Compiled the Water Monitoring Programme for the Magnetite mining project	Hacra Mining and Exploration Company (Pty) Ltd	Magnetite mine	Water monitoring programme	22 February 2016
Compiled the Water Monitoring Programme for the Hacra PGE mining project	Hacra Mining and Exploration Company (Pty) Ltd	PGE and PGM Mine	Water monitoring programme	25 February 2016
Compiled the Water Monitoring Programme for the Hacra PGE mining project	Hacra Mining and Exploration Company (Pty) Ltd	PGE and PGM Mine	Work Method Statement	25 February 2016

CHRISTINA PETRONELLA ERASMUS

Outline	Company	Section	Type	Completion date
Compiled the IWWMP for the Magnetite mining project	Hacra Mining and Exploration Company (Pty) Ltd	Magnetite mine	IWWMP	01 March 2016
Compiled the IWWMP for the Hacra PGE mining project	Hacra Mining and Exploration Company (Pty) Ltd	PGE and PGM Mine	IWWMP	01 March 2016
Review of the wetland delineation study	AfriSam	Saldanha	Review	06 June 2016
Compiled the wetland rehabilitation plan	AfriSam	Saldanha	Wetland rehabilitation plan	06 June 2016
Review of the hydrological report for the proposed piggery	Number Two Piggeries (Pty) Ltd (REC Services)	Longside	Review	30 June 2016
Update of the IWWMP's for various sections into one document	AEMFC (Gudani)	Vlakfontein	IWWMP	02 September 2016
Updated the IWWMP.	Phoenix Platinum	Buffelsfontein	IWWMP	27 September 2016
Conducted a waste classification on waste generated by Joc Abrasives (sanding paper)	Joc Abrasives	Joc Abrasives	Waste Management	27 September 2016
Review of the Surface water assessment	Steynburg Pork and Abattoir (Pty) Ltd (REC Services)	Steynburg	Review	12 October 2016
Compiled the WCDMP.	Phoenix Platinum	Buffelsfontein	WCDMP	20 October 2016
Reviewed the WUL Audit report for the Maroeloesfontein Operations	Andalusite Resources (Pty) Ltd	Maroeloesfontein	Review	06 January 2017
Management of the Water use licence application process	Kingdom Development Company	Kingdom	Project Management	26 January 2017
Review of the WULAR for the development	Kingdom Development Company	Kingdom	Review	26 January 2017
Review of the BAR for the implementation of WWTW	Chevron SA (Pty) Ltd	Millies	Review	15 February 2017
Review of the wetland delineation study	Roman Catholic Archdiocese of Johannesburg (REC Services)	Kruitfontein	Review	03 March 2017
Compiled the IWWMP report for the Jagdlust section	Samancor Eastern Chrome Mines	Jagdlust	IWWMP	24 March 2017
Compiled the Water use licence application report for the Jagdlust section	Samancor Eastern Chrome Mines	Jagdlust	WULAR	24 March 2017
Conducted a due diligence for the Sail group on Smokey Hills Platinum Mine	Sail group	Smokey Hill Platinum Mine	Due Diligence	13 April 2017
Conducted a due diligence for the Sail group on Black Chrome Mine	Sail group	Mooihoek (Black) Chrome Mine	Due Diligence	19 May 2017
Review of the aquatic delineation study	Walt Landgoed (Pty) Ltd (REC Services)	Biesjeskraal	Review	24 May 2017

Outline	Company	Section	Type	Completion date
Review of the Fauna Terrestrial biodiversity plan	Kwa-Madwala Private Game reserve	Nkomazi Safari Hotel	Review	31 May 2017
Review of the Rehabilitation plan for the proposed development	Kwa-Madwala Private Game reserve	Nkomazi Safari Hotel	Review	22 June 2017
Compiled the Integrated Water and Waste Management plan for the mine that was used as supporting information in the Water use licence application.	Sky Chrome Mining	Bapong	IWWMP	31 July 2017
Annual update of the WCDMP for Phoenix Platinum	Phoenix Platinum	Buffelsfontein	WCDMP	04 September 2017
Compiled the WQMR for the ERWAT Vlakplaats Water use licence amendment	Virtual Consulting Engineers	ERWAT Vlakplaats (DWP = Maziya)	IWWMP	2017/09/15
Water Availability and impact of re-use of Treated Waste When not released into the water resource: Olifantsfontein and Waterval	Gudani Consulting	Ekurhuleni	Surface water	18 September 2017
Review of the external audit on the licensee's compliance with the water use licence conditions.	Apollo Brick (Pty) Ltd	Elandsfontein	Review	02 October 2017
Compiled a rehabilitation plan for Meadowhurst	Nouvall	Meadowhurst	Rehabilitation strategy	12 October 2017
Opinion on impacts of re-use of treated sewage effluent from Olifantsfontein WWTW if not released to surface water resource	Gudani Consulting	Ekurhuleni Olifantsfontein	Surface water	10 November 2017
Drafted the annual water balance for Moeijelijk Mine.	Bauba (sub-contracted by Red Kite)	Moeijelijk Chrome Mine (Red Kite)	Water balance	15 November 2017
Updated the IWWMP.	Phoenix Platinum	Buffelsfontein	IWWMP	21 November 2017
Review of annual external water use licence audit	Coastal Fuels (Pty) Ltd	Various	Review	30 November 2017
Drafted the Surface water component for the Environmental Management Frameworks for the Vhembe District Municipality	Gudani Consulting	EMF Surface water (Capricorn and Vhembe DM)	Surface water	01 December 2017
Drafted the Surface water component for the Environmental Management Frameworks for the Capricorn District Municipality	Gudani Consulting	EMF Surface water (Capricorn and Vhembe DM)	Surface water	01 December 2017
Conducted a surface water impact assessment for the proposed Bauba operations (central, northern, southern and Waterkop clusters)	Bauba (sub-contracted by Red Kite)	Central, Northern, southern and waterkop	Surface water	15 December 2017
Drafted the supporting documentation for the Mooihoek Chrome Mine Water use licence application: Monitoring programme, Work Method Statement, Rehabilitation strategy and Landscape Maintenance Plan	Umnotho we-Sizwe Resources (Sail group)	Mooihoek (Black) Chrome Mine	RSIP	01 January 2018

Outline	Company	Section	Type	Completion date
Drafted the rehabilitation plan for the impacts on watercourses as a result of mining activities	Umnotho we-Sizwe Resources (Sail group)	Mooihoek (Black) Chrome Mine	Rehabilitation strategy and Landscape Maintenance plan	01 January 2018
Compiled a Surface and Groundwater monitoring plan for the Mooihoek Chrome Mine (BCM)	Umnotho we-Sizwe Resources (Sail group)	Mooihoek (Black) Chrome Mine	Water monitoring programme	01 January 2018
Drafted the Work method statement for the impacts on water courses as a result of mining activities	Umnotho we-Sizwe Resources (Sail group)	Mooihoek (Black) Chrome Mine	Work Method Statement	01 January 2018
Reviewed the WUL audit report for the Grasvally Chrome mine.	Sylvania	Grasvally Chrome mine	Review	01 January 2018
Drafted the 2016/2017 water balance for Samancor Buffelsfontein East Section	Samancor Western Chrome Mines	Buffelsfontein East	Water balance	2018/01/08
Drafted the RSIP for Samancor Buffelsfontein East Section	Samancor Western Chrome Mines	Buffelsfontein East	RSIP	2018/01/09
General Authorisation report for the Hacra (HW Iron) Magnetite project	Hacra Mining and Exploration Company (Pty) Ltd	Magnetite mine	IWWMP	11 January 2018
Management of the BA Process for the proposed new kilns	Corobrik	Driefontein	Project Management	01 February 2018
Review of documentation required for the Environmental Authorisation for the Corobrik Driefontein New Kiln Expansion project	Corobrik	Driefontein	Review	01 February 2018
Reviewed the Financial quantum assessment for the Mooihoek Chrome Mine (BCM)	Sail group	Mooihoek (Black) Chrome Mine	Review	01 February 2018
Reviewed the Financial quantum assessment for the Rooderand Chrome Mine	Sail group	Rooderand	Review	01 February 2018
Compiled the IWWMP for the Mooihoek Chrome Mine (BCM)	Umnotho we-Sizwe Resources (Sail group)	Mooihoek (Black) Chrome Mine	IWWMP	01 February 2018
Facilitated the Public participation process for the Corobrik New Kilns expansion project	Corobrik	Driefontein	Public Participation Process	01 February 2018
Compiled the 2107 Salt Balance and Mass balance report for the Buffelsfontein East Section	Samancor Western Chrome Mines	Buffelsfontein East	Salt balance	01 February 2018
Compiled the 2017 Water balance report for the Buffelsfontein East Section	Samancor Western Chrome Mines	Buffelsfontein East	Water balance	01 February 2018
Compiled the WCDMP for Buffelsfontein East	Samancor Western Chrome Mines	Buffelsfontein East	WCDMP	01 February 2018

Outline	Company	Section	Type	Completion date
Review of the surface waer assessment report	Red Kite	Rondevly	Surface water	03 February 2018
Drafted the 2016/2017 salt balance for Samancor Buffelsfontein East Section	Samancor Western Chrome Mines	Buffelsfontein East	Water balance	2018/02/05
Drafted theWCDMP for Samancor Buffelsfontein East Section	Samancor Western Chrome Mines	Buffelsfontein East	Water balance	2018/02/05
Compiled the waste classification report	Glenover Phosphate	Glenover	Waste Management	19 February 2018
Conducted an Aquatic Assessment for the proposed sand winning activities in the Mokolo River	Gudani Consulting	Mokolo River	Surface water assessment	22 February 2018
Conducted an Environmental Due diligence and Liability at portion 155 of the farm Elandskraal 469 JQ	Phoenix Platinum	Elandskraal / Minco	Due Diligence	01 March 2018
Reviewed the EIA/EMP compiled for the amendment at the Mooihoek Chrome Mine (BCM)	Umnotho we-Sizwe Resources (Sail group)	Mooihoek (Black) Chrome Mine	Review	01 March 2018
Compiled a static water balance for existing and proposed new activities	Umnotho we-Sizwe Resources (Sail group)	Mooihoek (Black) Chrome Mine	Water balance	01 March 2018
Drafted the WULAR documentation for the Mooihoek Chrome Mine Water use licence application for water from the Lebalelo water scheme	Umnotho we-Sizwe Resources (Sail group)	Mooihoek (Black) Chrome Mine	WULA	23 March 2018
Reviewed the EIA/EMP compiled for the amendment at the Glenover Phosphate mine	Glenover Phosphate	Glenover	Review	01 April 2018
Conducted Basic Public Participation for the Glenover Phosphate mine (Municipal Meetings)	Glenover Phosphate	Glenover	Public Participation Process	01 April 2018
Compiled an aquatic assessment for the Northdene plot 3 development	Vaalplan Regional and Town planners (Wilgeblare Beleggings)	Northdene	Surface water assessment	01 April 2018
Compiled the static water balance for Venetia mine (20162017)	Gudani Consulting	Venetia mine	Water balance	19 April 2018
Conducted the Desktop surface water assessment for the Tedstoneville development: Erf 853, Extension 1 (Ekurhuleni Municipality)	Gudani Consulting	Tedstoneville	Surface water assessment	27 April 2018
Annual update of the financial liabilities for all the Sylvania sites	Sylvania	Various	Closure quantum	01 May 2018
Conducted the surface water and wetland assessment for the Zwartkopjies and Rietspruit Development (Edenpark) (Ekurhuleni Municipality)	Gudani Consulting	Edenpark) (Ekurhuleni	Surface water and wetland assessment	16 May 2018

CHRISTINA PETRONELLA ERASMUS

Outline	Company	Section	Type	Completion date
Reviewed the Fauna Terrestrial Assessment for the Zwartkopjies and Rietspruit Development (Edenpark) (Ekurhuleni Municipality)	Gudani Consulting	Edenpark	Review	18 May 2018
Conducted baseline waste classification for Mr Piet Greyling	Piet Greyling	DNCC Granite	Waste Management	01 June 2018
Annual update of the Rehabilitation Strategy and Landscape Maintenance Plan for Phoenix Platinum	Phoenix Platinum	Buffelsfontein	Rehabilitation strategy and Landscape Maintenance plan	06 June 2018
Conducted the desktop surface water assessment for the Thaba Chueu mining right application	Gudani Consulting	Thaba Chueue	Surface water assessment	15 June 2018
Annual update of the financial liabilities for Phoenix Platinum	Phoenix Platinum	Buffelsfontein	Closure quantum	01 July 2018
Risk assessment report for the proposed pipeline at Mooihoek Chrome Mine (BCM)	Umnotho we-Sizwe Resources	Mooihoek (Black) Chrome Mine	Risk Assessment (surface water)	01 July 2018
Annual update of the WCDMP for Phoenix Platinum	Phoenix Platinum	Buffelsfontein	WCDMP	01 July 2018
Motivation and request for administrative changes to the Grasvally Chrome Mine WUL	Sylvania	Grasvally Chrome mine	WUL Amendment	01 July 2018
Conducted the Aquatic Assessment for the Small Scale mining activities in the Klein Letaba River	Gudani Consulting	Sandberg / Mona mona: Klein Letaba	Surface water assessment	05 July 2018
Conducted the water and Salt Balance report for Phoenix Platinum	Phoenix Platinum	Buffelsfontein	Salt balance	05 July 2018
Drafted the wet season water and Salt balance for Moeijelijk Mine.	Bauba (sub-contracted by Red Kite)	Moeijelijk Chrome Mine (Red Kite)	Water balance	14 July 2018
Compiled and submitted the WULAR documentation that was submitted for the Mooihoek Chrome Mine Water integrated water use licence	Umnotho we-Sizwe Resources (Sail group)	Mooihoek (Black) Chrome Mine	WULAR	23 July 2018
Annual update of the IWWMP for Phoenix Platinum	Phoenix Platinum	Buffelsfontein	IWWMP	01 August 2018
Review of the EMP Performance assessment for the prospecting permit on Palmietfontein	Palm Chrome	Palmietfontein	Review	01 August 2018
Review of the Fauna terrestrial assessment for Palm Chrome on the farm Palmietfontein	Palm Chrome	Palmietfontein	Review	01 August 2018
Review of the Fauna terrestrial assessment for Sefateng Chrome Mine	Red Kite	Sefateng Chrome Mine	Review	01 August 2018
Compiled the 2018-2019 water and salt balance report	Phoenix Platinum	Lesedi/Phoenix	Water and Salt Balance	14 August 2018

CHRISTINA PETRONELLA ERASMUS

Outline	Company	Section	Type	Completion date
Desktop Surface water assessment for Palm Chrome on the farm Palmietfontein	Palm Chrome	Palmietfontein	Surface water assessment	17 August 2018
Conducted the desktop Surface water assessment for 7 Seas Capital Ventures (Granite mining) in the Western Cape	Gudani Consulting	7Seas Capital ventures	Surface water assessment	22 August 2018
Reviewed the Surface water assessment report for the Rooderand Chrome Mine	Sail group	Rooderand	Review	04 September 2018
Review of the Flora Assessment	Red Kite	Memorial Park	Review	28 September 2018
Reviewed the actual rehabilitation cost as applicable to the TNT shaft at Mooihoek	Umnotho we-Sizwe Resources (Sail group)	Mooihoek (Black) Chrome Mine	Review	16 October 2018
Conducted the desktop Surface water assessment for Highly Blue (Granite mining) in the North West	Gudani Consulting	Highly Blue	Surface water assessment	16 October 2018
Compiled the ROD application submitted to the DWS for the Waste management activities	Glenover Phosphate	Glenover	Waste Management	16 November 2018
Compiled the IWWMP for the water use licence application	Glenover Phosphate	Glenover	Review	22 November 2018
Conducted a waste classification on waste generated by Langpan Chrome mine	Langpan Chrome Mine	Langpan	Waste Management	22 November 2018
Compiled the WULAR for the water use licence application	Glenover Phosphate	Glenover	Review	22 November 2018
Conducted a Surface water assessment for the proposed sand dredging in the Crocodile River	Gudani Consulting	Sanmar sands cc	Surface water	13 December 2018
Compiled documentaton for the WUL amendment of Phoenix (Borehole location change)	Sylvania	Lesedi/Phoenix	WUL Amendment	31 December 2018
Conducted a waste classification on waste generated by the Vlakpoort Chrome Mine	Afarak	Vlakpoort	Waste Management	21 January 2019
Conducted a waste classification on waste generated by the Odendaalsrust operations	Corobrik	Odendaalsrus	Waste Management	08 February 2019
Reviewed the Scoping report for the proposed UG1 opencast mine	Phokataba	SHPM	Scoping Report	01 May 2019
Review of the surface waer assessment report	Red Kite	SHPM	Surface water	15 May 2019
Review of the surface water assessment report	Red Kite	Silverton	Surface water	23 May 2019
Reviewed the waste classification Reports	Corobrik	Eastbrick	Waste Management	25 May 2019
Reviewed the waste classification Reports	Corobrik	Middlewit	Waste Management	25 May 2019

CHRISTINA PETRONELLA ERASMUS

Outline	Company	Section	Type	Completion date
Review of the Fauna and Terrestrial assessment for the SHPM	Red Kite	SHPM	Review	27 May 2019
Reviewed the waste classification Reports	Corobrik	Glencoe	Waste Management	27 May 2019
Conducted a Surface water assessment for the proposed weir and pond	Gudani Consulting	Cottdonale	Surface water	31 May 2019
Compiled the dry season and annual water balance for the mine	Red Kite	Bauba	Water Balance	03 June 2019
Managed the eWULA process for the proposed smelter	Altona Smelting	Altona Smelter	WULA	03 June 2019
Conducted a Surface water assessment for the proposed cemetery	Gudani Consulting	Mashishing	Surface water	04 June 2019
Conducted a Surface water assessment for the granite quarry	Gudani Consulting	Highly Blue: Concorida site	Surface water	04 June 2019
Conducted the Section 21© and (i) Risk assessment for the proposed development	Nouvelle	Meadowhurst	Surface water	18 June 2019
Conducted a waste classification on waste generated by the Driefontein operations	Corobrik	Driefontein	Waste Management	18 June 2019
Compiled the 2018-2019 water and salt balance report	Red Kite	Sefateng Chrome Mine	Water and Salt Balance	26 June 2019
Conducted a Surface water assessment for the clay mine	Gudani Consulting	Kumbelo	Surface water	27 June 2019
Amended the rehabilitation strategy	Phoenix Platinum	Lesedi/Phoenix	RSIP	12 July 2019
Reviewed the performance assessment and environmental compliance audit report	Phokataba	SHPM	Audit	24 July 2019
Compiled the 2018-2019 WCDMP report	Phoenix Platinum	Lesedi/Phoenix	WCDMP	26 July 2019
Conducted a waste classification and risk assessment	Corobrik	Middlewit	Waste Management	14 August 2019
Conducted a waste classification and risk assessment	Corobrik	Eastbrick	Waste Management	14 August 2019
Conducted a waste classification and risk assessment	Corobrik	Driefontein	Waste Management	14 August 2019
Conducted a waste classification and risk assessment	Corobrik	Phesantekraal	Waste Management	15 August 2019
Conducted a waste classification and risk assessment	Corobrik	Glencoe	Waste Management	15 August 2019
Conducted a waste classification and risk assessment on Jumbo Clay	Corobrik	Middlewit and Eastbrick	Waste Management	15 August 2019

CHRISTINA PETRONELLA ERASMUS

Outline	Company	Section	Type	Completion date
Compiled the presentation used for the Environmental training for Omnia Fertilisers Liquid and Blenders	Inlexo	Omnia	Training	16 August 2019
Conducted a waste classification and risk assessment	Corobrik	Midrand	Waste Management	16 August 2019
Reviewed the EIA/EMP for the proposed SHPM UG1 project area	Sail group	SHPM	EIA/EMP	27 August 2019
Conducted a waste classification and risk assessment	Corobrik	Boekenhoutskloof	Waste Management	04 September 2019
Compiled the static water balance for Venetia mine (2017_2018)	Gudani Consulting	Venetia mine	Water balance	04 September 2019
Conducted a waste classification and risk assessment	Corobrik	Springs	Waste Management	16 September 2019
Conducted a waste classification and risk assessment	Corobrik	Rietvlei	Waste Management	23 September 2019
Compiled the environmental site selection report for the ECM Tweefontein section Tailings storage facility project	Sylvania	ECM: Tweefontein	Site selection report	07 October 2019
Compiled the environmental site selection report for the ECM Lannex section Tailings storage facility project	Sylvania	ECM: Lannex	Site selection report	14 October 2019
Reviewed the Closure and rehabilitation plan for the proposed SHPM UG1 project area	Sail group	SHPM	Closure and rehabilitation plan	24 October 2019
Reviewed the BAR and EMPr for the proposed link road between Estate D' Afrique and Meerhof	Estate D'Afrique	Estate D'Afrique	BAR	13 November 2019
Determined the static water balance for the proposed Lefa Colliery	ElementumS	Lefa Coal	Water Balance	13 November 2019
Compiled the Annual Water balance for Moeijelijk Chrome Mine	Bauba (sub-contracted by Red Kite)	Moeijelijk Chrome Mine (Red Kite)	Water balance	25 November 2019
Conducted a waste classification and risk assessment	Corobrik	Rayton	Waste Management	10 December 2019

Outline	Company	Section	Type	Completion date
Compilation of Water Quality Report	Andalusite Resources (Pty) Ltd	Maroeloesfontein	Monitoring	1) 2010/05/10 2) 2010/08/11 3) 2010/12/02 4) 2011/04/11 5) 2011/07/28 6) 2011/10/11 7) 2012/01/06 8) 20120322 9) 20120605 10) 20121001
Compiled the water monitoring reports	Phoenix Platinum	Buffelsfontein	Monitoring report	1) 2018/05/01 (MR) 2) 2018/06/01(MR)&(QR) 3) 2018/06/21 (QR) 4) 2018/07/01(MR) 5) 2018/08/01(MR) 6) 2018/09/25(QR) 7) 2018/10/11(MR) 8) 2018/1022(QR) 9) 2018/11/12(MR) 10) 2018/12/04(QR) 11) 2018/12/12(MR) 12) 2019/02/01 (QR) 13) 2019/04/01(AR) 14) 2019/04/01(MR) 15) 2019/06/03(MR)&(QR) 16) 2019/07/19 (MR) 17) 2019/07/22 (MR) 18) 2019/08/19 (MR) 19) 2019/09/23 (AR) 20) 2019/10/24 (MR) 21) 2020/01/23 (Mr) 22) 2020/03/24 (AR) 23) 2020/07/31 (MR) 24) 2020/09/24 (MR) 25) 2020/10/12 (MR) 26) 2020/12/17 (MR)

Outline	Company	Section	Type	Completion date
Reviewed the water monitoring reports	Phoenix Platinum	Buffelsfontein	Monitoring report	1) 2019/03 (MR) 2) 2019/05 (MR) 3) 2019/11 (MR) 4) 2019/12 (MR) 5) 2020/02 (MR) 6) 2020/05 (QR) 7) 2020/08 (QR)
Compiled the water monitoring reports	Umnotho we-Sizwe Resources (Sail group)	Mooihoek (Black) Chrome Mine	Monitoring report	1) 2018/11/07(MR) 2) 2018/11/25(MR) 3) 2019/01/28(MR) 4) 2019/02/04(MR)
Review of ECO reports for storm water implementation construction activities	Ndodana Consulting Engineers	Oriel	Review	2013/06/11 2013/07/31 2013/08/31
Compiled the WCDMP for Venetia Mine	Gudani Consulting	Venetia Mine	WCDMP	2018/04/25 2019/12/30
Reviewed and updated the IWWMP updated for Venetia mine	Gudani Consulting	Venetia mine	Review	2018/05/31 2019/12/30
Conducted a Surface water assessment for the proposed Lodge	Gudani Consulting	Nkanyi Lodge	Surface water	2019/06/20 2019/09/23
Compiled the Public Participation report for the proposed link road to Meerhof	Estate D'Afrique	Estate D'Afrique	Public Participation Process	17 February 2020
Reviewed the completeness and suitability of the TMT Shaft 2008 approved EMPr for Sail group	Sail group	TNT Shaft	Review	27 February 2020
Conducted a surface water assessment for the proposed new Sabie Landfill site: Sabie	Gudani Consulting	Sabie Landfill site	Surface water	01 March 2020
Compiled an Environmental impact statement of the TNT shaft activities for the Sail Group	Sail group	TNT Shaft	Review	01 April 2020
Conducted a surface water assessment for the proposed filling and Depo station near Musina	Gudani Consulting	2SP Investment trust	Surface water	25 May 2020
Compiled the wet and dry water balance for AEMFC - Vlakfontein Mine	AEMFC	Vlakfontein	Water balance	22 May 2020
Compiled a Surface water description report for the Jannie mine near Polokwane	Gudani Consulting	Jannie Mining and Roodepoort crushers	Surface water	25 May 2020

CHRISTINA PETRONELLA ERASMUS

Outline	Company	Section	Type	Completion date
Reviewed the Estate D'Afrique Shore line rehabilitation report	Estate D'Afrique	Estate D'Afrique	Surface water	01 March 2020
Reviewed the IWWMP for East Block	AEMFC	East Block	IWWMP	22 May 2020
Reviewed the IWWMP for Central and North Blocks	AEMFC	Central, Northern Blocks	IWWMP	23 May 2020
Compiled the Scoping report for the Eastern Chrome Mines TSF and WRD expansion project	Samancor Chrome Ltd	Tweefontein	Scoping Report	07 July 2020
Conducted a Surface water assessment for the proposed TSF and WRD expansion for Eastern Chrome Mines	Samancor Chrome Ltd	Tweefontein	Surface water assessment	04 August 2020
Conducted a desktop surface water assessment for a proposed Limestone, Clay, Shale and Quartsite mine	Gudani Consulting	Gilmoe Mining	Surface water assessment	23 July 2020
Compiled a Waste Management for the University of Mpumalanga, Mbombela campus.	Afroteq	University of Mpumalanga	Waste Management	04 August 2020
Review of the Scoping report for Lannex Section EMPR consolidation and Expansion project	Samancor Chrome Ltd	Lannex	Review	17 July 2020
Project manger for the Samancor Tweefontein EMPR amendment project. - Drafting Public Participation Documentation - newspaper advertisements . Background information document. Application forms.	Samancor Chrome Ltd	Tweefontein	Project Management	on-going
Project manger for the Samancor Tweefontein EMPR amendment project. Drafting Public Participation Documentation - newspaper advertisements . Background information document. Application forms.	Samancor Chrome Ltd	Lannex	Project Management	on-going
Compiled the annual Salt balance for Sylvania Lesedi	Sylvania	Lesedi/Phoenix	Salt balance	28/09/2020
Conducted a Surface water assessment for Mofenyi Mining (Pty) Ltd Vermiculite mine	Gudani Consulting	Mofenyi mining	Surface water assessment	
Conducted a surface water assessment report for the Lannex Section expansion	Samancor Chrome Ltd	Lannex	Surface water Assessment	25 August 2020
Conducted a surface water assessment for the propsoed TSF expansion at Mooinooi section	Samancor Chrome Ltd	Mooinooi	Surface water assessment	17 August 2020
Drafted the Section 27 Motivation report for the Lannex Section Water use licence application	Samancor Chrome Ltd	Lannex	Section 27 Motivation	27 August 2020
Conducted a basic Waste classification for the Mooinooi Tailings	Sylvania	Mooinooi	Waste classification	23 September 2020

CHRISTINA PETRONELLA ERASMUS

Outline	Company	Section	Type	Completion date
Conducted a surface water assessment for the proposed Macarthy Mine EMPr amendment project	Salene Manganese	Macarthy Mine	Surface water Assessment	10 November 2020
Compiled the Section 27 for the Water use licence application	Samancor Chrome Ltd	Lannex	Section 27 Motivation	01 December 2020
Compiled the Rehabilitation stratfy and implementation for a new water use licence application	Samancor Chrome Ltd	Lannex	RSIP	09 December 2020
Compiled the Application form and the Basic Assessment Report (inclusive of EMPr) for the proposed pipeline between Lesedi and Mooinooi Sections	Samancor Chrome Ltd	Sylvania	BAR	15 December 2020
Updated the existing IWWMP and water use licence application, this included drafting water balances.	Samancor Chrome Ltd	Mooinooi	IWWMP	31 December 2020
Compiled the section 27 for the new TSF water use licence application at Mooinooi	Samancor Chrome Ltd	Mooinooi	Section 27 Motivation	31 January 2020
Compiled a Water use licence application report for a stand alone section 21(c) and (i) water use for a water and slurry pipeline	Samancor Chrome Ltd	Sylvania	WULAR	28 December 2020
Compiled a Section 27 motivation for a stand alone section 21(c) and (i) water use for a water and slurry pipeline	Samancor Chrome Ltd	Mooinooi	Section 27 Motivation	28 December 2020
Compiled a closure and rehabilitaton plan for proposed prospecting activities	Salene Manganese	Salene	Closure and rehabilitation plan	29 December 2020
Compiled the Record of Decision report submitted to the DWS in support of a Waste Management Licence	Samancor Chrome Ltd	Mooinooi	ROD	04 January 2021
Compiled the Rehabilitation stratfy and implementation for a new water use licence application	Samancor Chrome Ltd	Tweefontein	RSIP	02 April 2021
Compiled the Rehabilitation stratfy and implementation for a new water use licence application	Samancor Chrome Ltd	Lannex	RSIP	01 April 2021
Compiled the Basic Assessment Report and Environmental Management Programme for the proposed pipeline between Lesedi and Mooinooi Sections	Samancor Chrome Ltd	Mooinooi	BAR/EMPr	03 May 2021
Compiled the Rehabilitation stratfy and implementation for a new water use licence application	Samancor Chrome Ltd	Lesedi/Phoenix	RSIP	18 March 2021
Compiled the Method statement as supporting documentation for a Water use licence application	Samancor Chrome Ltd	Lannex	Method Statement	04 May 2021
Compiled the Method statement as supporting documentation for a Water use licence application	Samancor Chrome Ltd	Tweefontein	Method Statement	04 May 2021
Compiled the Record of Decision report submitted to the DWS in support of a Waste Management Licence	Samancor Chrome Ltd	Lannex	ROD	25 May 2021

CHRISTINA PETRONELLA ERASMUS

Outline	Company	Section	Type	Completion date
Managed the Public participation process and compiled the Public Participation report for the Mooinooi-IEsedi pipeline	Samancor Chrome Ltd	Mooinooi	Public Participation Process	03 May 2021
Conducted monitoring and compiled the water monitoring reports	Sylvania	Lesedi Phoenix TSF	Monitoring report	1) 2021/01 2) 2021/03 (+AR) 3) 2021/04 4) 2021/06
Compiled the water monitoring reports	Phoenix Platinum	Buffelsfontein	Monitoring report	January 2021 March 2021 April 2021 June 2021 July 2021 September 2021 October 2021 December 2021
Reviewed the water monitoring reports	Phoenix Platinum	Buffelsfontein	Monitoring report	February 2021 May 2021 August 2021 November 2021
Compiled the Basic Assessment Report and Environmental Management Programme for the proposed pipeline between Lesedi and Mooinooi Sections	Samancor Chrome Ltd	Mooinooi	BAR/EMPr	03 May 2021
Compiled the Method statement as supporting documentation for a Water use licence application	Samancor Chrome Ltd	Lannex	Method Statement	04 May 2021
Compiled the Method statement as supporting documentation for a Water use licence application	Samancor Chrome Ltd	Tweefontein	Method Statement	04 May 2021
Conducted monitoring and compiled the water monitoring reports	Sylvania	Lesedi Phoenix TSF	Monitoring report	1) 2021/01 2) 2021/03 (+AR) 3) 2021/04 4) 2021/06
Managed the Public participation process and compiled the Public Participation report for the Mooinooi-IEsedi pipeline	Samancor Chrome Ltd	Mooinooi	Public Participation Process	03 May 2021
Compiled the Record of Decision report submitted to the DWS in support of a Waste Management Licence	Samancor Chrome Ltd	Mooinooi	ROD	04 January 2021
Compiled the Record of Decision report submitted to the DWS in support of a Waste Management Licence	Samancor Chrome Ltd	Lannex	ROD	25 May 2021

CHRISTINA PETRONELLA ERASMUS

Outline	Company	Section	Type	Completion date
Compiled the Section 27 motivation for the new Section 21(a) water use licence application	Sylvania	Lesedi Phoenix TSF	Section 27 Motivation	29 September 2021
Updated the Mooinooi IWWMP for the new TSF WULA	Samancor Chrome Ltd	Mooinooi	IWWMP	30 March 2021
Sylvania Lesedi (Phoenix) annual water and salt balance report	Sylvania	Lesedi Phoenix TSF	Water and Salt Balance	27 July 2021
Sylvania Lesedi (Phoenix) annual WCDMP update	Sylvania	Lesedi Phoenix TSF	WCDMP	27 July 2021
Updated the Monitoring programme as part of the WULA	Sylvania	Lesedi Phoenix TSF	Monitoring programme	09 September 2021
Updated the RSIP for the Lesedi section	Sylvania	Lesedi Phoenix TSF	RSIP	29 September 2021
Drafted the WULAR for the Mooinooi - Lesedi Pipeline WUL	Samancor Chrome Ltd	Mooinooi	WULAR	14 October 2021
Compiled the Work method statement for the Mooinooi - Lesedi pipeline	Samancor Chrome Ltd	Mooinooi	Method Statement	20 October 2021
Compiled the Monitoring and Audit plan as supporting documentation for a WULA	Sylvania	Mooinooi	Monitoring and Audit plan	20 October 2021
Compiled the Water balance for the Macarthy WULA	Salene Manganese	Macarthy Mine	Water balance	19 October 2021
Compiled the Annual 2020-2021 Water balance fro Bauba Moeijelijk Chrome Mine	Bauba (sub-contracted by Red Kite)	Moeijelijk	Water balance	12 January 2022
Compiled the Annual 2020-2021 Water balance for Sefateng Chrome Mine	Sefateng (sub-contracted by Red Kite)	Sefateng	Water balance	17 January 2022
Assisted in compiling the EMZ and SEMP for the Capricorn District Municipality	Gudani Consulting	Capricorn EMF	EMZ and SEMP	18 February 2022
Compiling the final EMF for the Capricorn District Municipality	Gudani Consulting	Capricorn EMF	EMF	18 February 2022
Compiling the EMZ and SEMP for the Vhembe District Municipality	Gudani Consulting	Vhembe EMF	EMZ and SEMP	23 February 2022
Compiling the final EMF for the Vhembe District Municipality	Gudani Consulting	Vhembe EMF	EMF	11 March 2022

Outline	Company	Section	Type	Completion date
Compiled the Rehabilitation stratfy and implementation for a new water use licence application	Samancor Chrome Ltd	Twefontein	RSIP	02 April 2021
Compiled the Rehabilitation stratfy and implementation for a new water use licence application	Samancor Chrome Ltd	Lannex	RSIP	01 April 2021
Compiled the Rehabilitation stratfy and implementation for a new water use licence application	Samancor Chrome Ltd	Lesedi/Phoenix	RSIP	18 March 2021
Compiled the Record of Decision report submitted to the DWS in support of a Waste Management Licence	Samancor Chrome Ltd	Twefontein	ROD	29 September 2021
Compiled the updated water balance for TC Smelters	Samancor Chrome Ltd	TC Smelters	Water Balance	29 October 2021
Conducted a Desktop surface water assessment for a proposed granite mine	Gudani Consulting	Sable Granite	Surface water assessment	04 October 2021
Conducted a Desktop surface water assessment for a proposed cemetary expansion	Gudani Consulting	Vaalwater cemetary	Surface water assessment	25 August 2021
Facilitating the registration of Waste Water Treatment works	Gudani Consulting	Venetia Mine	WULA	30 November 2021
Compiled the IWWMP for the Macarthy Mine	Salene Manganese	Macarthy Mine	IWWMP	20 December 2021
Compiled the Section 27 motivation for the Macarthy Mine WULA	Salene Manganese	Macarthy Mine	Section 27 Motivation	21 September 2021
Compiled the updated IWWMP for Lannex Section as part of the WULA	Samancor Chrome Ltd	Lannex Section	IWWMP	31 May 2021
Compiled the Method statement as supporting documentation for a Water use licence application	Samancor Chrome Ltd	Lannex Section	Method Statement	09 June 2021
Compiled the Monitoring and Audit plan as supporting documentation for a WULA	Samancor Chrome Ltd	Lannex Section	Monitoring and Audit plan	15 June 2021
Compiled the Water use licence application report for the Lannex section	Samancor Chrome Ltd	Lannex Section	WULAR	24 September 2021
Compiled the EIA/EMP document for the Twefontein Expansion project	Samancor Chrome Ltd	Twefontein	EIA/EMP	25 October 2021
Compiled the Section 27 motivation for the Twefontein WULA	Samancor Chrome Ltd	Twefontein	Section 27 Motivation	14 June 2021
Compiled the work method statement for Twefontein Section	Samancor Chrome Ltd	Twefontein	Work Method Statement	20 May 2021
Compiled the Monitoring and Audit plan as supporting documentation for a WULA	Samancor Chrome Ltd	Twefontein	Monitoring and Audit plan	20 December 2021
Updated the IWWMP for Lesedi (Phoenix) to be used in new WULA	Sylvania	Lesedi Phoenix TSF	IWWMP	20 October 2021



Appendix 2

Declaration of Independence



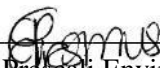
Details of Specialist and Declaration of Interest

Specialist:	Prescali Environmental Consultants (Pty) Ltd		
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Professional affiliation(s) (if any)	SACNASP / EAPASA		
Project Consultant:	Prescali Environmental Consultants (Pty) Ltd		
Contact person:	Elaine van der Linde		
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General declaration:

I, Christina Petronella Erasmus, declare that --

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of section 24F of the Act.

Signature of the specialist: 

Name of company (if applicable): Prescali Environmental Consultants (Pty) Ltd

Date: 28/09/2022

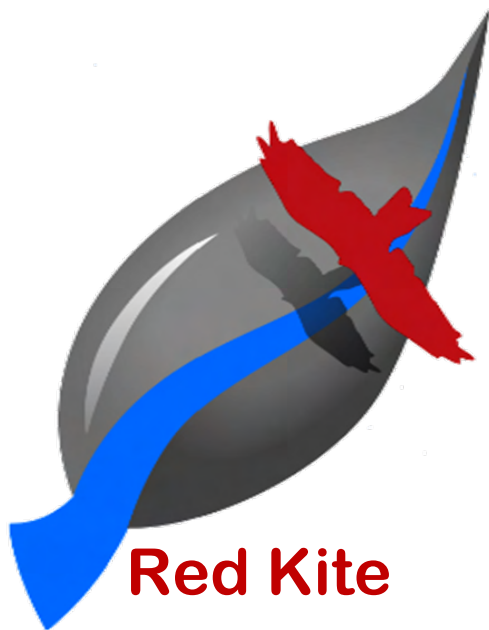
Desktop Terrestrial Ecology Assessment

**DESKTOP
TERRESTRIAL ECOLOGY ASSESSMENT
FOR
SYLVANIA NORTHERN MINING (PTY) LTD:
PROSPECTING PROJECT**

**ON VARIOUS FARMS IN THE
MOGALAKWENA AND BLOUBERG LOCAL
MUNICIPALITIES,**

LIMPOPO PROVINCE

SEPTEMBER 2022



Red Kite

Environmental Solutions

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Project Reference: RK/2022/SNMTEA/V1

CONFIDENTIALITY:

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Executive Summary

Red Kite Environmental Solutions (Pty) Ltd (“Red Kite”) was appointed by Prescali Environmental Consultants (Pty) Ltd to conduct a desktop Terrestrial Ecology Assessment for the Sylvania Northern Mining (Pty) Ltd: Prospecting project in the Mogalakwena and Blouberg Local Municipalities of the Limpopo Province.

Sylvania Northern Mining is applying for two Prospecting Rights (LP 14710PR & LP 14728PR) with a combined area of 10 661.07 ha. The preliminary area of disturbance has been estimated as a total of 3 050 m² (0.3 ha).

No site survey was conducted to verify or dispute any findings related to the desktop assessment.

Information on plant species previously recorded for the project area was extracted from the POSA online database hosted by SANBI. The results indicate that 78 plant species have been recorded in the area queried:

- None of the species previously recorded for the area are Species of Conservation Concern (SCC) in terms of their Red List status. Furthermore, the Environmental Screening Tool Report for the project area does not list any SCC. The aforementioned is supported by the findings of previous ecology assessments undertaken on the project area.
- None of the flora species recorded on POSA for the area are listed as protected in the LEMA.
- Four protected species, in terms of the NFA, may occur on the project area, namely:
 - *Boscia albitrunca* (Shepherd’s tree)
 - *Combretum imberbe* (Leadwood)
 - *Sclerocarya birrea* (Marula)
 - *Vachellia erioloba* (Camel thorn)

A desktop study was conducted to establish whether any potentially sensitive faunal species or species of conservation concern may possibly occur on site. The following summary of findings are relevant to the development:

- Mammals: one (1) mammal species was found to possibly occur, which is a provincial SCC and listed nationally within TOPS 2007, while two (2) additional SCC were listed by the Screening Tool Report for the project.
- Avifaunal: 168 bird species were found to possibly occur, with eight (8) avifaunal species indicated as SCC.
- Butterflies: Thirteen (13) butterfly species were found to occur, all of which were categorized as LC.
- Other Invertebrates: Three (3) Dungbeetle species were shown to occur for the QDS, all noted as LC.
- Reptiles: 36 reptile species were recorded for the QDS, of which three are SCC.
- Amphibians: Nine (9) amphibian species were reported, of which one (1) is listed within TOPS 2007.

The majority of the project footprint lies within the Makhado Sweet Bushveld and a small section on the north-western most border of the PR area is located in the Roodeberg Bushveld. The Makhado Sweet Bushveld and Roodeberg Bushveld are not listed in the “National List of Ecosystems that are Threatened and need of protection”, and as Least Concern by the 2018 National Biodiversity Assessment.

The Prospecting Right areas contains the following classes from the LCP and District Bioregional Plans: CBA1, CBA2, ESA1, ESA2, NNR and ONA. However, the majority of the proposed target areas are located in areas categorised as ONA and NNR. Limited sections of the target area on the farm Altona 696 is located on areas categorised as CBA2 and ESA2.

The north-eastern section of the Prospecting Right area is located in the transition zone of the Vhembe Biosphere Reserve.

From satellite imagery of the Prospecting Right areas the following impacts are apparent:

- Numerous dirt roads. Impacts from human and vehicle movement on these roads are expected.
- Extensive dryland crop farming has taken place on the Prospecting Right area.
- A number of villages and residences are located on and adjacent to the Prospecting Right area.



- Heavy livestock grazing and wood harvesting is expected, as reported in previous ecological studies conducted on the study area.
- Exotic and Alien Invasive Plant species proliferation is expected, as reported in previous ecological studies conducted on the study area.

Various non-perennial tributaries of the Matlalane River and Seepabana River are located on the Prospecting Right areas. However, the layout of the prospecting target areas appear to have been designed to avoid most of these non-perennial tributaries.

The southern section of the Prospecting Right area is located in an area designated as a Phase 2 and the northern section is located in an area designated as an Upstream FEPA.

Based on the desktop assessment findings, the Terrestrial Ecology sensitivity is considered as follows:

- All untransformed areas indicated as Critical Biodiversity Areas are considered high sensitivity.
- All watercourses and their associated riparian zones are considered high sensitivity.
- The remainder of the Prospecting Right area is considered low sensitivity.

Sensitive watercourse and their associated riparian vegetation habitat constitute the most important features which make up the area identified as increased sensitivity.

It is the reasoned opinion of the specialist that the development may continue if all recommended mitigation measures are implemented from the onset of the development.



Table of Contents

1. INTRODUCTION	8
2. SCOPE OF THE STUDY	11
3. LEGISLATION	12
3.1. The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA)	12
3.1.1. <i>National Environmental Management Biodiversity Act (Act No. 10 Of 2004) (NEMBA)</i>	12
3.2. The National Forest Act, 1998 (Act No. 84 of 1998) (NFA)	14
3.3. Focus Areas for Protected Area Expansion – NPAES (2008)	14
3.4. National Biodiversity Assessment (NBA; 2018)	14
3.5. Limpopo Environmental Management Act, 2003 (Act No. 7 of 2003) (LEMA)	15
4. METHODS AND APPROACH	16
4.1. Data Sourcing	16
4.2. Limitations and Assumptions	17
5. FLORA	18
5.1. Biomes	18
5.2. Vegetation Types	18
5.2.1. <i>Makhado Sweet Bushveld</i>	18
5.2.2. <i>Roodeberg Bushveld</i>	19
5.3. Conservation Status	21
5.4. POSA Plant Species	25
6. FAUNA	26
6.1. Mammals	26
6.2. Avifaunal	27
6.3. Butterflies	27
6.4. Other Invertebrates	27
6.5. Reptiles	27
6.6. Amphibians	27
7. SENSITIVITY	28
8. IMPACT ASSESSMENT	31
8.1. Methodology	31
8.1.1. <i>Assessment Criteria</i>	31
8.1.2. <i>Mitigation</i>	32
8.1.3. <i>Assessment Weighting</i>	33
8.2. Nature of Impacts Identified	35
8.3. Impact Assessment and Risk Evaluation	35
8.3.1. <i>Impact on overall biodiversity due to development activities</i>	35
8.3.2. <i>Impact on biodiversity due to exotic and invasive plant species</i>	36
8.3.3. <i>Impact on species of conservation concern and sensitive habitats</i>	37



8.3.4. Impact on ecology due to Closure / Post-closure Phase	37
9. ECOLOGICAL MANAGEMENT PLAN	39
9.1. Pre-Construction Phase	39
9.2. Construction and Operational Phases	39
9.2.1. Aim and Objectives	39
9.2.2. Mitigation and Management measures	39
9.3. Decommissioning and Closure	40
9.4. Monitoring	40
10. CONCLUSION	41
11. REFERENCES	43
APPENDIX A: SPECIALISTS' CURRICULUM VITAE.....	44
APPENDIX B: IUCN RED LIST DEFINITIONS.....	45
APPENDIX C: POSA FLORA SPECIES LIST	47
APPENDIX D: FAUNA SPECIES LIST FOR QDS.....	49

List of Figures

Figure 1: Locality of the proposed Prospecting Right areas	9
Figure 2: Proposed preliminary prospecting target areas.....	10
Figure 3: Vegetation types of the study site.....	20
Figure 4: Limpopo Conservation Plan (V2) Biodiversity areas on the project area	22
Figure 5: Protected and conservation areas.....	23
Figure 6: FEPA located on project area	24
Figure 7: Rivers and stream in relation to the project site	29
Figure 8: Map of animal species (left) and plant species (right) theme sensitivity as per the Environmental Screening Tool Report.....	30
Figure 9: Environmental Screening Tool maps of terrestrial ecology themes sensitivity	30

List of Tables

Table 1: Fauna SCC previously recorded for QDS	26
Table 2: Impact Assessment Criteria	31
Table 3: Significance-Without Mitigation.....	33
Table 4: Significance- With Mitigation	33
Table 5: Description of assessment parameters with its respective weighting.....	34



Abbreviations


AIP	Alien Invasive Plant
ADU	Animal Demographic Unit
CBA	Critical Biodiversity Area
CITES	Convention on International Trade in Endangered Species
DFFE	Department of Forestry, Fisheries and the Environment
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
ESA	Ecological Support Area
FEPA	Freshwater Ecosystem Priority Area
IBA	Important Birding and Biodiversity Area
IDP	Integrated Development Plan
IUCN	International Union for Conservation of Nature and Natural Resources
LC	Least Concern
LCP	Limpopo Conservation Plan
LEMA	Limpopo Environmental Management Act, 2003 (Act No. 7 of 2003)
NBA	National Biodiversity Assessment
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NEMBA	National Environmental Management: Biodiversity Act (Act 10 of 2004)
NEMPAA	National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003)
NFA	National Forests Act, 1998 (Act No. 84 of 1998)
NFEPA	National Freshwater Ecosystem Priority Areas
NPAES	National Protected Area Expansion Strategy
POSA	Plants of Southern Africa
QDS	Quarter Degree Squares
SABAP2	South African Bird Atlas Project 2
SABCA	South African Butterfly Conservation Assessment
SACAD	South African Conservation Areas Database
SANBI	South African National Biodiversity Institute
SAPAD	South African Protected Areas Database
SARCA	South African Reptile Conservation Assessment
SCC	Species of Conservation Concern
ToPS	Threatened and Protected Species List (2007) as part of the National Environmental Management: Biodiversity Act (Act 10 of 2004)
VU	Vegetation Unit



Declaration of Independence


I, Nicole Upton, declare that -

- I act as the independent specialist;
- I will perform the work relating to the project in an objective manner, even if this results in views and findings that are not favourable to the project proponent;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this project, including knowledge of the National Environmental Management Act, 1998 (Act No. 107 of 1998; the Act), regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I will take into account, to the extent possible, the matters listed in Regulation 8;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the project proponent and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the project; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority or project proponent;
- All the particulars furnished by me in this document are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of section 24F of the Act.

Signature of Specialist	
Name of Company	Red Kite Environmental Solutions (Pty) Ltd ("Red Kite")
Date	29/09/2022

I, Corlien Lambrechts, declare that -

- I act as the independent specialist;
- I will perform the work relating to the project in an objective manner, even if this results in views and findings that are not favourable to the project proponent;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this project, including knowledge of the National Environmental Management Act, 1998 (Act No. 107 of 1998; the Act), regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I will take into account, to the extent possible, the matters listed in Regulation 8;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the project proponent and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the project; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority or project proponent;
- All the particulars furnished by me in this document are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of section 24F of the Act.

Signature of Specialist	
Name of Company	External for Red Kite Environmental Solutions (Pty) Ltd ("Red Kite")
Date	29/09/2022



1. INTRODUCTION

Red Kite Environmental Solutions (Pty) Ltd (“Red Kite”) was appointed by Prescali Environmental Consultants (Pty) Ltd to conduct a desktop Terrestrial Ecology Assessment for the Sylvania Northern Mining (Pty) Ltd: Prospecting project in the Mogalakwena and Blouberg Local Municipalities of the Limpopo Province.

Sylvania Northern Mining is applying for two Prospecting Rights over the following farm portions:

Prospecting Right LP30/5/1/1 /2/14710PR	Prospecting Right LP30/5/1/1/2/14728PR
Aurora 397 LR Nonnenworth 421 LR remaining extent Non Plus Ultra 683 LR Altona 696 LR Teneriffe 682 LR	Schaffhausen 689 LR portion 2

The combined Prospecting Right areas are 10 661.07 Ha in extent.

The following invasive activities are proposed as part of the prospecting project:

- **Ground geophysics and soil geochemical sampling:**
- **Trenching:** Eight short (25x2x2m) trenches will be excavated over the outcrop positions of the defined orebodies. Upon completion trenches will be refilled. During the trenching and mapping, temporary barriers will be erected around the excavation to prevent people/animals from falling into the trenches.
- **Resource drilling:** Drilling (diamond or RC) of the prospective areas. It is anticipated that initially approximately 4 drill holes will be drilled. Drill holes could vary in depth from 150 to 350m, with an average depth of 250 meters. Depending on the results of this drilling further 1 drill hole may be required.

Activities	Prospecting Right: LP30/5/1/1 /2/14710PR	Prospecting Right: LP30/5/1/1/2/14728PR
Drill Site	10m x 10m Drill Sites 1 Drill site= 100 m ² Total Drill Site Areas: (6) = 600 m ²	10 m x 10 m drill sites 1 drill site= 100 m ² Total Drill Site Areas: (4) = 400 m ²
Trenching	25m x 2m x 2m Trench Sites 1 Trench = 50 m ² Total Trench Areas (25) = 1 250 m ²	25m x 2m x 2m Trench Sites 1 Trench = 50 m ² Total Trench Areas: (8) = 400 m ²
Contractor’s camp	N/A	400 m ²
Rehabilitation and Closure	1 850 m ²	1 200 m ²

As per the table above, the preliminary area of disturbance has been estimated as a total of 3 050 m² (0.3 ha).

The objectives of the fauna and flora assessment include:

- Identify sensitive areas and species that should be avoided during the proposed development.
- Make use of the South African Biodiversity Institute Database to obtain specialised information and previous surveys within the area.
- Summarise legislation pertaining to the project with regard to biodiversity.
- Highlight major concern or fatal flaws of the project with regard to biodiversity.
- Provide relevant mitigations and recommendations to the developer to help limit and minimise the impacts they may have on the fauna and flora of the area.



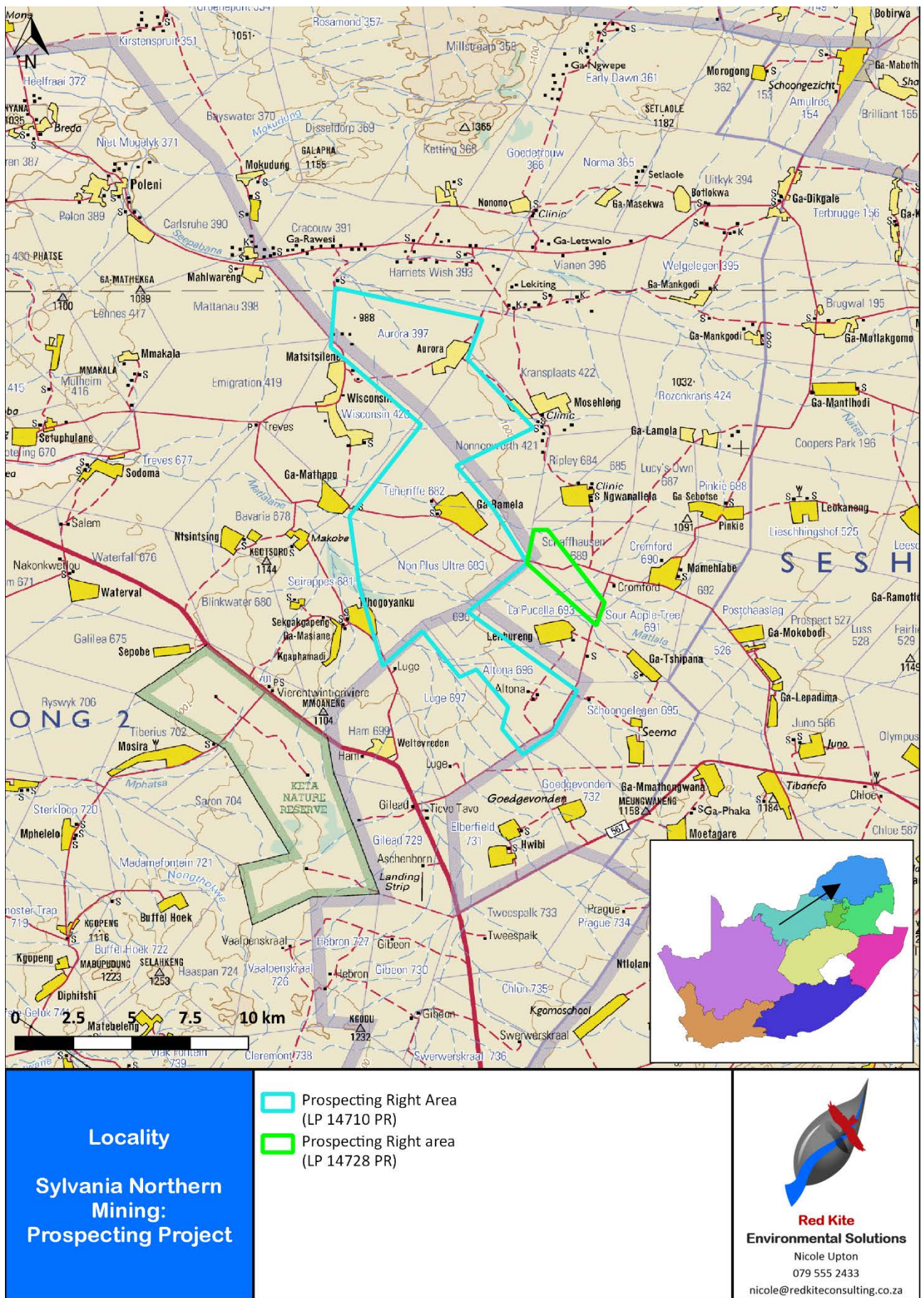


Figure 1: Locality of the proposed Prospecting Right areas



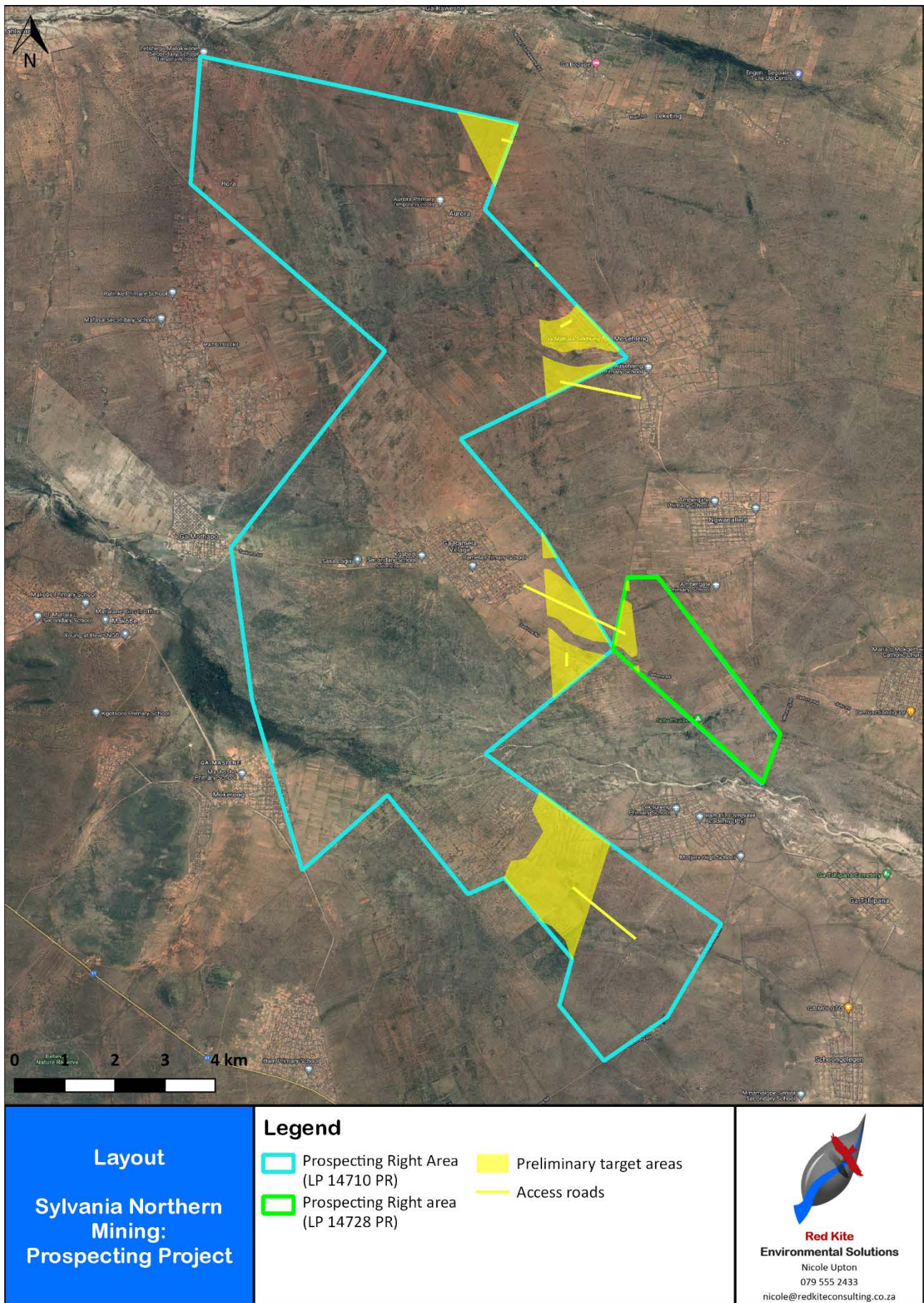


Figure 2: Proposed preliminary prospecting target areas



2. SCOPE OF THE STUDY

Red Kite Environmental Solutions was appointed to conduct a Desktop Terrestrial Ecology Assessment as one of the specialist studies for the Environmental Authorisation process for the project. This Terrestrial Ecology Assessment consist of a desktop study, which includes the following:

- A desktop vegetation study, which included:
 - Classification of the main biome and description of the dominant vegetation type;
 - Investigation of the dominant indigenous species within this region;
 - Listing the endemic species;
 - Listing species of conservation concern; and
 - Determining the medicinal species.

- A desktop invertebrate and mammal study, which included determining the:
 - Endemic species;
 - Baseline occurrences of species within the area;
 - Virtual Museum and Animal Demographic Unit consultation; and
 - Listing species of conservation concern.

No field assessment was conducted to verify or dispute the findings as obtained during the desktop assessment.

The information from the desktop study was used to report on the following:

- General description of the biodiversity components in the study area;
- Description and mapping of the broad vegetation types identified in the study area
- Identify sensitive areas and species that should be avoided by the proposed development.
- Make use of the South African Biodiversity Institute Database to obtain specialised information and previous surveys within the area.
- Summarise legislation pertaining to the project with regard to biodiversity.
- Highlight major concern or fatal flaws of the project with regard to biodiversity.
- Identify potential impacts to terrestrial ecology aspects and determine the potential significance of these impacts.
- Provide relevant mitigations and recommendations to limit and minimise the impacts the activities may have on the fauna and flora of the area.



3. LEGISLATION

The aim of this component of the report is to provide a brief overview of the pertinent policies, as well as legal and administrative requirements applicable to biodiversity aspects of the proposed development.

3.1. The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA)

The NEMA is the statutory framework to enforce Section 24 of the Constitution of the Republic of South Africa. The Act aids in providing for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote cooperative governance and procedures for co-ordinating environmental functions exercised by organs of state. The Act also provides for certain aspects of the administration and enforcement of other environmental management laws and matters connected therewith.

This Act embraces all three fields of environmental concern namely:

- i) resource conservation and exploitation;
- ii) pollution control and waste management; and
- iii) land use planning and development.

3.1.1. National Environmental Management Biodiversity Act (Act No. 10 Of 2004) (NEMBA)

The following aspects of the NEMBA are important to consider in the compilation of an ecological report:

- Lists of ecosystems that are threatened or in need of national protection;
 - Links to Integrated Environmental Management processes;
 - Must be taken into account in Environmental Management Plans (EMP) and Integrated Development Plans (IDPs);
 - The Minister may make regulations to reduce the threats to listed ecosystems.
- **Threatened or Protected Species List (ToPS List) – Government Gazette Notice No. 151 of 2007**
“National Environmental Management: Biodiversity Act, 2004 (Act No. 10 Of 2004): Publication of Lists of Critically Endangered, Endangered, Vulnerable and Protected Species”

The status provided by the Government Gazette in terms of Notice 151 implies:

- Critically endangered: Section 56(1)(a) applies to the species awarded this status in terms of NEMBA, meaning: *“Critically endangered species, being any indigenous species facing an extremely high risk of extinction in the wild in the immediate future”*
- Endangered species: Section 56(1)(b) applies to the species awarded this status in terms of NEMBA, meaning: *“Endangered species, being any indigenous species facing a high risk of extinction in the wild in the near future, although they are not a critically endangered species”*
- Vulnerable species: Section 56(1)(c) applies to the species awarded this status in terms of NEMBA, meaning: *“Vulnerable species, being any indigenous species facing an extremely high risk of extinction in the wild in the medium-term future, although they are not a critically endangered species or an endangered species”*
- Protected species: Section 56(1)(d) applies to the species awarded this status in terms of NEMBA, meaning: *“Protected species, being any species, which are of such high conservation value or national importance that they require national protection, although they are not listed in terms of paragraph (a), (b) or (c)”*



- ***Alien and Invasive Species List - Government Gazette Notice No. 598 of 2014 [as amended]***

The Department of Forestry, Fisheries and Environment (DFFE) manages Invasive Alien Species (IAS) under the NEMBA.

The four different categories that NEMBA classify AIPs under are:

- Category 1a: A person in control of a Category 1a Listed Invasive Species must immediately take steps to combat or eradicate listed invasive species and officials from the DEFF must be allowed access to monitor or assist with control. If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must control the listed invasive species in accordance with such programme.
- Category 1b: A person in control of a Category 1b Listed Invasive Species must control the listed invasive species. If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must control the listed invasive species in accordance with such programme. The Minister may require any person to develop a Category 1b Control Plan for one or more Category 1b species. Officials from the DFFE must be allowed access to monitor or assist with control.
- Category 2: These are invasive species that can remain in your garden, but only with a permit. A person in control of a Category 2 Listed Invasive Species, or person in possession of a permit, must ensure that the specimens of the species do not spread outside of the land or the area specified in the Notice or permit. Any species listed as a Category 2 Listed Invasive Species that occurs outside the specified area (permit) must, for purposes of these regulations, be considered to be a Category 1b Listed Invasive Species and must be managed accordingly.
- Category 3: These are invasive species that can remain on your property. However, you cannot propagate or sell these species and must control them in your garden. In riparian zones or wetlands all category 3 plants become category 1b plants.

- ***National List of Ecosystems that are threatened and in need of protection - Government Gazette Notice No. 1002 of 2011***

The National Environmental Management Biodiversity Act (Act 10 of 2004) (NEMBA) provides for listing of threatened or protected ecosystems, in one of four categories:

- Critically Endangered: these have undergone severe degradation of ecological structure, function or composition as a result of human intervention and are subject to an extremely high risk of irreversible transformation;
- Endangered: these have undergone degradation of ecological structure, function or composition as a result of human intervention, although they are not critically endangered ecosystems;
- Vulnerable: these have a high risk of undergoing significant degradation of ecological structure, function or composition as a result of human intervention, although they are not critically endangered ecosystems or endangered ecosystems; or
- Protected: these have a high conservation value or of high national or provincial importance, although they are not listed as critically endangered, endangered or vulnerable.

Threatened ecosystems are listed in order to reduce the rate of ecosystem and species extinction by preventing further degradation and loss of structure, function and composition of threatened ecosystems. The purpose of listing protected ecosystems is primarily to conserve sites of exceptionally high conservation value (SANBI, BGIS).



3.2. The National Forest Act, 1998 (Act No. 84 of 1998) (NFA)

The National Forests Act:

- Promotes the sustainable management and development of forests for the benefit of all;
- Creates the conditions necessary to restructure forestry in State Forests;
- Provide special measures for the protection of certain forests and protected trees;
- Promotes the sustainable use of forests for environmental, economic, educational, recreational, cultural, health and spiritual purposes; and
- Promotes community forestry.

In terms of the NFA, forest trees or protected tree species may not be cut, disturbed, damaged, destroyed and their products may not be possessed, collected, removed, transported, exported, donated, purchased or sold – except under license granted by the Department of Forestry, Fisheries and Environment (DFFE).

The list of protected trees has been published in terms of Section 12 (1) (d) of the NFA, in Government Gazette No. 536 of 2018.

3.3. Focus Areas for Protected Area Expansion – NPAES (2008)

The goal of the National Protected Area Expansion Strategy (NPAES) is to achieve cost effective protected area expansion for ecological sustainability and adaptation to climate change. The NPAES sets targets for protected area expansion, provides maps of the most important areas for protected area expansion, and makes recommendations on mechanisms for protected area expansion. It deals with land-based and marine protected areas across all of South Africa's territory (SANBI, BGIS).

3.4. National Biodiversity Assessment (NBA; 2018)

The National Biodiversity Assessment (NBA) is the primary tool for monitoring and reporting on the state of biodiversity in South Africa and is prepared as part of the SANBI mandate under the National Environmental Management: Biodiversity Act (Act 10 of 2004). It is used to inform policies, strategies and actions in a range of sectors for managing and conserving biodiversity more effectively.

The NBA focusses primarily on assessing biodiversity at the ecosystem and species level, and the two headline indicators of threat status and protection level are applied to both ecosystems and species in the four realms (terrestrial, inland aquatic, estuarine and marine) and in two cross-realm areas (the coast and South Africa's sub-Antarctic territory). These established headline indicators provide a way of comparing results meaningfully across the realms, and a standardised framework that links with policy and legislation in South Africa to facilitate an effective interface between science and policy. Underlying the headline indicators is a wealth of geographically detailed information that can be applied at the provincial and local level.

The latest NBA (NBA 2018) was released in October 2019 and builds on the National Spatial Biodiversity Assessment 2004 and the NBA 2011.



3.5. Limpopo Environmental Management Act, 2003 (Act No. 7 of 2003) (LEMA)

The objectives of this Act are:

- to manage and protect the environment in the Province;
- to secure ecologically sustainable development and responsible use of natural resources in the Province;
- generally, to contribute to the progressive realisation of the fundamental rights contained in section 24 of the Constitution of the Republic of South Africa Act, 1996 (Act No. 108 of 1996), and
- to give effect to international agreements effecting environmental management which are binding on the Province.

The LEMA deals with the conservation of wild animals, fresh water fish and the conservation and protection of flora in the Limpopo Province. Animals and plants are both listed in the schedules with different degrees of protection afforded to each. The LEMA (2003) contains schedules of specially protected Wild animals (Schedule 2), Protected Wild Animals (Schedule 3), specially protected plants (Schedule 11) and protected plants (Schedule 12).

This Act must be interpreted and applied in accordance with the national environmental management principles set out in Section 2 of the National Environmental Management Act, 1998 (Act No. 107 of 1998).



4. METHODS AND APPROACH

This report is based on a literature review and GIS analysis of the proposed development. The literature review included scientific and popular publications on related aspects for the area. Internet searches for ecological issues in the area and Red Data plant and animal species were performed. The Google search engine was used for information pertaining to Red Data flora and fauna and their habitat preferences.

A baseline assessment was conducted to establish whether any potentially sensitive species/receptors might occur on site. The South African National Biodiversity Institute's (SANBI) online biodiversity tool and the Virtual Museum and Animal Demography Unit (ADU) was used to query species lists for the project area.

The National Web Based Environmental Screening Tool, hosted by the Department of Forestry, Fisheries and Environment, was also used to determine geographically based sensitivity information in terms of terrestrial ecology, and animal and plant species themes, including potential sensitive species associated with the region.

Aerial photographs and satellite imagery were used to delineate potential sensitive habitat types and these were used as suitable method to identify sensitive areas at a desktop level.

No field survey was conducted for the assessment and all results given within this document is based on desktop findings and assessments. A field assessment is recommended to assess the habitat conditions and to ascertain whether any SCC occur on the project footprint before construction begins.

4.1. Data Sourcing

The data sources consulted and used where necessary in the study includes the following:

- Vegetation types and their conservation status were extracted from the South African National Vegetation Map (Mucina and Rutherford 2006) (updated 2018).
- Information on plant species recorded for the project area was extracted from the Plants of Southern Africa (POSA) database hosted by SANBI. The area queried is a much larger extent than the study area to account for the fact that the area has probably not been well sampled in the past.
- The IUCN conservation status of the species recorded for the area queries on POSA was also extracted from the database and is based on the Threatened Species Programme, Red List of South African Plants.
- Threatened Ecosystem data was extracted from the NEM:BA listed ecosystems layer (2011 and 2018).
- Information on Critical Biodiversity Areas (CBA) was extracted from the Limpopo Conservation Plan (2018) and the Waterberg Bioregional Plan (2019).
- Protected areas expansion areas were extracted from the National Protected Areas Expansion Strategy 2008 (NPAES).
- Protected Areas, in terms of the NEMPAA, was extracted from the DFFE Protected Areas Register (2022).
- South African Conservation Areas were sourced from the DFFE database (2022).
- Important Bird and Biodiversity Areas (2015) were sourced from SANBI.
- Lists of mammals, reptiles and amphibians which are likely to occur at the site were derived based on distribution records from the literature and various spatial databases (SANBI's SIBIS and BGIS databases).
- Bird species lists for the area were extracted from the SABAP 1 and SABAP 2 databases and Birdlife South Africa's Important Bird Areas was also consulted to ascertain if the site falls within the range of any range-restricted or globally threatened species.
- The faunal species lists provided are based on species which are known to occur in the broad geographical area.
- The conservation status of each species is also listed, based on the latest IUCN Red List Categories and Criteria and where species have not been assessed under these criteria, the CITES status is reported where possible.



4.2. Limitations and Assumptions

The desktop study was conducted with up to date resources. It might however be possible that additional information become available in time, because environmental impact assessments deal with dynamic natural ecosystems. It is therefore important that the report be viewed and acted upon with these limitations in mind.

No field survey was conducted for the assessment and all results given within this document are based on desktop findings and assessments. Therefore, the results, typical flora, herpetofauna, avifauna and mammalian communities found within the study should/can therefore only be used as a general guideline.

The specialist responsible for this study reserves the right to amend this report, recommendations and/or conclusions at any stage should any additional or otherwise significant information come to light.



5. FLORA

5.1. Biomes

The project area is located in the Savanna biome.

The Savanna Biome is the largest biome in South Africa, covering 46% of the country (Low & Rebelo, 1996). Savanna stretches from the Kalahari in the north-west across to the lowveld in the north-east and southwards to the lowlands of KwaZulu Natal and the Eastern Cape.

The Savanna biome is characterised by a grassy ground layer and a distinct upper layer of woody plants. Where this upper layer is near the ground the vegetation may be referred to as Shrubveld, where it is dense as Woodland, and the intermediate stages are locally known as Bushveld (Low & Rebelo, 1996).

The environmental factors delimiting the biome are complex: altitude ranges from sea level to 2 000 m; rainfall varies from 235 to 1 000 mm per year; frost may occur from 0 to 120 days per year; and almost every major geological and soil type occurs within the biome. A major factor delimiting the biome is the lack of sufficient rainfall which prevents the upper layer from dominating, coupled with fires and grazing, which keep the grass layer dominant. Summer rainfall is essential for the grass dominance, which, with its fine material, fuels near-annual fires. In fact, almost all species are adapted to survive fires, usually with less than 10% of plants, both in the grass and tree layer, killed by fire. Even with severe burning, most species can resprout from the stem bases (Low & Rebelo, 1996).

5.2. Vegetation Types

According to SANBI (2006 – 2018), the majority of the project footprint lies within the Makhado Sweet Bushveld (SVcb20) and a small section on the north-western most border of the PR area is located in the Roodeberg Bushveld (SVcb18). A description of the vegetation types, extracted from the CD accompanying Mucina & Rutherford (2006), is presented below.

5.2.1. Makhado Sweet Bushveld

The Makhado Sweet Bushveld vegetation type is found in the Limpopo Province and occurs on the plains south of the Soutpansberg, east of the Waterberg and on the apron surrounding the Blouberg and Lerataupje Mountains, and north of the Polokwane Plateau and west of the escarpment, with extensions to Mokopane to the south and to the north near Vivo. The vegetation type is found on slightly to moderately undulating plains sloping generally down to the north, with some hills in the southwest. Makhado Sweet Bushveld is characterised by short and shrubby bushveld with a poorly developed grass layer.

A list of expected common and dominant species in undisturbed vegetation includes the following (those with a "d" are considered to be dominant) (Mucina and Rutherford, 2006):

- **Trees:** *Senegalia erubescens* (d), *Vachellia gerrardii* (d), *Senegalia mellifera* subsp. *detinens* (d), *Vachellia rehmanniana* (d), *Boscia albitrunca* (d), *Combretum apiculatum* (d), *Vachellia tortilis* subsp. *heteracantha*, *Terminalia sericea*.
- **Shrubs:** *Commiphora pyracanthoides*, *Dichrostachys cinerea*, *Grewia flava*, *Hibiscus calyphyllus*, *Lycium shawii*, *Rhigozum obovatum*, *Barleria lancifolia*, *Hirpicium bechuanense*, *Indigofera polioties*, *Melhaniania rehmannii*, *Pechuel-Loeschea leubnitziae*.
- **Graminoids:** *Antheophora pubescens* (d), *Aristida stipitata* subsp. *graciliflora* (d), *Cenchrus ciliaris* (d), *Enneapogon scoparius* (d), *Brachiaria nigropedata*, *Eragrostis trichophora*, *Panicum coloratum*, *P. maximum*, *Schmidtia pappophoroides*, *Urochloa mosambicensis*.



- **Herbs:** *Chamaecrista absus*, *Corbichonia decumbens*, *Geigeria acaulis*, *Harpagophytum procumbens* subsp. *transvaalense*, *Heliotropium steudneri*, *Hemizygia elliottii*, *Hermbstaedtia odorata*, *Leucas sexdentata*, *Osteospermum muricatum*, *Tephrosia purpurea* subsp. *leptostachya*.

5.2.2. Roodeberg Bushveld

The Roodeberg Bushveld vegetation type is located in the Limpopo Province, straddling the Tropic of Capricorn. The vegetation type occurs from Marken and Villa Nora in the south through Baltimore to near Swartwater in the north and to the plains around the base of the Blouberg and Lerataupje Mountains in the northeast. The vegetation type is characterised by plains and slightly undulating plains, including some low hills, with short, closed woodland to tall open woodland and poorly developed grass layer.

A list of expected common and dominant species in undisturbed vegetation includes the following (those with a "d" are considered to be dominant) (Mucina and Rutherford, 2006):

- **Trees:** *Senegalia burkei* (d), *S. nigrescens* (d), *Vachellia robusta* (d), *V. erioloba*, *Sclerocarya birrea* subsp. *caffra*, *Senegalia erubescens* (d), *S. mellifera* subsp. *detinens* (d), *Vachellia nilotica* (d), *V. tortilis* subsp. *heteracantha* (d), *Combretum apiculatum* (d), *Kirkia acuminata* (d), *Vachellia grandicornuta*, *V. luederitzii* var. *retinens*, *Senegalia senegal* var. *leiorhachis*, *Albizia harveyi*, *Combretum imberbe*, *Commiphora mollis*, *Searsia lancea*, *Terminalia sericea*, *Ziziphus mucronata*.
- **Shrubs:** *Dichrostachys cinerea* (d), *Grewia flava* (d), *Euclea crispa* subsp. *crispa*, *E. undulata*, *Grewia monticola*, *Hibiscus micranthus*, *Commiphora africana*, *Melhania acuminata*, *Sida cordifolia*, *Solanum delagoense*.
- **Graminoids:** *Aristida canescens* (d), *Chloris virgata* (d), *Digitaria eriantha* subsp. *eriantha* (d), *Enneapogon cenchroides* (d), *Eragrostis rigidior* (d), *Panicum maximum* (d), *Urochloa mosambicensis* (d), *Aristida congesta*, *Brachiaria deflexa*, *Cymbopogon pospischilii*, *Cynodon dactylon*, *Eragrostis rotifer*.
- **Herbs:** *Achyranthes aspera*, *Corbichonia decumbens*, *Hemizygia elliottii*, *Kyphocarpa angustifolia*, *Seddera capensis*, *Tephrosia purpurea* subsp. *leptostachya*, *Waltheria indica*.



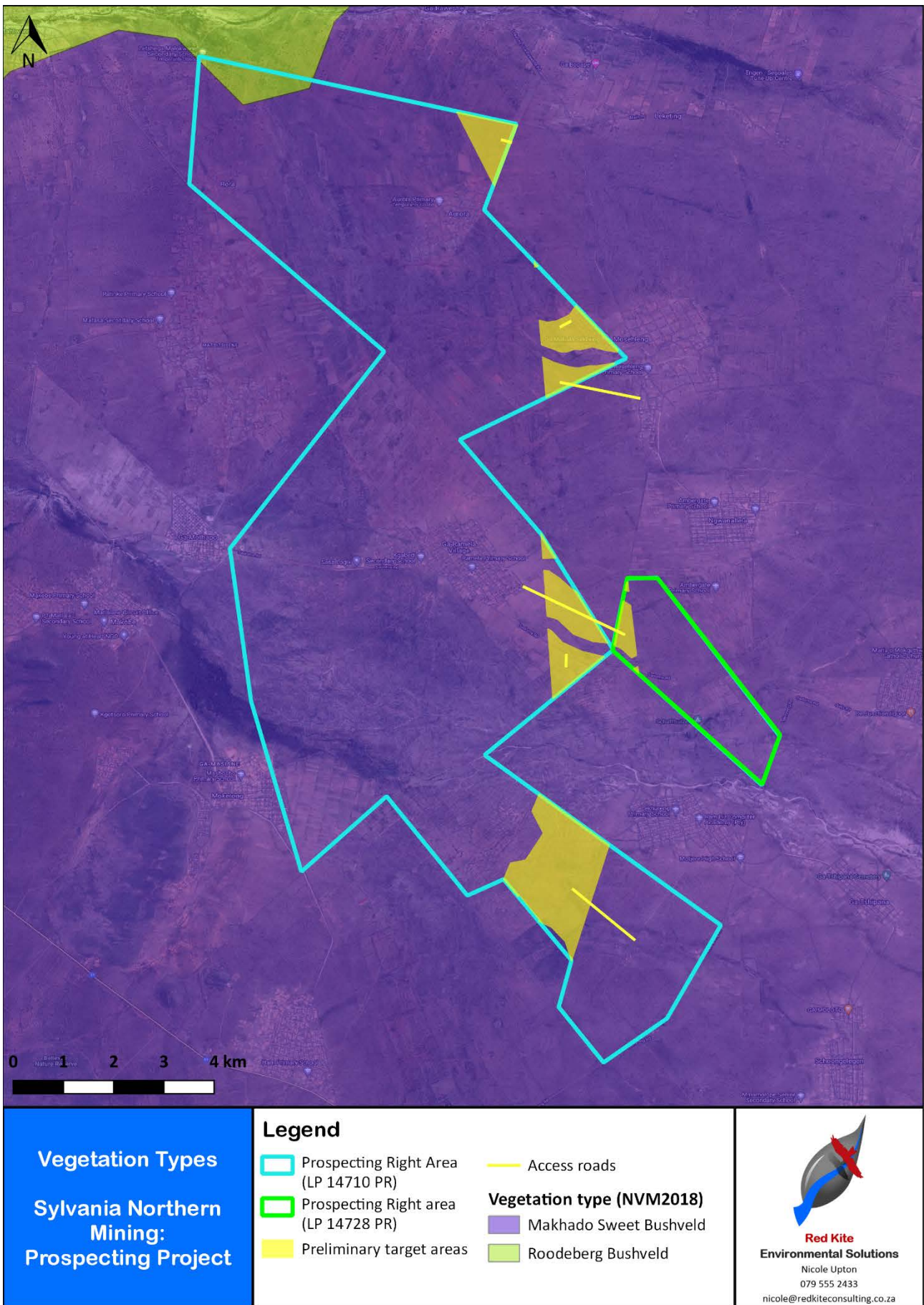


Figure 3: Vegetation types of the study site

5.3. Conservation Status

The National List of Ecosystems that are Threatened and need of protection (GN1002 of 2011), published under NEMBA (Section 3.1.1), lists national vegetation types that are afforded protection on the basis of rates of transformation. The Makhado Sweet Bushveld and Roodeberg Bushveld are not listed in the “National List of Ecosystems that are Threatened and need of protection”, and as Least Concern by the 2018 National Biodiversity Assessment.

There is one main conservation management plan for the province, namely the Limpopo Conservation Plan (LCP) (LCPv2, 2013). The LCP comprises two spatial components: maps of terrestrial and freshwater critical biodiversity areas (CBAs); and a set of land-use guidelines that are important for maintaining and supporting the inherent biodiversity values of these critical biodiversity areas. The LCP has been updated consecutively and individually for the Waterberg (2015), Mopani (2016), Vhembe (2017), Sekhukhune (2018) and Capricorn (2018) district municipalities as part the compilation of bioregional plans for these municipalities. Each bioregional plan produced an updated CBA map for the district.

Protection of the priority areas identified in the LCP and bioregional plans would contribute to meeting national biodiversity targets for the South African vegetation types.

- **Critical Biodiversity Areas (1) (CBA1):** Irreplaceable Sites. Areas required to meet biodiversity pattern and/or ecological processes targets. No alternative Sites are Available to Meet targets. Maintain In a natural state with limited or no biodiversity loss. Rehabilitate degraded areas to a natural or near natural state, and manage for no further degradation.
- **Critical Biodiversity Area (2) (CBA2):** Best Design Selected Sites. Areas selected to meet biodiversity pattern and/or ecological process targets. Alternative sites may be available to meet targets. Maintain in a natural state with limited or no biodiversity loss. Maintain current agricultural activities. Ensure that land use is not intensified and that activities are managed to minimize impact on threatened species.
- **Ecological Support Areas (1) (ESA1):** Natural, Near natural and degraded areas supporting CBAs by maintaining Ecological processes. Maintain ecosystem functionality and connectivity allowing for limited loss of biodiversity pattern.
- **Ecological Support Areas (2) (ESA2):** Areas with no natural habitat that is important for supporting ecological processes. Avoid additional / new impacts on ecological processes.
- **Other Natural Areas (ONA):** Natural and intact but not required to meet targets, or identified as CBA or ESA. No management objectives, land management recommendations or land-use guidelines are prescribed.
- **No natural habitat remaining:** Areas with no significant direct biodiversity value. Not Natural or degraded natural areas that are not required as ESA, including intensive agriculture, urban, industry; and human infrastructure. No management objectives, land management recommendations or land-use guidelines are prescribed.

The Prospecting Right areas contains the following classes from the LCP and District Bioregional Plans: CBA1, CBA2, ESA1, ESA2, NNR and ONA. However, the majority of the proposed target areas are located in area categorised as ONA & NNR. Limited sections of the target area on the farm Altona 696 is located on areas categorised as CBA2 and ESA2.

No Protected Areas, in terms of NEMPAA, are located within 10 km of the project area.

The Limpopo Central Bushveld NPAES is located approximately 7.4 km south-west of the project area.

The north-eastern section of the Prospecting Right area is located in the transition zone of the Vhembe Biosphere Reserve.



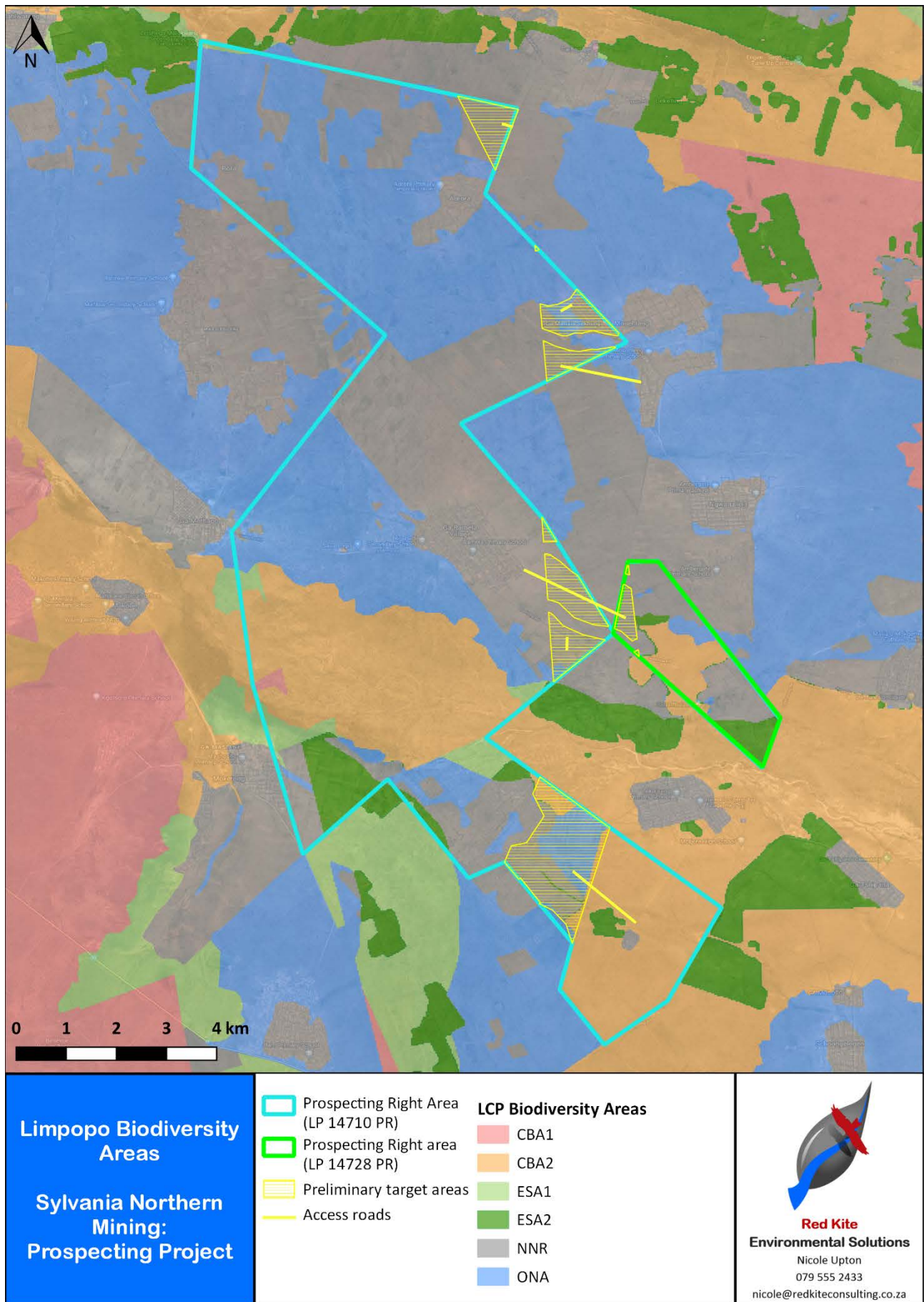


Figure 4: Limpopo Conservation Plan (V2) Biodiversity areas on the project area

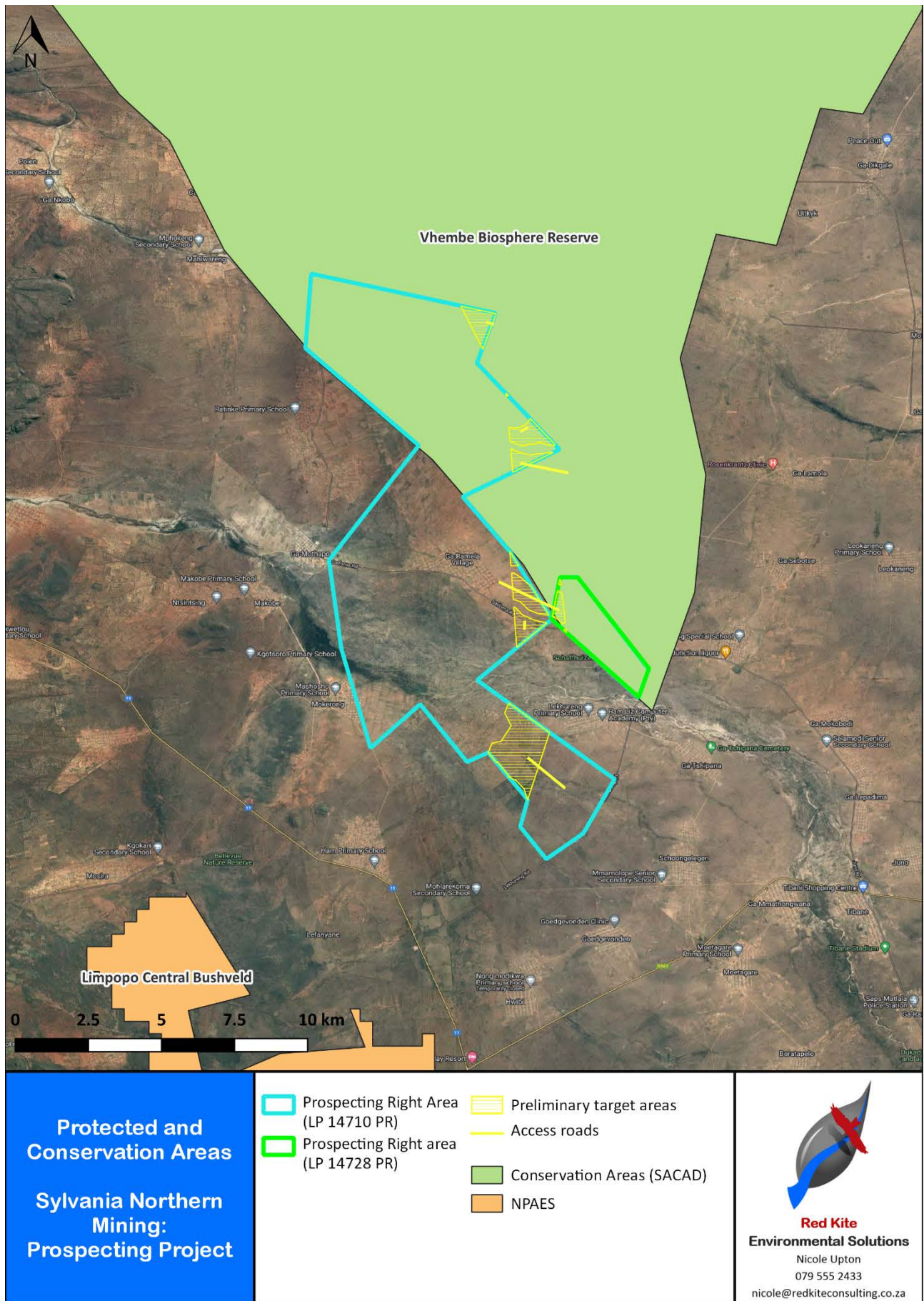


Figure 5: Protected and conservation areas



The southern section of the Prospecting Right area is located in an area designated as a Phase 2 and the northern section is located in an area designated as an Upstream FEPA.

The project area is not located in a Strategic Water Source Area (SWSA).

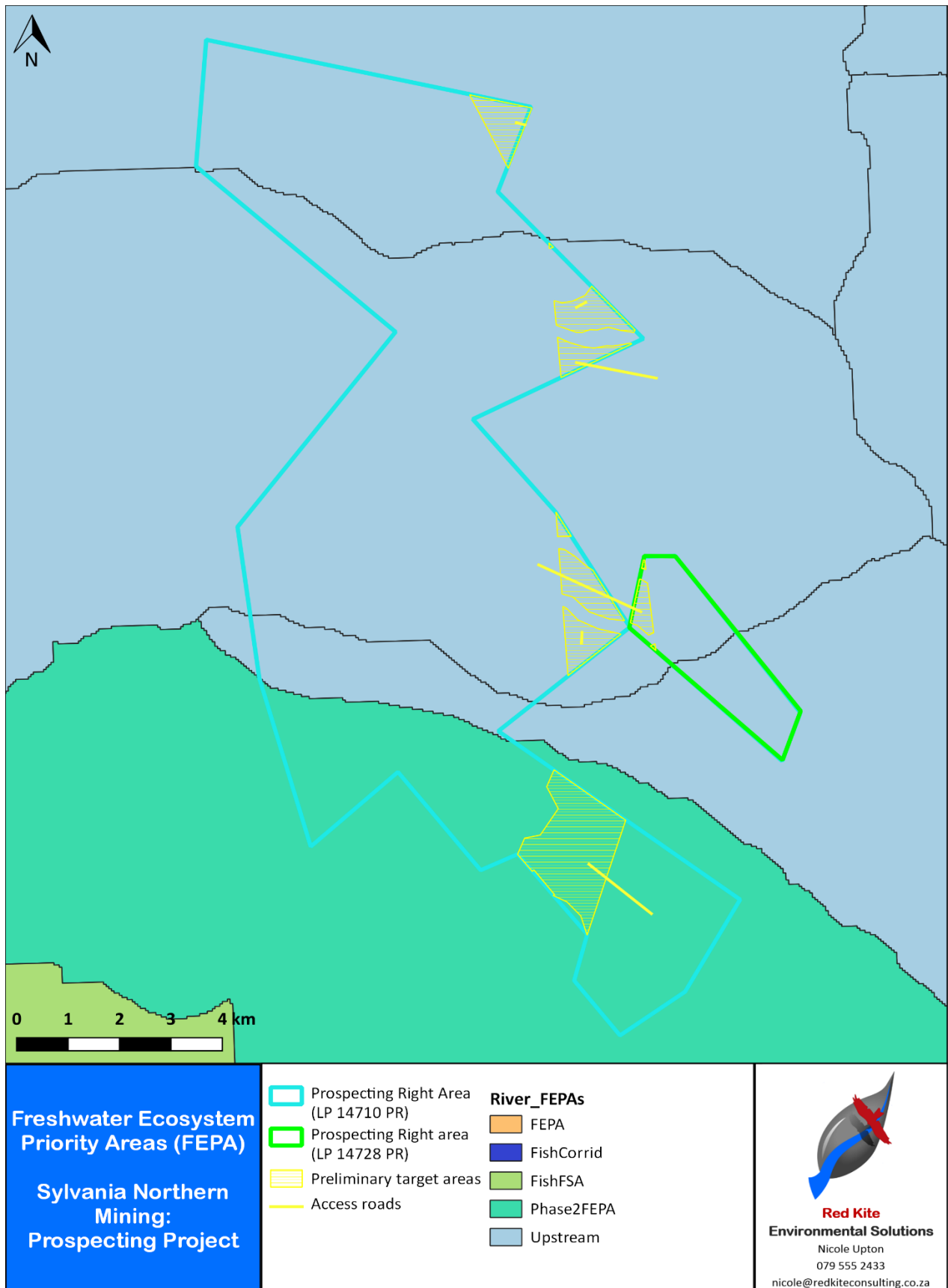


Figure 6: FEPA located on project area



5.4. POSA Plant Species

Information on plant species previously recorded for the project area was extracted from the POSA online database hosted by SANBI. A list of plant species that have previously been recorded in the project area is provided in Appendix C. The results indicate that 78 plant species have been recorded in the area queried, consisting of 13 families. The most prominent family is Poaceae, with 60 species.

Of the 78 species previously recorded for the area, none are Species of Conservation Concern (SCC) in terms of their Red List status. Furthermore, the Environmental Screening Tool Report for the project area does not list any SCC. The aforementioned is supported by the findings of previous ecology assessments undertaken on the project area (M2 Environmental Connections, 2014 & Scientific Aquatic Services, 2013).

None of the flora species recorded on POSA for the area are listed as protected in the LEMA.

Three protected species, in terms of the NFA, has been recorded on POSA for the area queried, namely:

- *Boscia albitrunca* (Shepherd's tree)
- *Combretum imberbe* (Leadwood)
- *Sclerocarya birrea* (Marula)

The above protected tree species as well as *Vachellia erioloba* (Camel thorn) were identified to occur on the project footprint during previous studies carried out on the project footprint (M2 Environmental Connections, 2014 & Scientific Aquatic Services, 2013).

Four of the flora species recorded on POSA for the area are known to have medicinal uses:

- *Ehretia rigida*
- *Sclerocarya birrea*
- *Senna italica*
- *Terminalia sericea*

Various additional flora species that have medicinal or cultural uses were identified to occur on the project footprint during previous studies carried out on the project footprint (M2 Environmental Connections, 2014 & Scientific Aquatic Services, 2013).

None of the flora species listed on POSA for the project area are endemic to South Africa.



6. FAUNA

A desktop study was conducted to establish whether any potentially sensitive faunal species or species of conservation concern (SCC) may possibly occur on site. The Virtual Museum and Animal Demography Unit (ADU) were used to compile species lists based on the sightings and data gathering from the South African Biodiversity Institute for the 2328BD and 2328DB QDS. The avifaunal species list was obtained from SABAP2 for the pentads.

It is important to note that a QDS covers a large area: $\pm 27 \times 25 \text{ km}$ ($\pm 693 \text{ km}^2$) and a pentad (SABAP2 Protocol) and area of $\pm 8 \times 7.6 \text{ km}$ ($\pm 60.8 \text{ km}^2$) and it is possible that suitable habitat will exist for a certain Red Data avifaunal species within this wider area surrounding the study site. However, the specific habitat(s) found on site may not suit Red Data species, even though it has been recorded for the QDS or pentad.

Species and habitat were identified as possibly sensitive within the framework of this study. Sensitive species were determined according to their close relationship and dependence on the vegetation type and habitat found to occur from aerial footage of the area.

Appendix D list the faunal species for the 2328BD and 2328DB QDS and Table 1 lists all fauna species that are of conservation concern which were found during the desktop study. Mammalian, avifaunal, reptilian and amphibian SCC are known to occur in the regional area where the Prospecting Right is proposed.

Table 1: Fauna SCC previously recorded for QDS

Scientific Name	Common Name	Red Data List Category
Mammalia		
<i>Mellivora capensis</i>	Honey Badger	LC, LEMA Schedule 3 Protected, TOPS 2007
<i>Crociodura maquassiensis</i>	Makwassie musk shrew	VU (2016) - As per Screening Tool Report
<i>Dasymys robertsii</i>	Robert's Marsh Rat	NT (2016)- As per Screening Tool Report
Avifauna		
<i>Oxyura maccoa</i>	Duck, Maccoa	NT (Regional), VU (Global)
<i>Falco biarmicus</i>	Falcon, Lanner	VU (Regional), LC (Global)
<i>Certhilauda chuana</i>	Lark, Short-clawed	NT (Regional), LC (Global)
<i>Ciconia nigra</i>	Stork, Black	VU (Regional), LC (Global)
<i>Gyps coprotheres</i>	Vulture, Cape	EN (Regional), EN (Global), TOPS EN
<i>Torgos tracheliotos</i>	Vulture, Lappet-faced	EN (Regional), EN (Global), TOPS EN
<i>Gyps africanus</i>	Vulture, White-backed	CR (Regional), CR (Global), TOPS EN
<i>Aquila rapax</i>	Eagle, Tawny	EN (Regional), LC (Global), Flagged by STR
Reptiles		
<i>Platysaurus monotropis</i>	Orange-throated Flat Lizard	EN (SARCA 2014), LEMA Schedule 3
<i>Homopholis mulleri</i>	Muller's Velvet Gecko	VU (SARCA 2014), LEMA Schedule 3
<i>Lygodactylus soutpansbergensis</i>	Soutpansberg Dwarf Gecko	NT (SARCA 2014), LEMA Schedule 3
Amphibian		
<i>Pyxicephalus edulis</i>	African/Lesser Bull Frog	LC (SARCA 2014), LEMA Schedule 3, TOPS 2007

6.1. Mammals

According to the SANBI Animal Demographic Unit (ADU), one (1) mammal species was found to possibly occur in the area queried, which is a provincial SCC (LEMA) and listed Nationally under TOPS 2007:

- *Mellivora capensis* (Honey Badger) - LC, LEMA Schedule 3 Protected, TOPS

Two (2) additional mammalian SCC were listed in the Environmental Screening Tool Report for the project:

- *Crociodura maquassiensis* (Makwassie musk shrew) - VU (2016)



- *Dasymys robertsii* (Robert's Marsh Rat) - NT (2016)

6.2. Avifaunal

According to data collected during the Southern African Bird Atlas Project 2 (SABAP2), the site is located within pentads 2325_2845, 2325_2850, 2330_2850 and 2335_2850 and hundred and sixty-eight (168) bird species have been recorded to occur within this area.

Eight (8) avifaunal SCC were listed for the area queried:

- | | | | | |
|-------------------------|---|----------------------------|---|----------------------------|
| • Duck, Maccoa | - | <i>Oxyura maccoa</i> | - | NT (Regional), VU (Global) |
| • Falcon, Lanner | - | <i>Falco biarmicus</i> | - | VU (Regional), LC (Global) |
| • Lark, Short-clawed | - | <i>Certhilauda chuana</i> | - | NT (Regional), LC (Global) |
| • Stork, Black | - | <i>Ciconia nigra</i> | - | VU (Regional), LC (Global) |
| • Vulture, Cape | - | <i>Gyps coprotheres</i> | - | EN (Regional), EN (Global) |
| • Vulture, Lappet-faced | - | <i>Torgos tracheliotos</i> | - | EN (Regional), EN (Global) |
| • Vulture, White-backed | - | <i>Gyps africanus</i> | - | CR (Regional), CR (Global) |
| • Eagle, Tawny | - | <i>Aquila rapax</i> | - | EN (Regional), LC (Global) |

The site is located a significant distance away from Important Birding and Biodiversity Areas (IBAs). The Waterberg IBA is located 45 km south-west of the project area and the Blouberg IBA is located 30 km north of the project area.

6.3. Butterflies

Thirteen (13) butterfly species were recorded in for the 2328BD and 2328DB QDS, all of which were categorized as LC by SANBI.

6.4. Other Invertebrates

Three (3) Dungbeetle species were recorded for the QDS, all of which were categorized as LC by SANBI.

6.5. Reptiles

Thirty-six (36) reptile species were recorded for the QDS. Three (3) of the species have are SCC:

- *Platysaurus monotropis* (Orange-throated Flat Lizard) - Endangered (SARCA 2014)
- *Homopholis mulleri* (Muller's Velvet Gecko) - Vulnerable (SARCA 2014)
- *Lygodactylus soutpansbergensis* (Soutpansberg Dwarf Gecko) - Near Threatened (SARCA 2014)
- Almost all species of Reptiles are protected in terms of LEMA: Schedule 3, excluding the water monitor, rock monitor, and all indigenous snakes not listed in the Act otherwise.

6.6. Amphibians

Nine (9) amphibian species were reported within the QDS, of which one is listed as an SCC in terms of TOPS 2007:

- *Pyxicephalus edulis* (African/Lesser Bull Frog) - Least Concern (SARCA 2014), LEMA Schedule 3, TOPS 2007



7. SENSITIVITY

The majority of the project footprint lies within the Makhado Sweet Bushveld (SVcb20) and a small section on the north-western most border of the PR area is located in the Roodeberg Bushveld (SVcb18). The Makhado Sweet Bushveld and Roodeberg Bushveld are not listed in the “National List of Ecosystems that are Threatened and need of protection”, and as Least Concern by the 2018 National Biodiversity Assessment.

The Prospecting Right areas contains the following classes from the LCP and District Bioregional Plans: CBA1, CBA2, ESA1, ESA2, NNR and ONA. However, the majority of the proposed target areas are located in area categorised as ONA and NNR. Limited sections of the target area on the farm Altona 696 is located on areas categorised as CBA2 and ESA2.

The north-eastern section of the Prospecting Right area is located in the transition zone of the Vhembe Biosphere Reserve.

None of the flora species previously recorded for the area on POSA are Species of Conservation Concern (SCC) in terms of their Red List status. However, fifteen (15) faunal species previously recorded in the area queried are categorised as SCC.

From satellite imagery of the Prospecting Right areas the following impacts are apparent:

- Numerous dirt roads. Impacts from human and vehicle movement on these roads are expected.
- Extensive dryland crop farming has taken place on the Prospecting Right area.
- A number of villages and residences are located on and adjacent to the Prospecting Right area.
- Heavy livestock grazing and wood harvesting is expected, as reported in previous ecological studies conducted on the study area (M2 Environmental Connections, 2014 and Scientific Aquatic Services, 2013).
- Exotic and Alien Invasive Plant species proliferation is expected, as reported in previous ecological studies conducted on the study area (M2 Environmental Connections, 2014 and Scientific Aquatic Services, 2013).

Various non-perennial tributaries of the Matlalane River and Seepabana River are located on the Prospecting Right areas. However, the layout of the prospecting target areas appear to have been designed to avoid most of these non-perennial tributaries.

The southern section of the Prospecting Right area is located in an area designated as a Phase 2 and the northern section is located in an area designated as an Upstream FEPA.



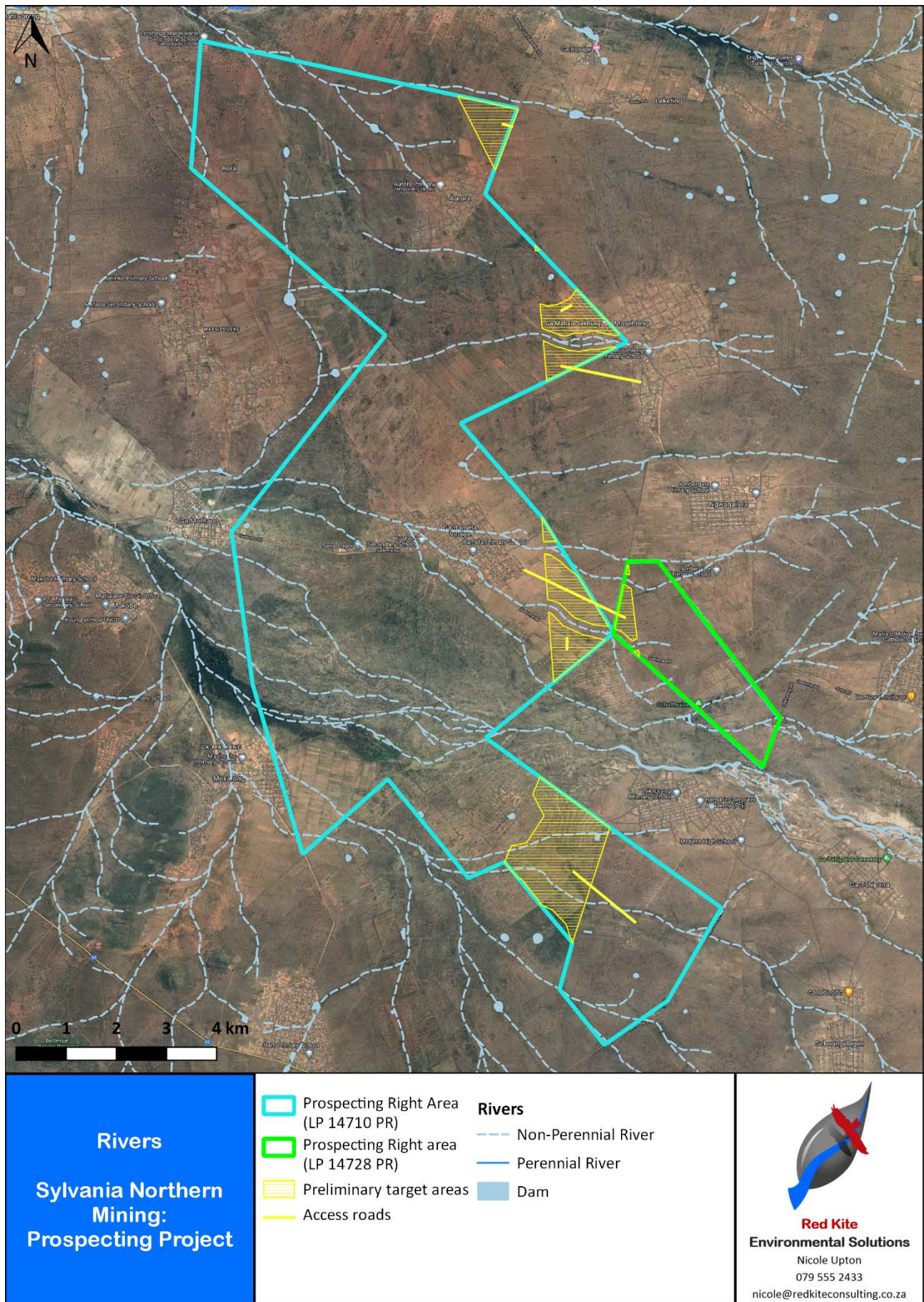


Figure 7: Rivers and stream in relation to the project site



8. IMPACT ASSESSMENT

All forms of development, albeit for mining, industrial, urban or residential purposes, will have an immediate effect on the natural environment. It is therefore of utmost importance to provide information on the environmental consequences these activities will have and to inform the decision-makers thereof.

8.1. Methodology

8.1.1. Assessment Criteria

The criteria for the description and assessment of environmental impacts were drawn from the EIA Guidelines, National Environmental Management Act (Act No. 107 of 1998): EIA Regulations (2014) and as amended from time to time.

The level of detail as depicted in the EIA Guidelines was fine-tuned by assigning specific values to each impact. In order to establish a coherent framework within which all impacts could be objectively assessed, it was necessary to establish a rating system, which was applied consistently to all the criteria. For such purposes each aspect was assigned a value, ranging from one (1) to five (5), depending on its definition. This assessment is a relative evaluation within the context of all the activities and the other impacts within the framework of the project.

An explanation of the impact assessment criteria is defined below.

Table 2: Impact Assessment Criteria

EXTENT	
Classification of the physical and spatial scale of the impact	
Footprint	The impacted area extends only as far as the activity, such as footprint occurring within the total site area.
Site	The impact could affect the whole, or a significant portion of the site.
Regional	The impact could affect the area including the neighbouring farms, the transport routes and the adjoining towns.
National	The impact could have an effect that expands throughout the country (South Africa).
International	Where the impact has international ramifications that extend beyond the boundaries of South Africa.
DURATION	
The lifetime of the impact that is measured in relation to the lifetime of the proposed development.	
Short term	The impact will either disappear with mitigation or will be mitigated through a natural process in a period shorter than that of the construction phase.
Short to Medium term	The impact will be relevant through to the end of a construction phase (1.5 years).
Medium term	The impact will last up to the end of the development phases, where after it will be entirely negated.
Long term	The impact will continue or last for the entire operational lifetime i.e. exceed 30 years of the development, but will be mitigated by direct human action or by natural processes thereafter.
Permanent	This is the only class of impact, which will be non-transitory. Mitigation either by man or natural process will not occur in such a way or in such a time span that the impact can be considered transient.
INTENSITY	
The intensity of the impact is considered by examining whether the impact is destructive or benign, whether it destroys the impacted environment, alters its functioning, or slightly alters the environment itself. The intensity is rated as	



Low	The impact alters the affected environment in such a way that the natural processes or functions are not affected.
Medium	The affected environment is altered, but functions and processes continue, albeit in a modified way.
High	Function or process of the affected environment is disturbed to the extent where it temporarily or permanently ceases.
PROBABILITY	
This describes the likelihood of the impacts actually occurring. The impact may occur for any length of time during the life cycle of the activity, and not at any given time. The classes are rated as follows:	
Improbable	The possibility of the impact occurring is none, due either to the circumstances, design or experience. The chance of this impact occurring is zero (0 %).
Possible	The possibility of the impact occurring is very low, due either to the circumstances, design or experience. The chances of this impact occurring is defined as 25 %.
Likely	There is a possibility that the impact will occur to the extent that provisions must therefore be made. The chances of this impact occurring is defined as 50 %.
Highly Likely	It is most likely that the impacts will occur at some stage of the development. Plans must be drawn up before carrying out the activity. The chances of this impact occurring is defined as 75 %.
Definite	The impact will take place regardless of any prevention plans, and only mitigation actions or contingency plans to contain the effect can be relied on. The chance of this impact occurring is defined as 100 %.

The status of the impacts and degree of confidence with respect to the assessment of the significance must be stated as follows:

- **Status of the impact:** A description as to whether the impact would be positive (a benefit), negative (a cost), or neutral.
- **Degree of confidence in predictions:** The degree of confidence in the predictions, based on the availability of information and specialist knowledge.

Other aspects to take into consideration in the specialist studies are:

- Impacts should be described both before and after the proposed mitigation and management measures have been implemented.
- All impacts should be evaluated for the full-lifecycle of the proposed development, including construction, operation and decommissioning.
- The impact evaluation should take into consideration the cumulative effects associated with this and other facilities which are either developed or in the process of being developed in the region.
- The specialist studies must attempt to quantify the magnitude of potential impacts (direct and cumulative effects) and outline the rationale used. Where appropriate, national standards are to be used as a measure of the level of impact.

8.1.2. Mitigation

The impacts that are generated by the development can be minimised if measures are implemented in order to reduce the impacts. The mitigation measures ensure that the development considers the environment and the predicted impacts in order to minimise impacts and achieve sustainable development.

8.1.2.1. Determination of Significance-Without Mitigation

Significance is determined through a synthesis of impact characteristics as described in the above paragraphs. It provides an indication of the importance of the impact in terms of both tangible and intangible characteristics. The significance of the impact “without mitigation” is the prime determinant of the nature and degree of mitigation required. Where the impact is positive, significance is noted as “positive”. Significance is rated on the following scale:



Table 3: Significance-Without Mitigation

NO SIGNIFICANCE	The impact is not substantial and does not require any mitigation action.
LOW	The impact is of little importance, but may require limited mitigation.
MEDIUM	The impact is of importance and is therefore considered to have a negative impact. Mitigation is required to reduce the negative impacts to acceptable levels.
HIGH	The impact is of major importance. Failure to mitigate, with the objective of reducing the impact to acceptable levels, could render the entire development option or entire project proposal unacceptable. Mitigation is therefore essential.

8.1.2.2. Determination of Significance- With Mitigation

Determination of significance refers to the foreseeable significance of the impact after the successful implementation of the necessary mitigation measures. Significance with mitigation is rated on the following scale:

Table 4: Significance- With Mitigation

NO SIGNIFICANCE	The impact will be mitigated to the point where it is regarded as insubstantial.
LOW	The impact will be mitigated to the point where it is of limited importance.
LOW TO MEDIUM	The impact is of importance, however, through the implementation of the correct mitigation measures such potential impacts can be reduced to acceptable levels.
MEDIUM	Notwithstanding the successful implementation of the mitigation measures, to reduce the negative impacts to acceptable levels, the negative impact will remain of significance. However, taken within the overall context of the project, the persistent impact does not constitute a fatal flaw.
MEDIUM TO HIGH	The impact is of major importance but through the implementation of the correct mitigation measures, the negative impacts will be reduced to acceptable levels.
HIGH	The impact is of major importance. Mitigation of the impact is not possible on a cost-effective basis. The impact is regarded as high importance and taken within the overall context of the project, is regarded as a fatal flaw. An impact regarded as high significance, after mitigation could render the entire development option or entire project proposal unacceptable.

8.1.3. Assessment Weighting

Each aspect within an impact description was assigned a series of quantitative criteria. Such criteria are likely to differ during the different stages of the project's life cycle. In order to establish a defined base upon which it becomes feasible to make an informed decision, it was necessary to weigh and rank all the criteria.

8.1.3.1. Ranking, Weighting and Scaling

For each impact under scrutiny, a scaled weighting factor is attached to each respective impact (refer Table 7). The purpose of assigning weights serves to highlight those aspects considered the most critical to the various stakeholders and ensure that each specialist's element of bias is taken into account. The weighting factor also provides a means whereby the impact assessor can successfully deal with the complexities that exist between the different impacts and associated aspect criteria.

Simply, such a weighting factor is indicative of the importance of the impact in terms of the potential effect that it could have on the surrounding environment. Therefore, the aspects considered to have a relatively high value will score a relatively higher weighting than that which is of lower importance.



Table 5: Description of assessment parameters with its respective weighting

EXTENT		DURATION		INTENSITY		PROBABILITY		WEIGHTING FACTOR (WF)		SIGNIFICANCE RATING (SR)	
Footprint	1	Short term	1	Low	1	Probable	1	Low	1	Low	0-19
Site	2	Short to Medium	2			Possible	2	Low to Medium	2	Low to Medium	20-39
Regional	3	Medium term	3	Medium	3	Likely	3	Medium	3	Medium	40-59
National	4	Long term	4			Highly Likely	4	Medium to High	4	Medium to High	60-79
International	5	Permanent	5	High	5	Definite	5	High	5	High	80-100
MITIGATION EFFICIENCY (ME)				SIGNIFICANCE FOLLOWING MITIGATION (SFM)							
High				0.2		Low		0 - 19			
Medium to High				0.4		Low to Medium		20 - 39			
Medium				0.6		Medium		40 - 59			
Low to Medium				0.8		Medium to High		60 - 79			
Low				1.0		High		80 - 100			

8.1.3.2. Identifying the Potential Impacts Without Mitigation Measures (WOM)

Following the assignment of the necessary weights to the respective aspects, criteria are summed and multiplied by their assigned weightings, resulting in a value for each impact (prior to the implementation of mitigation measures).

Equation 1:

$$\text{Significance Rating (WOM)} = (\text{Extent} + \text{Intensity} + \text{Duration} + \text{Probability}) \times \text{Weighting Factor}$$

8.1.3.3. Identifying the Potential Impacts with Mitigation Measures (WM)

In order to gain a comprehensive understanding of the overall significance of the impact, after implementation of the mitigation measures, it was necessary to re-evaluate the impact.

8.1.3.4. Mitigation Efficiency (ME)

The most effective means of deriving a quantitative value of mitigated impacts is to assign each significance rating value (WOM) a mitigation efficiency (ME) rating (refer to Table 7). The allocation of such a rating is a measure of the efficiency and effectiveness, as identified through professional experience and empirical evidence of how effectively the proposed mitigation measures will manage the impact.

Thus, the lower the assigned value the greater the effectiveness of the proposed mitigation measures and subsequently, the lower the impacts with mitigation.

Equation 2:

$$\text{Significance Rating (WM)} = \text{Significance Rating (WOM)} \times \text{Mitigation Efficiency}$$

or $\text{WM} = \text{WOM} \times \text{ME}$

8.1.3.5. Significance Following Mitigation (SFM)

The significance of the impact after the mitigation measures are taken into consideration. The efficiency of the mitigation measure determines the significance of the impact. The level of impact is therefore seen in its entirety with all considerations taken into account.



8.2. Nature of Impacts Identified

The following section focuses on the potential impacts that the proposed activity and associated activities may have on the terrestrial ecology of the area. Potential impacts, as a result of the proposed activities, will be investigated for two phases of the project: operational phase and closure / decommissioning phase. As the project only proposes to undertake trenching and drilling as part of the invasive activities, no dedicated construction phase is expected.

The impacts and significance rating for the proposed invasive prospecting activities on both Prospecting Right areas are expected to be similar. Thus, the impacts assessment below is applicable to both Prospecting Right applications (LP 14710PR & LP 14728PR).

- Most of the impacts on plant species will occur during the operational phase when removal of plant communities will take place on site, which will also impact on the animals that use the area.
- The operational activities may result in impacts to the natural environment due to increased traffic and personnel to the area. Heavy machinery and vehicles will result in compaction of the soil and removal of vegetation and topsoil.
- Impacts to sensitive areas and specialised niche habitats, such as rivers and streams may occur as a result of the proposed project.
- Vegetation clearance will likely destroy habitats and lead to possible invasive and / or exotic species establishing in the area and edge-effects occurring surrounding the prospecting activities. Bare areas may become vulnerable to Alien and Invasive Plant species and these may compete with indigenous species, likely leading to the migration of sensitive species from the site to a more favourable habitat.
- Endemic and/or SCC species could possibly occur within the operational footprint area and would then be damaged or destroyed without proper knowledge and/or mitigation measures.
- Anthropogenic influence stemming from staff and contractors that infiltrate the natural veld areas may damage and impact on species communities within these areas.
- Human activity may impact on the faunal communities within the area. Associated noise, waste, the smell of humans, physical infiltration into natural areas are problematic and may lead to declining populations (where the disturbance of habitat has caused habitat remaining to become unfavorable).
- Once the invasive prospecting activities have been concluded, final steps in the rehabilitation process will take place. It is, however, possible that the rehabilitation actions are not effective or only implemented and planned at a late stage, hindering successful rehabilitation.

8.3. Impact Assessment and Risk Evaluation

8.3.1. Impact on overall biodiversity due to development activities

Phase of development: operation

Impact	No Mitigation	With Mitigation
<ul style="list-style-type: none"> • Invasive prospecting and associated activities will lead to destruction and damage of habitats and vegetation communities and overall loss of biodiversity and ecosystem function within the clearance and operational area. • Destruction of habitat may lead to faunal species migrating to other more favourable areas. 		
Extent	Site (2)	0.8 (Low to medium) ME
Duration	Short to medium term (2)	
Magnitude	Low to medium (2)	
Probability	Definite (5)	
Weighting factor	Low to medium (2)	
Significance Rating (SR)	Low to Medium (22)	



Recommended mitigation measures:

- The vegetation removal should be controlled, very specific and the clearance area kept as small as possible.
- A control of access should be implemented for all remaining natural areas to prevent unnecessary destruction of habitats or disturbance of species. It is also vital that no unnecessary fragmentation occurs and that all roads are clearly demarcated and kept to without any exceptions. No vehicles or personnel are permitted outside of these demarcated roads.
- To minimize potential impacts to animal species, animals (wildlife and domestic animals) may under no circumstances be handled.
- Continuous rehabilitation of the area should occur, where infilling of trenches and replacement of topsoil should be prioritised.

Phase of development: operation

Impact		
The continuous human activity over a longer-term period may further impact on the faunal communities within the area. Associated noise, waste, the smell of humans and physical infiltration into remaining natural areas are problematic and may lead to declining populations (where the disturbance of habitat has caused habitat remaining to become unfavourable).		
	No Mitigation	With Mitigation
Extent	Regional (3)	0.8 ME (Low to Medium)
Duration	Short to medium term (2)	
Magnitude	Low to medium (2)	
Probability	Probable (4)	
Weighting factor	Medium (3)	
Significance Rating (SR)	Low to Medium (33)	Low to Medium (26)

Recommended mitigation measures:

- Animals may get used to movement by people in designated areas if the it is predictable. A control of access should be implemented for all remaining natural areas to prevent infiltration of remaining natural habitats or disturbance of species.
- To minimize potential impacts to animal species, animals (wildlife and domestic animals) may under no circumstances be handled, removed, killed or interfered with.
- Prevent impacts and waste from reaching the surface water systems and areas outside the footprint areas.
- Hazardous wastes should be stored in impermeable and bunded areas. Domestic waste and other waste should be managed in the appropriate manner and apply good housekeeping practices will aid this issue.

8.3.2. Impact on biodiversity due to exotic and invasive plant species

Phase of development: operation

Impact		
Vegetation clearance will destroy indigenous vegetation and lead to possible invasive and/or exotic species establishing in the area and edge-effects occurring surrounding the prospecting activities. Bare areas may become vulnerable to Alien and Invasive Plant species and these may compete with indigenous species, likely leading to the migration of sensitive species from the site to a more favourable habitat.		
	No Mitigation	With Mitigation
Extent	Regional (3)	0.6 (Medium) ME
Duration	Long term (4)	
Magnitude	Medium (3)	
Probability	Possible (3)	
Weighting factor	Medium (3)	
Significance Rating (SR)	Low to medium (39)	Low to medium (23)



Recommended mitigation measures:

- Alien Invasive Plant (AIP) control measures should be implemented for the control of invasive and exotic plant species.

8.3.3. Impact on species of conservation concern and sensitive habitats

Phase of development: operation

Impact		
Invasive prospecting and associated activities may impact on areas designated as high sensitivity, including critical biodiversity areas and watercourses situated in and around the Prospecting Right area. The majority of the proposed target areas are located in area categorised as ONA and NNR. Limited sections of the target area on the farm Altona 696 are located on areas categorised as CBA. The layout of the prospecting target areas appear to have been designed to avoid most of the non-perennial tributaries.		
The activity may lead to the loss of species of conservation concern. Based on the desktop study findings, no flora SCC are considered to be likely to occur on the project area. However, fifteen (15) faunal species previously recorded in the area queried are categorised as SCC.		
	No Mitigation	With Mitigation
Extent	Regional (3)	0.4 (Medium to high) ME
Duration	Long term (4)	
Magnitude	Medium (3)	
Probability	Possible (2)	
Weighting factor	Medium (3)	
Significance Rating (SR)	Low to Medium (36)	Low (14)

Recommended mitigation measures:

- The vegetation removal should be controlled, very specific and the clearance area kept as small as possible.
- If any SCC are encountered within the subject property in the future, the following should be ensured:
 - If any threatened species will be disturbed, ensure effective relocation of individuals to suitable offset areas or within designated open space on the subject property.
 - All rescue and relocation plans should be overseen by a suitably qualified specialist.
 - Obtain relevant permits/consent, if applicable, for each protected or endangered floral species identified within the proposed development area that will be destroyed.
- Placement of the infrastructure and activities should be planned to avoid sensitive areas such as CBAs and rivers and streams.

8.3.4. Impact on ecology due to Closure / Post-closure Phase

Phase of development: closure / post-closure

Impact		
Rehabilitation could be ineffective if rehabilitation actions are not effectively implemented. Without the necessary mitigation measures, rehabilitation will be less successful and the ecology of the impacted areas may not recover to a pre-prospecting state.		
Without mitigation the alien invasive species may increase and result in a degraded veld condition making the property less viable for post-closure land use activities such as wilderness, grazing and agriculture.		
	No Mitigation	With Mitigation
Extent	Site (2)	0.6 ME
Duration	Medium term (3)	
Magnitude	Medium (3)	
Probability	Likely (3)	



Weighting factor	Medium (3)	
Significance Rating (SR)	Low to Medium (33)	Low to Medium (20)

Recommended mitigation measures:

- Alien Invasive Plant (AIP) control measures should be implemented for the control of invasive and exotic plant species.
- Prior to finalisation of the activities and closure, an AIP survey must be undertaken to determine whether AIP are present in and around the project footprint.
- Rehabilitation plans should be planned long before the closure phase is due. Continuous rehabilitation should also take place during the operational phase, with infilling of trenches and replacement of topsoil being the priority.



9. ECOLOGICAL MANAGEMENT PLAN

9.1. Pre-Construction Phase

- Sensitive watercourses and associated riparian zone habitats constitute the most important features which make up the area identified as increased sensitivity. Invasive prospecting activities should be planned to keep clear of these zones.
- Four protected tree species, in terms of the NFA, may occur on the project footprint. A survey for protected tree species on the clearance footprint should be undertaken by a suitably qualified specialist prior to the start of construction / clearance. Based on the findings of the survey, the relevant permits, if applicable, for each protected tree species identified within the proposed clearance footprint, which may be damaged or destroyed, should be applied for.

9.2. Construction and Operational Phases

9.2.1. Aim and Objectives

- Prevent the needless loss of or damage to fauna and flora, particularly with regard to SCC.
- Prevent the needless death, injury or hindrance to fauna, particularly with regard to protected species.
- Prevent or limit significant alteration to the ecosystems in the area.

9.2.2. Mitigation and Management measures

- Adhere to mitigation measures as prescribed in this report as well as the EMPr to prevent and mitigate impacts associated with the proposed project.
- The river systems should be avoided by the proposed invasive prospecting and associated activities.
- Responsible persons from the staff members/workers should be identified to ensure that the necessary mitigation measures are implemented and established. These personnel should also enforce the collaboration of other staff members, contractors and visitors to comply with these mitigation measures.
- Alien Invasive Plant (AIP) control measures should be implemented for the control of invasive and exotic plant species.
- Adequate waste storage and disposal must be implemented at the development. Littering must be prevented and regularly cleaned up and form part of good housekeeping practices to be implemented around site.
- Ensure awareness amongst all staff, contractors and visitors to site to not needlessly harm or hinder animals or damage flora.
- No additional fragmentation should occur and all roads should be clearly demarcated and kept to without any exceptions and within the proposed footprints where possible.
- All footprint areas should remain as small as possible.
- The vegetation removal should be controlled and should be very specific.
- It is vital that if any SCC occurs on the proposed site that these species should be protected and/or left undisturbed as far as possible. Only as an exception can these species be relocated to favourable sites with the use of a specialist prior to vegetation and habitat removal. If at any point any SCC is encountered, a specialist should be consulted as to determine the best way forward and a permit should be obtained if any intervention is required.



9.3. Decommissioning and Closure

- Prior to finalisation of the activities and closure, an AIP survey must be undertaken to determine whether AIP are present in and around the project footprint.
- Rehabilitation plans should be planned long before the closure phase is due. Continuous rehabilitation should also take place during the operational phase, with infilling of trenches and replacement of topsoil being the priority.
- Ensure that an acceptable aesthetic scenario is created post closure.
- When closure is considered successful and rehabilitation complete, unnecessary fences/barriers should be lifted to restore larger foraging areas.
- Re-vegetation of all degraded areas and bare patches is advised to speed recovery to natural, self-sustaining state as soon as possible.

9.4. Monitoring

An ECO or appropriately appointed person must ensure that all impacts remain within the approved footprint and remains in compliance with the approved EMPr.

Monitoring should start as soon as the operational phase of the development activities commences. The monitoring should include the following:

- Annual visual assessment of surrounding areas to determine if vegetation in undisturbed areas is being impacted. The visual assessment can be undertaken by the ECO. Photographic record of monitoring sites should be kept for comparison between monitoring events.
- Annual alien invasive plant monitoring, eradication and control programme.
- Implement an Observe and Report approach which will enable employees/locals to report any disturbance of fauna or degradation that they encounter during the operational phase.
- Prior to finalisation of the activities and closure, an AIP survey must be undertaken to determine that AIP are present in and around the project footprint.



10. CONCLUSION

No site survey was conducted to verify or dispute any findings related to the desktop assessment.

Information on plant species previously recorded for the project area was extracted from the POSA online database hosted by SANBI. The results indicate that 78 plant species have been recorded in the area queried:

- None of the species previously recorded for the area are Species of Conservation Concern (SCC) in terms of their Red List status. Furthermore, the Environmental Screening Tool Report for the project area does not list any SCC. The aforementioned is supported by the findings of previous ecology assessments undertaken on the project area.
- None of the flora species recorded on POSA for the area are listed as protected in the LEMA.
- Four protected species, in terms of the NFA, may occur on the project area, namely:
 - *Boscia albitrunca* (Shepherd's tree)
 - *Combretum imberbe* (Leadwood)
 - *Sclerocarya birrea* (Marula)
 - *Vachellia erioloba* (Camel thorn)

A desktop study was conducted to establish whether any potentially sensitive faunal species or species of conservation concern may possibly occur on site. The following summary of findings are relevant to the development:

- Mammals: one (1) mammal species was found to possibly occur, which is a provincial SCC and listed nationally within TOPS 2007, while two (2) additional SCC were listed by the Screening Tool Report for the project.
- Avifaunal: 168 bird species were found to possibly occur, with eight (8) avifaunal species indicated as SCC.
- Butterflies: Thirteen (13) butterfly species were found to occur, all of which were categorized as LC.
- Other Invertebrates: Three (3) Dungbeetle species were shown to occur for the QDS, all noted as LC.
- Reptiles: 36 reptile species were recorded for the QDS, of which three are SCC.
- Amphibians: Nine (9) amphibian species were reported, of which one (1) is listed within TOPS 2007.

The majority of the project footprint lies within the Makhado Sweet Bushveld and a small section on the north-western most border of the PR area is located in the Roodeberg Bushveld. The Makhado Sweet Bushveld and Roodeberg Bushveld are not listed in the "National List of Ecosystems that are Threatened and need of protection", and as Least Concern by the 2018 National Biodiversity Assessment.

The Prospecting Right areas contains the following classes from the LCP and District Bioregional Plans: CBA1, CBA2, ESA1, ESA2, NNR and ONA. However, the majority of the proposed target areas are located in area categorised as ONA and NNR. Limited sections of the target area on the farm Altona 696 is located on areas categorised as CBA2 and ESA2.

The north-eastern section of the Prospecting Right area is located in the transition zone of the Vhembe Biosphere Reserve.

From satellite imagery of the Prospecting Right areas the following impacts are apparent:

- Numerous dirt roads. Impacts from human and vehicle movement on these roads are expected.
- Extensive dryland crop farming has taken place on the Prospecting Right area.
- A number of villages and residences are located on and adjacent to the Prospecting Right area.
- Heavy livestock grazing and wood harvesting is expected, as reported in previous ecological studies conducted on the study area (M2 Environmental Connections, 2014 and Scientific Aquatic Services, 2013).
- Exotic and Alien Invasive Plant species proliferation is expected, as reported in previous ecological studies conducted on the study area (M2 Environmental Connections, 2014 and Scientific Aquatic Services, 2013).



Various non-perennial tributaries of the Matlalane River and Seepabana River are located on the Prospecting Right areas. However, the layout of the prospecting target areas appear to have been designed to avoid most of these non-perennial tributaries.

The southern section of the Prospecting Right area is located in an area designated as a Phase 2 and the northern section is located in an area designated as an Upstream FEPA.

Based on the desktop assessment findings, the Terrestrial Ecology sensitivity is considered as follows:

- All untransformed areas indicated as Critical Biodiversity Areas are considered high sensitivity
- All watercourses and their associated riparian zones are considered high sensitivity
- The remainder of the Prospecting Right area is considered low sensitivity

Sensitive watercourse and their associated riparian vegetation habitat constitute the most important features which make up the area identified as increased sensitivity.

It is the reasoned opinion of the specialist that the development may continue if all recommended mitigation measures are implemented from the onset of the development.



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APPENDIX A: SPECIALISTS' CURRICULUM VITAE



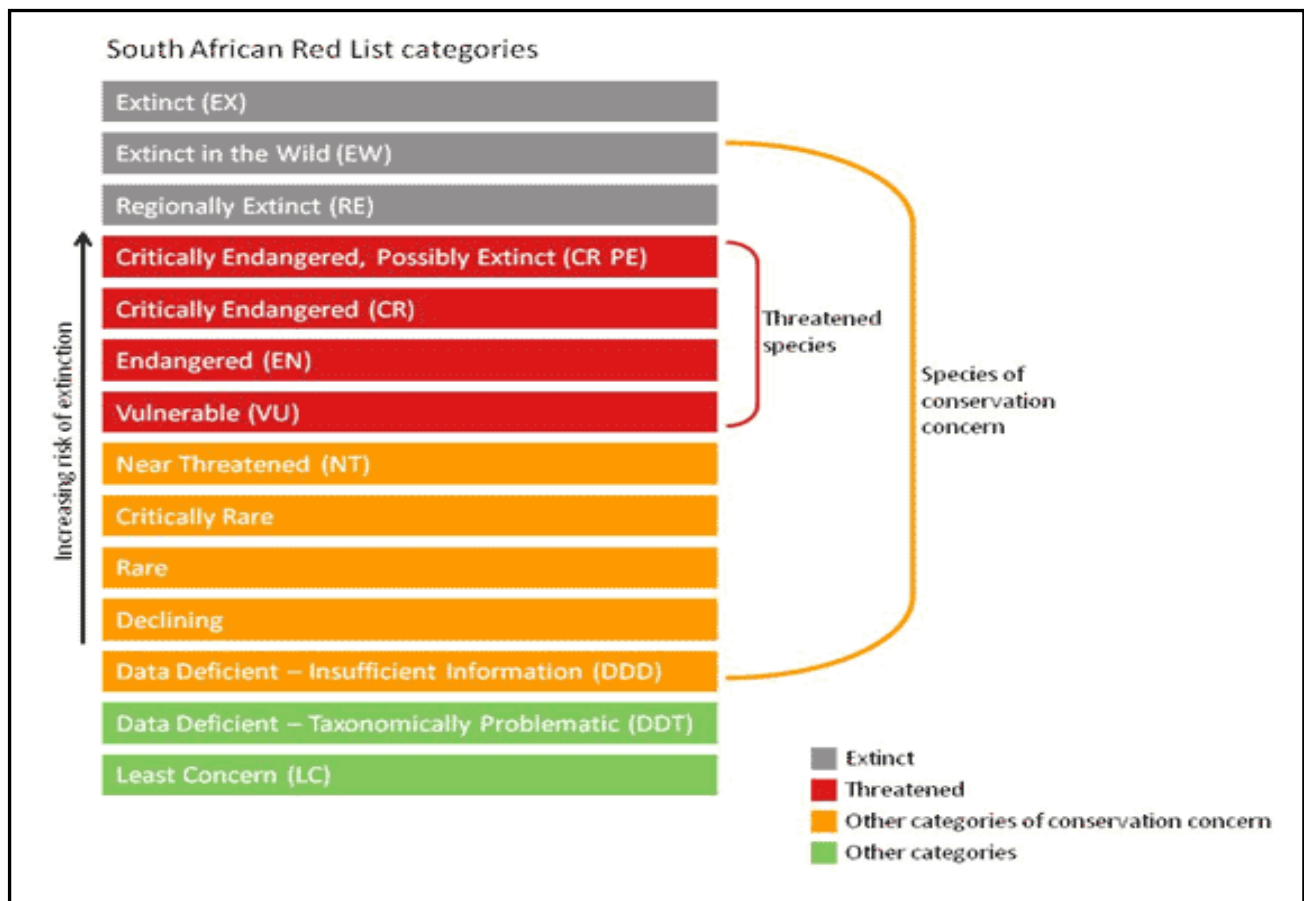
APPENDIX B: IUCN RED LIST DEFINITIONS

Categories marked with ^N are non-IUCN, national Red List categories for species not in danger of extinction but considered of conservation concern. The IUCN equivalent of these categories is Least Concern (LC).

Categories	Definition
Extinct (EX)	A species is Extinct when there is no reasonable doubt that the last individual has died. Species should be classified as Extinct only once exhaustive surveys throughout the species' known range have failed to record an individual.
Extinct in the Wild (EW)	A species is Extinct in the Wild when it is known to survive only in cultivation or as a naturalized population (or populations) well outside the past range.
Regionally Extinct (RE)	A species is Regionally Extinct when it is extinct within the region assessed (in this case South Africa), but wild populations can still be found in areas outside the region.
Critically Endangered, Possibly Extinct (CR PE)	Possibly Extinct is a special tag associated with the category Critically Endangered, indicating species that are highly likely to be extinct, but the exhaustive surveys required for classifying the species as Extinct has not yet been completed. A small chance remains that such species may still be rediscovered.
Critically Endangered (CR)	A species is Critically Endangered when the best available evidence indicates that it meets at least one of the five IUCN criteria for Critically Endangered, indicating that the species is facing an extremely high risk of extinction.
Endangered (EN)	A species is Endangered when the best available evidence indicates that it meets at least one of the five IUCN criteria for Endangered, indicating that the species is facing a very high risk of extinction.
Vulnerable (VU)	A species is Vulnerable when the best available evidence indicates that it meets at least one of the five IUCN criteria for Vulnerable, indicating that the species is facing a high risk of extinction.
Near Threatened (NT)	A species is Near Threatened when available evidence indicates that it nearly meets any of the IUCN criteria for Vulnerable and is therefore likely to become at risk of extinction in the near future.
^N Critically Rare	A species is Critically Rare when it is known to occur at a single site but is not exposed to any direct or plausible potential threat and does not otherwise qualify for a category of threat according to one of the five IUCN criteria.
^N Rare	A species is Rare when it meets at least one of four South African criteria for rarity but is not exposed to any direct or plausible potential threat and does not qualify for a category of threat according to one of the five IUCN criteria. The four criteria are as follows: <ul style="list-style-type: none"> • Restricted range: Extent of Occurrence <500 km², OR • Habitat specialist: Species is restricted to a specialized microhabitat so that it has a very small Area of Occupancy, typically smaller than 20 km², OR • Low densities of individuals: Species always occurs as single individuals or very small subpopulations (typically fewer than 50 mature individuals) scattered over a wide area, OR • Small global population: Less than 10 000 mature individuals.
^N Declining	A species is Declining when it does not meet or nearly meet any of the five IUCN criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened, but there are threatening processes causing a continuing decline of the species.
Least Concern (LC)	A species is Least Concern when it has been evaluated against the IUCN criteria and does not qualify for any of the above categories. Species classified as Least Concern



Categories	Definition
	are considered at low risk of extinction. Widespread and abundant species are typically classified in this category.
Data Deficient - Insufficient Information (DDD)	A species is DDD when there is inadequate information to make an assessment of its risk of extinction, but the species is well defined. Listing of species in this category indicates that more information is required, and that future research could show that a threatened classification is appropriate.
Data Deficient - Taxonomically Problematic (DDT)	A species is DDT when taxonomic problems hinder the distribution range and habitat from being well defined, so that an assessment of risk of extinction is not possible.
Not Evaluated (NE)	A species is Not Evaluated when it has not been evaluated against the criteria. The national Red List of South African plants is a comprehensive assessment of all South African indigenous plants, and therefore all species are assessed and given a national Red List status. However, some species included in <u>Plants of southern Africa: an online checklist</u> are species that do not qualify for national listing because they are naturalized exotics, hybrids (natural or cultivated), or synonyms. These species are given the status Not Evaluated and the reasons why they have not been assessed are included in the assessment justification.



APPENDIX C: POSA FLORA SPECIES LIST

Protected or Species of Conservation Concern (SCC) are highlighted green

Exotic species are highlighted orange

Family	Species	Red List Status	Diagnostic	Conservation
Amaranthaceae	<i>Aerva leucura</i>	LC	herb;	
Loranthaceae	<i>Agelanthus natalitius</i>	LC	succulent; parasite; shrub;	
Poaceae	<i>Andropogon chinensis</i>	LC	graminoid;	
Scrophulariaceae	<i>Antherothamnus pearsonii</i>	LC	shrub;	
Poaceae	<i>Aristida congesta</i>	LC	graminoid;	
Poaceae	<i>Aristida mollissima</i>	LC	graminoid;	
Poaceae	<i>Aristida rhinochloa</i>	LC	graminoid;	
Poaceae	<i>Aristida stipitata</i>	LC	graminoid;	
Brassicaceae	<i>Boscia albitrunca</i>	LC	tree;	NFA: Protected
Poaceae	<i>Bothriochloa radicans</i>	LC	graminoid;	
Poaceae	<i>Brachiaria eruciformis</i>	LC	graminoid;	
Poaceae	<i>Brachiaria nigropedata</i>	LC	graminoid;	
Poaceae	<i>Brachiaria serrata</i>	LC	graminoid;	
Poaceae	<i>Cenchrus ciliaris</i>	LC	graminoid;	
Poaceae	<i>Chloris virgata</i>	LC	graminoid;	
Poaceae	<i>Chrysopogon serrulatus</i>	LC	graminoid;	
Combretaceae	<i>Combretum apiculatum</i>	LC	shrub; tree;	
Combretaceae	<i>Combretum hereroense</i>	LC	shrub; tree;	
Combretaceae	<i>Combretum imberbe</i>	LC	shrub; tree;	NFA: Protected
Poaceae	<i>Cymbopogon pospischilii</i>	NE	graminoid;	
Poaceae	<i>Cynodon dactylon</i>	LC	graminoid;	
Poaceae	<i>Dactyloctenium aegyptium</i>	LC	graminoid;	
Poaceae	<i>Dichanthium annulatum</i>	LC	graminoid;	
Poaceae	<i>Digitaria eriantha</i>	LC	graminoid;	
Poaceae	<i>Echinochloa holubii</i>	LC	graminoid;	
Boraginaceae	<i>Ehretia rigida</i>	LC	shrub;	Medicinal
Poaceae	<i>Elionurus muticus</i>	LC	graminoid;	
Poaceae	<i>Enneapogon cenchroides</i>	LC	graminoid;	
Poaceae	<i>Enneapogon scoparius</i>	LC	graminoid;	
Poaceae	<i>Eragrostis aspera</i>	LC	graminoid;	
Poaceae	<i>Eragrostis barbinodis</i>	LC	graminoid;	
Poaceae	<i>Eragrostis biflora</i>	LC	graminoid;	
Poaceae	<i>Eragrostis chloromelas</i>	LC	graminoid;	
Poaceae	<i>Eragrostis cilianensis</i>	LC	graminoid;	
Poaceae	<i>Eragrostis lehmanniana</i>	LC	graminoid;	
Poaceae	<i>Eragrostis nindensis</i>	LC	graminoid;	
Poaceae	<i>Eragrostis pallens</i>	LC	graminoid;	
Poaceae	<i>Eragrostis rigidior</i>	LC	graminoid;	
Poaceae	<i>Eragrostis trichophora</i>	LC	graminoid;	
Poaceae	<i>Eustachys paspaloides</i>	LC	graminoid;	
Poaceae	<i>Fingerhuthia africana</i>	LC	graminoid;	
Malvaceae	<i>Grewia olukondae</i>	LC	shrub;	



Family	Species	Red List Status	Diagnostic	Conservation
Boraginaceae	<i>Heliotropium ciliatum</i>	LC	herb;	
Poaceae	<i>Heteropogon contortus</i>	LC	graminoid;	
Poaceae	<i>Hyparrhenia anamesa</i>	LC	graminoid;	
Poaceae	<i>Hyperthelia dissoluta</i>	LC	graminoid;	
Poaceae	<i>Ischaemum afrum</i>	LC	graminoid;	
Poaceae	<i>Leptochloa eleusine</i>	LC	graminoid;	
Poaceae	<i>Lintonia nutans</i>	LC	graminoid;	
Poaceae	<i>Loudetia flavida</i>	LC	graminoid;	
Poaceae	<i>Melinis repens</i>	LC	graminoid;	
Fabaceae	<i>Ormocarpum trichocarpum</i>	LC	shrub; tree;	
Poaceae	<i>Panicum coloratum</i>	LC	graminoid;	
Poaceae	<i>Panicum deustum</i>	LC	graminoid;	
Poaceae	<i>Panicum maximum</i>	LC	graminoid;	
Poaceae	<i>Perotis patens</i>	LC	graminoid;	
Poaceae	<i>Pogonarthria squarrosa</i>	LC	graminoid;	
Vitaceae	<i>Rhoicissus revoilii</i>	LC	tree; climber; shrub	
Poaceae	<i>Schizachyrium jeffreysii</i>	LC	graminoid;	
Poaceae	<i>Schmidtia pappophoroides</i>	LC	graminoid;	
Anacardiaceae	<i>Sclerocarya birrea</i>	LC	tree'	NFA: Protected; Medicinal
Asteraceae	<i>Senecio latifolius</i>	LC	herb;	
Fabaceae	<i>Senna italica</i>	LC	herb;	Medicinal
Poaceae	<i>Setaria incrassata</i>	LC	graminoid;	
Poaceae	<i>Setaria sphacelata</i>	LC	graminoid;	
Poaceae	<i>Setaria verticillata</i>	LC	graminoid;	
Solanaceae	<i>Solanum lichtensteinii</i>	LC	dwarf shrub; shrub;	
Poaceae	<i>Sporobolus stapfianus</i>	LC	graminoid;	
Combretaceae	<i>Terminalia sericea</i>	LC	tree;	Medicinal
Poaceae	<i>Themeda triandra</i>	LC	graminoid;	
Poaceae	<i>Tragus berteronianus</i>	LC	graminoid;	
Poaceae	<i>Tricholaena monachne</i>	LC	graminoid;	
Poaceae	<i>Trichoneura grandiglumis</i>	LC	graminoid;	
Poaceae	<i>Triraphis schinzii</i>	LC	graminoid;	
Poaceae	<i>Urochloa mosambicensis</i>	LC	graminoid;	
Poaceae	<i>Urochloa oligotricha</i>	LC	graminoid;	
Poaceae	<i>Urochloa panicoides</i>	LC	graminoid;	
Fabaceae	<i>Vachellia gerrardii</i>	LC	tree;	



APPENDIX D: FAUNA SPECIES LIST FOR QDS

Mammal species found in QDS 2328BD and 2328DB (MammalMAP)

Family	Scientific name	Common name	Red list category
Mustelidae	<i>Mellivora capensis</i>	Honey Badger	Least Concern (2016), LEMA Schedule 3 Protected

Avifaunal species found within the relevant pentads

Common Name	Scientific Name	Regional	Global
Brubru	<i>Nilaus afer</i>	LC	LC
Shikra	<i>Accipiter badius</i>	LC	LC
Babbler, Arrow-marked	<i>Turdoides jardineii</i>	LC	LC
Babbler, Southern Pied	<i>Turdoides bicolor</i>	LC	LC
Barbet, Acacia Pied	<i>Tricholaema leucomelas</i>	LC	LC
Barbet, Black-collared	<i>Lybius torquatus</i>	LC	LC
Barbet, Crested	<i>Trachyphonus vaillantii</i>	LC	LC
Batis, Chinspot	<i>Batis molitor</i>	LC	LC
Bee-eater, European	<i>Merops apiaster</i>	LC	LC
Bee-eater, Little	<i>Merops pusillus</i>	LC	LC
Bee-eater, White-fronted	<i>Merops bullockoides</i>	LC	LC
Bishop, Southern Red	<i>Euplectes orix</i>	LC	LC
Boubou, Southern	<i>Laniarius ferrugineus</i>	LC	LC
Bulbul, African Red-eyed	<i>Pycnonotus nigricans</i>	LC	LC
Bulbul, Dark-capped	<i>Pycnonotus tricolor</i>	LC	LC
Bunting, Golden-breasted	<i>Emberiza flaviventris</i>	LC	LC
Bunting, Lark-like	<i>Emberiza impetuani</i>	LC	LC
Bushshrike, Grey-headed	<i>Malaconotus blanchoti</i>	LC	LC
Buzzard, Common	<i>Buteo buteo</i>	LC	LC
Canary, Black-throated	<i>Crithagra atrogularis</i>	LC	LC
Canary, Yellow	<i>Crithagra flaviventris</i>	LC	LC
Canary, Yellow-fronted	<i>Crithagra mozambica</i>	LC	LC
Chat, Familiar	<i>Oenanthe familiaris</i>	LC	LC
Cisticola, Desert	<i>Cisticola aridulus</i>	LC	LC
Cisticola, Rattling	<i>Cisticola chiniana</i>	LC	LC
Cisticola, Zitting	<i>Cisticola juncidis</i>	LC	LC
Cormorant, Reed	<i>Microcarbo africanus</i>	LC	LC
Coucal, Burchell's	<i>Centropus burchellii</i>	LC	LC
Courser, Temminck's	<i>Cursorius temminckii</i>	LC	LC
Crake, Black	<i>Zapornia flavirostra</i>	LC	LC
Crombec, Long-billed	<i>Sylvietta rufescens</i>	LC	LC
Crow, Cape	<i>Corvus capensis</i>	LC	LC
Crow, Pied	<i>Corvus albus</i>	LC	LC
Cuckoo, Black	<i>Cuculus clamosus</i>	LC	LC
Cuckoo, Diederik	<i>Chrysococcyx caprius</i>	LC	LC
Cuckoo, Jacobin	<i>Clamator jacobinus</i>	LC	LC
Cuckoo, Klaas's	<i>Chrysococcyx klaas</i>	LC	LC
Cuckoo, Levallant's	<i>Clamator levallantii</i>	LC	LC
Dove, Cape Turtle	<i>Streptopelia capicola</i>	LC	LC
Dove, Emerald-spotted Wood	<i>Turtur chalcospilos</i>	LC	LC
Dove, Laughing	<i>Spilopelia senegalensis</i>	LC	LC



Common Name	Scientific Name	Regional	Global
Dove, Namaqua	<i>Oena capensis</i>	LC	LC
Dove, Red-eyed	<i>Streptopelia semitorquata</i>	LC	LC
Dove, Rock	<i>Columba livia</i>	LC	LC
Drongo, Fork-tailed	<i>Dicrurus adsimilis</i>	LC	LC
Duck, Maccoa	<i>Oxyura maccoa</i>	NT	VU
Duck, White-faced Whistling	<i>Dendrocygna viduata</i>	LC	LC
Duck, Yellow-billed	<i>Anas undulata</i>	LC	LC
Eremomela, Burnt-necked	<i>Eremomela usticollis</i>	LC	LC
Eremomela, Yellow-bellied	<i>Eremomela icteropygialis</i>	LC	LC
Falcon, Lanner	<i>Falco biarmicus</i>	VU	LC
Finch, Red-headed	<i>Amadina erythrocephala</i>	LC	LC
Firefinch, Jameson's	<i>Lagonosticta rhodopareia</i>	LC	LC
Fiscal, Southern	<i>Lanius collaris</i>	LC	LC
Flycatcher, Marico	<i>Melaenornis mariquensis</i>	LC	LC
Flycatcher, Spotted	<i>Muscicapa striata</i>	LC	LC
Francolin, Crested	<i>Dendroperdix sephaena</i>	LC	LC
Go-away-bird, Grey	<i>Crinifer concolor</i>	LC	LC
Goose, Egyptian	<i>Alopochen aegyptiaca</i>	LC	LC
Goshawk, Gabar	<i>Micronisus gabar</i>	LC	LC
Grebe, Little	<i>Tachybaptus ruficollis</i>	LC	LC
Greenbul, Yellow-bellied	<i>Chlorocichla flaviventris</i>	LC	LC
Guineafowl, Helmeted	<i>Numida meleagris</i>	LC	LC
Harrier-Hawk, African	<i>Polyboroides typus</i>	LC	LC
Heron, Black-headed	<i>Ardea melanocephala</i>	LC	LC
Heron, Grey	<i>Ardea cinerea</i>	LC	LC
Honeyguide, Lesser	<i>Indicator minor</i>	LC	LC
Hoopoe, African	<i>Upupa africana</i>	LC	LC
Hornbill, Southern Red-billed	<i>Tockus rufirostris</i>	LC	LC
Hornbill, Southern Yellow-billed	<i>Tockus leucomelas</i>	LC	LC
Ibis, Hadada	<i>Bostrychia hagedash</i>	LC	LC
Kestrel, Greater	<i>Falco rupicoloides</i>	LC	LC
Kingfisher, Brown-hooded	<i>Halcyon albiventris</i>	LC	LC
Kingfisher, Pied	<i>Ceryle rudis</i>	LC	LC
Kingfisher, Woodland	<i>Halcyon senegalensis</i>	LC	LC
Kite, Yellow-billed	<i>Milvus aegyptius</i>	LC	LC
Korhaan, Red-crested	<i>Lophotis ruficrista</i>	LC	LC
Lapwing, Blacksmith	<i>Vanellus armatus</i>	LC	LC
Lapwing, Crowned	<i>Vanellus coronatus</i>	LC	LC
Lark, Fawn-colored	<i>Calendulauda africanoides</i>	LC	LC
Lark, Monotonous	<i>Mirafrapa passerina</i>	LC	LC
Lark, Sabota	<i>Calendulauda sabota</i>	LC	LC
Lark, Short-clawed	<i>Certhilauda chuana</i>	NT	LC
Martin, Common House	<i>Delichon urbicum</i>	LC	LC
Martin, Rock	<i>Ptyonoprogne fuligula</i>	LC	LC
Moorhen, Common	<i>Gallinula chloropus</i>	LC	LC
Mousebird, Red-faced	<i>Urocolius indicus</i>	LC	LC
Mousebird, Speckled	<i>Colius striatus</i>	LC	LC
Myna, Common	<i>Acridotheres tristis</i>	LC	LC
Owlet, Pearl-spotted	<i>Glaucidium perlatum</i>	LC	LC



Common Name	Scientific Name	Regional	Global
Oxpecker, Red-billed	<i>Buphagus erythrorhynchus</i>	LC	LC
Peafowl, Indian	<i>Pavo cristatus</i>	LC	LC
Pigeon, Speckled	<i>Columba guinea</i>	LC	LC
Pipit, African	<i>Anthus cinnamomeus</i>	LC	LC
Plover, Three-banded	<i>Charadrius tricollaris</i>	LC	LC
Prinia, Black-chested	<i>Prinia flavicans</i>	LC	LC
Prinia, Tawny-flanked	<i>Prinia subflava</i>	LC	LC
Puffback, Black-backed	<i>Dryoscopus cubla</i>	LC	LC
Pytilia, Green-winged	<i>Pytilia melba</i>	LC	LC
Quelea, Red-billed	<i>Quelea quelea</i>	LC	LC
Robin-Chat, White-throated	<i>Cossypha humeralis</i>	LC	LC
Roller, Lilac-breasted	<i>Coracias caudatus</i>	LC	LC
Roller, Purple	<i>Coracias naevius</i>	LC	LC
Sandgrouse, Burchell's	<i>Pterocles burchelli</i>	LC	LC
Scimitarbill, Common	<i>Rhinopomastus cyanomelas</i>	LC	LC
Scrub Robin, Kalahari	<i>Cercotrichas paena</i>	LC	LC
Scrub Robin, White-browed	<i>Cercotrichas leucophrys</i>	LC	LC
Shrike, Crimson-breasted	<i>Laniarius atrococcineus</i>	LC	LC
Shrike, Lesser Grey	<i>Lanius minor</i>	LC	LC
Shrike, Magpie	<i>Urolestes melanoleucus</i>	LC	LC
Shrike, Red-backed	<i>Lanius collurio</i>	LC	LC
Shrike, Southern White-crowned	<i>Eurocephalus anguitimens</i>	LC	LC
Sparrow, Cape	<i>Passer melanurus</i>	LC	LC
Sparrow, Great	<i>Passer motitensis</i>	LC	LC
Sparrow, House	<i>Passer domesticus</i>	LC	LC
Sparrow, Southern Grey-headed	<i>Passer diffusus</i>	LC	LC
Sparrow, Yellow-throated Bush	<i>Gymnoris superciliaris</i>	LC	LC
Sparrow-Weaver, White-browed	<i>Plocepasser mahali</i>	LC	LC
Sparrowhawk, Little	<i>Accipiter minullus</i>	LC	LC
Spoonbill, African	<i>Platalea alba</i>	LC	LC
Spurfowl, Swainson's	<i>Pternistis swainsonii</i>	LC	LC
Starling, Cape	<i>Lamprotornis nitens</i>	LC	LC
Starling, Red-winged	<i>Onychognathus morio</i>	LC	LC
Starling, Wattled	<i>Creatophora cinerea</i>	LC	LC
Stilt, Black-winged	<i>Himantopus himantopus</i>	LC	LC
Stork, Black	<i>Ciconia nigra</i>	VU	LC
Sunbird, Amethyst	<i>Chalcomitra amethystina</i>	LC	LC
Sunbird, Marico	<i>Cinnyris mariquensis</i>	LC	LC
Sunbird, White-bellied	<i>Cinnyris talatala</i>	LC	LC
Swallow, Barn	<i>Hirundo rustica</i>	LC	LC
Swallow, Greater Striped	<i>Cecropis cucullata</i>	LC	LC
Swallow, Lesser Striped	<i>Cecropis abyssinica</i>	LC	LC
Swallow, Red-breasted	<i>Cecropis semirufa</i>	LC	LC
Swift, African Palm	<i>Cypsiurus parvus</i>	LC	LC
Swift, Alpine	<i>Tachymarptis melba</i>	LC	LC
Swift, Little	<i>Apus affinis</i>	LC	LC
Tchagra, Black-crowned	<i>Tchagra senegalus</i>	LC	LC
Tchagra, Brown-crowned	<i>Tchagra australis</i>	LC	LC
Teal, Red-billed	<i>Anas erythrorhyncha</i>	LC	LC



Common Name	Scientific Name	Regional	Global
Tern, Whiskered	<i>Chlidonias hybrida</i>	LC	LC
Thick-knee, Spotted	<i>Burhinus capensis</i>	LC	LC
Thrush, Groundscraper	<i>Turdus litsitsirupa</i>	LC	LC
Thrush, Kurrichane	<i>Turdus libonyana</i>	LC	LC
Tinkerbird, Yellow-fronted	<i>Pogoniulus chrysoconus</i>	LC	LC
Tit, Ashy	<i>Melaniparus cinerascens</i>	LC	LC
Tit, Cape Penduline	<i>Anthoscopus minutus</i>	LC	LC
Tit, Southern Black	<i>Melaniparus niger</i>	LC	LC
Vulture, Cape	<i>Gyps coprotheres</i>	EN	EN
Vulture, Lappet-faced	<i>Torgos tracheliotos</i>	EN	EN
Vulture, White-backed	<i>Gyps africanus</i>	CR	CR
Wagtail, Cape	<i>Motacilla capensis</i>	LC	LC
Warbler, Chestnut-vented	<i>Curruca subcoerulea</i>	LC	LC
Warbler, Olive-tree	<i>Hippolais olivetorum</i>	LC	LC
Warbler, Willow	<i>Phylloscopus trochilus</i>	LC	LC
Waxbill, Black-faced	<i>Brunhilda erythronotos</i>	LC	LC
Waxbill, Blue	<i>Uraeginthus angolensis</i>	LC	LC
Waxbill, Common	<i>Estrilda astrild</i>	LC	LC
Waxbill, Violet-eared	<i>Granatina granatina</i>	LC	LC
Weaver, Red-billed Buffalo	<i>Bubalornis niger</i>	LC	LC
Weaver, Scaly-feathered	<i>Sporopipes squamifrons</i>	LC	LC
Weaver, Southern Masked	<i>Ploceus velatus</i>	LC	LC
Weaver, Spectacled	<i>Ploceus ocularis</i>	LC	LC
Whitethroat, Common	<i>Curruca communis</i>	LC	LC
Whydah, Long-tailed Paradise	<i>Vidua paradisaea</i>	LC	LC
Widowbird, White-winged	<i>Euplectes albonotatus</i>	LC	LC
Wood Hoopoe, Green	<i>Phoeniculus purpureus</i>	LC	LC
Woodpecker, Cardinal	<i>Dendropicops fuscescens</i>	LC	LC
Wren-Warbler, Barred	<i>Calamonastes fasciolatus</i>	LC	LC

Butterfly species occurring in QDS

Family	Scientific name	Common name	Red list category
Geometridae	<i>Chiasmia furcata</i>		LC
Geometridae	<i>Isturgia catalaunaria</i>		
Hesperiidae	<i>Coeliades pistratus</i>	Two-pip policeman	LC (SABCA 2013)
Hesperiidae	<i>Spialia colotes transvaaliae</i>	Bushveld sandman	LC (SABCA 2013)
Lycaenidae	<i>Anthene dulcis dulcis</i>	Mashuna ciliate blue	LC (SABCA 2013)
Lycaenidae	<i>Tarucus bowkeri transvaalensis</i>	Chequered pierrot	LC (SABCA 2013)
Nymphalidae	<i>Byblia anvatara acheloia</i>	African joker	LC (SABCA 2013)
Nymphalidae	<i>Byblia ilithyia</i>	Spotted joker	LC (SABCA 2013)
Nymphalidae	<i>Coenyropsis natalii natalii</i>	Orange lined ringlet	LC (SABCA 2013)
Nymphalidae	<i>Junonia hierta cebrene</i>	Yellow pansy	LC (SABCA 2013)
Pieridae	<i>Eurema brigitta brigitta</i>	Broad-bordered grass yellow	LC (SABCA 2013)
Pieridae	<i>Pinacopteryx eriphia eriphia</i>	Zebra white	LC (SABCA 2013)
Pieridae	<i>Teracolus agoye agoye</i>	Speckled sulphur tip	LC (SABCA 2013)



Reptile species possibly occurring in QDS

Family	Scientific name	Common name	Red list category
Agamidae	<i>Acanthocercus atricollis</i>	Southern Tree Agama	LC (SARCA 2014), LEMA Schedule 3
Agamidae	<i>Agama aculeata distanti</i>	Distant's Ground Agama	LC (SARCA 2014), LEMA Schedule 3
Amphisbaenidae	<i>Monopeltis infuscata</i>	Dusky Worm Lizard	LC (SARCA 2014), LEMA Schedule 3
Chamaeleonidae	<i>Chamaeleo dilepis</i>	Common Flap-neck Chameleon	LC (SARCA 2014), LEMA Schedule 3
Colubridae	<i>Dasypeltis scabra</i>	Rhombic Egg-eater	Least Concern (SARCA 2014)
Colubridae	<i>Philothamnus semivariatus</i>	Spotted Bush Snake	Least Concern (SARCA 2014)
Colubridae	<i>Thelotornis capensis capensis</i>	Southern Twig Snake	Least Concern (SARCA 2014)
Cordylidae	<i>Platysaurus guttatus</i>	Dwarf Flat Lizard	LC (SARCA 2014), LEMA Schedule 3
Cordylidae	<i>Platysaurus monotropis</i>	Orange-throated Flat Lizard	EN (SARCA 2014), LEMA Schedule 3
Cordylidae	<i>Smaug breyeri</i>	Waterberg Girdled Lizard	LC (SARCA 2014), LEMA Schedule 3
Gekkonidae	<i>Homopholis mulleri</i>	Muller's Velvet Gecko	VU (SARCA 2014), LEMA Schedule 3
Gekkonidae	<i>Homopholis wahlbergii</i>	Wahlberg's Velvet Gecko	LC (SARCA 2014), LEMA Schedule 3
Gekkonidae	<i>Lygodactylus bradfieldi</i>	Bradfield's Dwarf Gecko	LC (SARCA 2014), LEMA Schedule 3
Gekkonidae	<i>Lygodactylus capensis</i>	Common Dwarf Gecko	LC (SARCA 2014), LEMA Schedule 3
Gekkonidae	<i>Lygodactylus montiscaeruli</i>	Makgabeng Dwarf Gecko	DD (SARCA 2014), LEMA Schedule 3
Gekkonidae	<i>Lygodactylus soutpansbergensis</i>	Soutpansberg Dwarf Gecko	NT (SARCA 2014), LEMA Schedule 3
Gekkonidae	<i>Pachydactylus affinis</i>	Transvaal Gecko	LC (SARCA 2014), LEMA Schedule 3
Gekkonidae	<i>Pachydactylus capensis</i>	Cape Gecko	LC (SARCA 2014), LEMA Schedule 3
Gerrhosauridae	<i>Gerrhosaurus flavigularis</i>	Yellow-throated Plated Lizard	LC (SARCA 2014), LEMA Schedule 3
Gerrhosauridae	<i>Matobosaurus validus</i>	Common Giant Plated Lizard	LC (SARCA 2014), LEMA Schedule 3
Lacertidae	<i>Heliobolus lugubris</i>	Bushveld Lizard	LC (SARCA 2014), LEMA Schedule 3
Lacertidae	<i>Ichnotropis capensis</i>	Ornate Rough-scaled Lizard	LC (SARCA 2014), LEMA Schedule 3
Lacertidae	<i>Meroles squamulosus</i>	Common Rough-scaled Lizard	LC (SARCA 2014), LEMA Schedule 3
Lacertidae	<i>Nucras holubi</i>	Holub's Sandveld Lizard	LC (SARCA 2014), LEMA Schedule 3
Lacertidae	<i>Nucras intertexta</i>	Spotted Sandveld Lizard	LC (SARCA 2014), LEMA Schedule 3
Lacertidae	<i>Pedioplanis lineoocellata lineoocellata</i>	Spotted Sand Lizard	LC (SARCA 2014), LEMA Schedule 3
Lamprophiidae	<i>Lamprophis guttatus</i>	Spotted House Snake	LC (SARCA 2014)
Leptotyphlopidae	<i>Leptotyphlops incognitus</i>	Incognito Thread Snake	Least Concern (SARCA 2014)
Leptotyphlopidae	<i>Leptotyphlops scutifrons scutifrons</i>	Peters' Thread Snake	
Scincidae	<i>Mochlus sundevallii</i>	Sundevall's Writhing Skink	LC (SARCA 2014), LEMA Schedule 3
Scincidae	<i>Panaspis wahlbergii</i>	Wahlberg's Snake-eyed Skink	LC (SARCA 2014), LEMA Schedule 3
Scincidae	<i>Trachylepis punctatissima</i>	Speckled Rock Skink	LC (SARCA 2014), LEMA Schedule 3
Scincidae	<i>Trachylepis punctulata</i>	Speckled Sand Skink	LC (SARCA 2014), LEMA Schedule 3
Scincidae	<i>Trachylepis sp. (Transvaal varia)</i>	Skink sp. 1	LC (SARCA 2014), LEMA Schedule 3



Family	Scientific name	Common name	Red list category
Scincidae	<i>Trachylepis varia sensu lato</i>	Common Variable Skink Complex	LC (SARCA 2014), LEMA Schedule 3
Typhlopidae	<i>Afrotyphlops schlegelii</i>	Schlegel's Beaked Blind Snake	LC (SARCA 2014)

Amphibian species found in 2328BD and 2328DB QDS (FrogMAP)

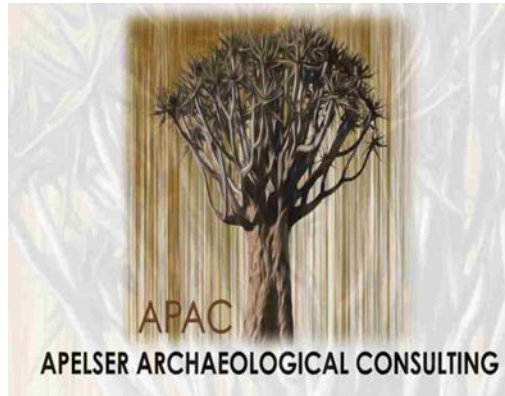
Family	Scientific name	Common name	Red list category
Brevicipitidae	<i>Breviceps adspersus</i>	Bushveld Rain Frog	LC (SARCA 2014), LEMA Schedule 3
Bufonidae	<i>Sclerophrys garmani</i>	Olive Toad	LC (SARCA 2014), LEMA Schedule 3
Hyperoliidae	<i>Kassina senegalensis</i>	Bubbling Kassina	LC (SARCA 2014), LEMA Schedule 3
Microhylidae	<i>Phrynomantis bifasciatus</i>	Banded Rubber Frog	LC (SARCA 2014), LEMA Schedule 3
Ptychadenidae	<i>Ptychadena anchietae</i>	Plain Grass Frog	LC (SARCA 2014), LEMA Schedule 3
Pyxicephalidae	<i>Cacosternum boettgeri</i>	Common Caco	LC (SARCA 2014), LEMA Schedule 3
Pyxicephalidae	<i>Pyxicephalus edulis</i>	African/Lesser Bull Frog	LC (SARCA 2014), LEMA Schedule 3, TOPS 2007
Pyxicephalidae	<i>Tomopterna cryptotis</i>	Tremelo Sand Frog	LC (SARCA 2014), LEMA Schedule 3
Pyxicephalidae	<i>Tomopterna natalensis</i>	Natal Sand Frog	LC (SARCA 2014), LEMA Schedule 3

Other invertebrate species occurring in QDS

Family	Scientific name	Common name	Red list category
Dungbeetle species			
Scarabaeidae	<i>Gymnopleurus humeralis</i>	-	DD
Scarabaeidae	<i>Onitis alexis</i>	-	DD
Scarabaeidae	<i>Proagoderus aureiceps</i>	-	DD



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**A DESKTOP HERITAGE IMPACT ASSESSMENT REPORT
FOR THE SYLVANIA NORTHERN MINING PROSPECTING RIGHTS APPLICATION
ON VARIOUS FARMS IN THE MOKOPANE MAGISTERIAL DISTRICT
OF THE LIMPOPO PROVINCE**

For:

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REPORT: **APAC022/93**

by:

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Although all efforts are made to identify all sites of cultural heritage (archaeological and historical) significance during an assessment of study areas, the nature of archaeological and historical sites are as such that it is always possible that hidden or subterranean sites, features or objects could be overlooked during the study. APELSE Archaeological Consulting can't be held liable for such oversights or for costs incurred as a result thereof.

Clients & Developers should not continue with any development actions until SAHRA or one of its subsidiary bodies has provided final comments on this report. Submitting the report to SAHRA is the responsibility of the Client unless required of the Heritage Specialist as part of their appointment and Terms of Reference

A handwritten signature in black ink, appearing to be 'A. El' or similar, located at the bottom center of the page.

SUMMARY

APelser Archaeological Consulting (APAC cc) was appointed by Prescali Environmental Consultants (Pty) Ltd, on behalf of Sylvania North Mining (Pty) Ltd, to conduct a Desktop-based Heritage Impact Assessment for the their Prospecting/Mining Rights Application on various farms in the Mokopane Magisterial District of the Limpopo Province. The study and project area is situated approximately 67km north-west of Mokopane & 61km north-west of Polokwane.

Background research indicates that there are several cultural heritage (archaeological & historical) sites and features in the larger geographical area within which the study area falls, and some in the study area and on a number of the farms that form part of the Application Area. These sites and heritage resources were identified during previous assessments conducted by APAC cc in the area. This report discusses the results of the background research and provides recommendations on the way forward at the end.

From a Cultural Heritage point of view it is recommended that the proposed Prospecting Rights Application be allowed to continue, taking into consideration the recommendations put forward at the end.

CONTENTS

1. INTRODUCTION	5
2. TERMS OF REFERENCE.....	5
3. LEGISLATIVE REQUIREMENTS.....	6
4. METHODOLOGY	9
5. DESCRIPTION OF THE AREA & PROJECT	9
6. DISCUSSION.....	13
7. CONCLUSIONS AND RECOMMENDATIONS.....	22
8. REFERENCES	23
APPENDIX A: DEFINITION OF TERMS:.....	25
APPENDIX B: DEFINITION/ STATEMENT OF HERITAGE SIGNIFICANCE.....	26
APPENDIX C: SIGNIFICANCE AND FIELD RATING:	27
APPENDIX D: PROTECTION OF HERITAGE RESOURCES:.....	28
APPENDIX E: HERITAGE IMPACT ASSESSMENT PHASES.....	29

1. INTRODUCTION

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The client indicated the location and boundaries of the study area and the assessment concentrated on this portion.

2. TERMS OF REFERENCE

The Terms of Reference for the study was to:

1. Identify all objects, sites, occurrences and structures of an archaeological or historical nature (cultural heritage sites) located on the portion of land that will be impacted upon by the proposed development;
2. Assess the significance of the cultural resources in terms of their archaeological, historical, scientific, social, religious, aesthetic and tourism value;
3. Describe the possible impact of the proposed development on these cultural remains, according to a standard set of conventions;
4. Propose suitable mitigation measures to minimize possible negative impacts on the cultural resources;
5. Review applicable legislative requirements;

It should be noted that No Field-Based Assessment was conducted as part of this Appointment and that the results and recommendations made in this report are based on the scrutiny of previous research and assessments in the area, as well as archival research and aerial images of the study area.

3. LEGISLATIVE REQUIREMENTS

Aspects concerning the conservation of cultural resources are dealt with mainly in two Acts. These are the National Heritage Resources Act (Act 25 of 1999) and the National Environmental Management Act (Act 107 of 1998).

3.1. The National Heritage Resources Act

According to the Act the following is protected as cultural heritage resources:

- a. Archaeological artifacts, structures and sites older than 100 years
- b. Ethnographic art objects (e.g. prehistoric rock art) and ethnography
- c. Objects of decorative and visual arts
- d. Military objects, structures and sites older than 75 years
- e. Historical objects, structures and sites older than 60 years
- f. Proclaimed heritage sites
- g. Grave yards and graves older than 60 years
- h. Meteorites and fossils
- i. Objects, structures and sites of scientific or technological value.

The National Estate includes the following:

- a. Places, buildings, structures and equipment of cultural significance
- b. Places to which oral traditions are attached or which are associated with living heritage
- c. Historical settlements and townscapes
- d. Landscapes and features of cultural significance
- e. Geological sites of scientific or cultural importance
- f. Sites of Archaeological and paleontological importance
- g. Graves and burial grounds
- h. Sites of significance relating to the history of slavery
- i. Movable objects (e.g. archaeological, paleontological, meteorites, geological specimens, military, ethnographic, books etc.)

A Heritage Impact Assessment (HIA) is the process to be followed in order to determine whether any heritage resources are located within the area to be developed as well as the possible impact of the proposed development thereon. An Archaeological Impact Assessment (AIA) only looks at archaeological resources. An HIA must be done under the following circumstances:

- a. The construction of a linear development (road, wall, power line, canal etc.) exceeding 300m in length
- b. The construction of a bridge or similar structure exceeding 50m in length
- c. Any development or other activity that will change the character of a site and exceed 5 000m² or involve three or more existing erven or subdivisions thereof

- d. Re-zoning of a site exceeding 10 000 m²
- e. Any other category provided for in the regulations of SAHRA or a Provincial Heritage Authority

Structures

Section 34 (1) of the Act states that no person may demolish any structure or part thereof which is older than 60 years without a permit issued by the relevant provincial heritage resources authority.

A structure means any building, works, device or other facility made by people and which is fixed to land, and includes any fixtures, fittings and equipment associated therewith.

Alter means any action affecting the structure, appearance or physical properties of a place or object, whether by way of structural or other works, by painting, plastering or the decoration or any other means.

Archaeology, palaeontology and meteorites

Section 35(4) of the Act deals with archaeology, palaeontology and meteorites and states that no person may, without a permit issued by the responsible heritage resources authority (National or Provincial):

- a. destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or paleontological site or any meteorite;
- b. destroy, damage, excavate, remove from its original position, collect or own any archaeological or paleontological material or object or any meteorite;
- c. trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or paleontological material or object, or any meteorite;
- d. bring onto or use at an archaeological or paleontological site any excavation equipment or any equipment that assists in the detection or recovery of metals or archaeological and paleontological material or objects, or use such equipment for the recovery of meteorites;
- e. alter or demolish any structure or part of a structure which is older than 60 years as protected.

The above mentioned may only be disturbed or moved by an archaeologist, after receiving a permit from the South African Heritage Resources Agency (SAHRA). In order to demolish such a site or structure, a destruction permit from SAHRA will also be needed.

Human remains

Graves and burial grounds are divided into the following:

- a. ancestral graves
- b. royal graves and graves of traditional leaders
- c. graves of victims of conflict
- d. graves designated by the Minister
- e. historical graves and cemeteries
- f. human remains

In terms of Section 36(3) of the National Heritage Resources Act, no person may, without a permit issued by the relevant heritage resources authority:

- a. destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;
- b. destroy, damage, alter, exhume or remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or
- c. bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) any excavation, or any equipment which assists in the detection or recovery of metals.

Human remains that are less than 60 years old are subject to provisions of the Human Tissue Act (Act 65 of 1983) and to local regulations. Exhumation of graves must conform to the standards set out in the **Ordinance on Excavations (Ordinance no. 12 of 1980)** (replacing the old Transvaal Ordinance no. 7 of 1925).

Permission must also be gained from the descendants (where known), the National Department of Health, Provincial Department of Health, Premier of the Province and local police. Furthermore, permission must also be gained from the various landowners (i.e. where the graves are located and where they are to be relocated to) before exhumation can take place.

Human remains can only be handled by a registered undertaker or an institution declared under the **Human Tissues Act (Act 65 of 1983 as amended)**.

3.2. The National Environmental Management Act

This Act states that a survey and evaluation of cultural resources must be done in areas where development projects, that will change the face of the environment, will be undertaken. The impact of the development on these resources should be determined and proposals for the mitigation thereof are made.

Environmental management should also take the cultural and social needs of people into account. Any disturbance of landscapes and sites that constitute the nation's cultural heritage should be avoided as far as possible and where this is not possible the disturbance should be minimized and remedied.

4. METHODOLOGY

4.1. Survey of literature

A survey of available literature was undertaken in order to place the development area in an archaeological and historical context. The sources utilized in this regard are indicated in the bibliography.

4.2. Field survey

The field assessment section of the study is normally conducted according to generally accepted HIA practices and aimed at locating all possible objects, sites and features of heritage significance in the area of the proposed development. The location/position of all sites, features and objects is determined by means of a Global Positioning System (GPS) where possible, while detail photographs are also taken where needed.

No field work was undertaken as part of this assessment.

4.3. Oral histories

People from local communities are sometimes interviewed in order to obtain information relating to the surveyed area. It needs to be stated that this is not applicable under all circumstances. When applicable, the information is included in the text and referred to in the bibliography.

4.4. Documentation

All sites, objects, features and structures identified are documented according to a general set of minimum standards. Co-ordinates of individual localities are determined by means of the Global Positioning System (GPS). The information is added to the description in order to facilitate the identification of each locality.

5. DESCRIPTION OF THE AREA & PROJECT

The study and Prospecting Rights Application Area is located on various farms in the Mokopane Magisterial District of the Limpopo Province, and approximately 67km north-west of the town of Mokopane & 61km north-west of Polokwane. The farms included in the Application Area are:

Aurora 397LR
Nonnenwerth 421LR

Teneriffe 682LR
Non Plus Ultra 683LR
Gillelberg 861LR
Altona 696LR
Schaffhausen 689LR

The topography and general landscape of the study & application area can't be described from a personal observation perspective as no physical fieldwork was undertaken for this specific assessment. However, based on aerial images (Google Earth) of the area, as well as physical assessments done in the area previously, it is clear that the area is relatively flat and open with little or no rocky ridges and outcrops present. Portions have been extensively ploughed and changed agriculturally, while a number of residential villages are also present and had changed the natural and historical landscape to some degree. Cattle grazing have also impacted on the area, while sections are also characterized by sandveld. A number of small streams and tributaries of rivers such as the Matlala & Seepabana is present in parts of the study & application area.

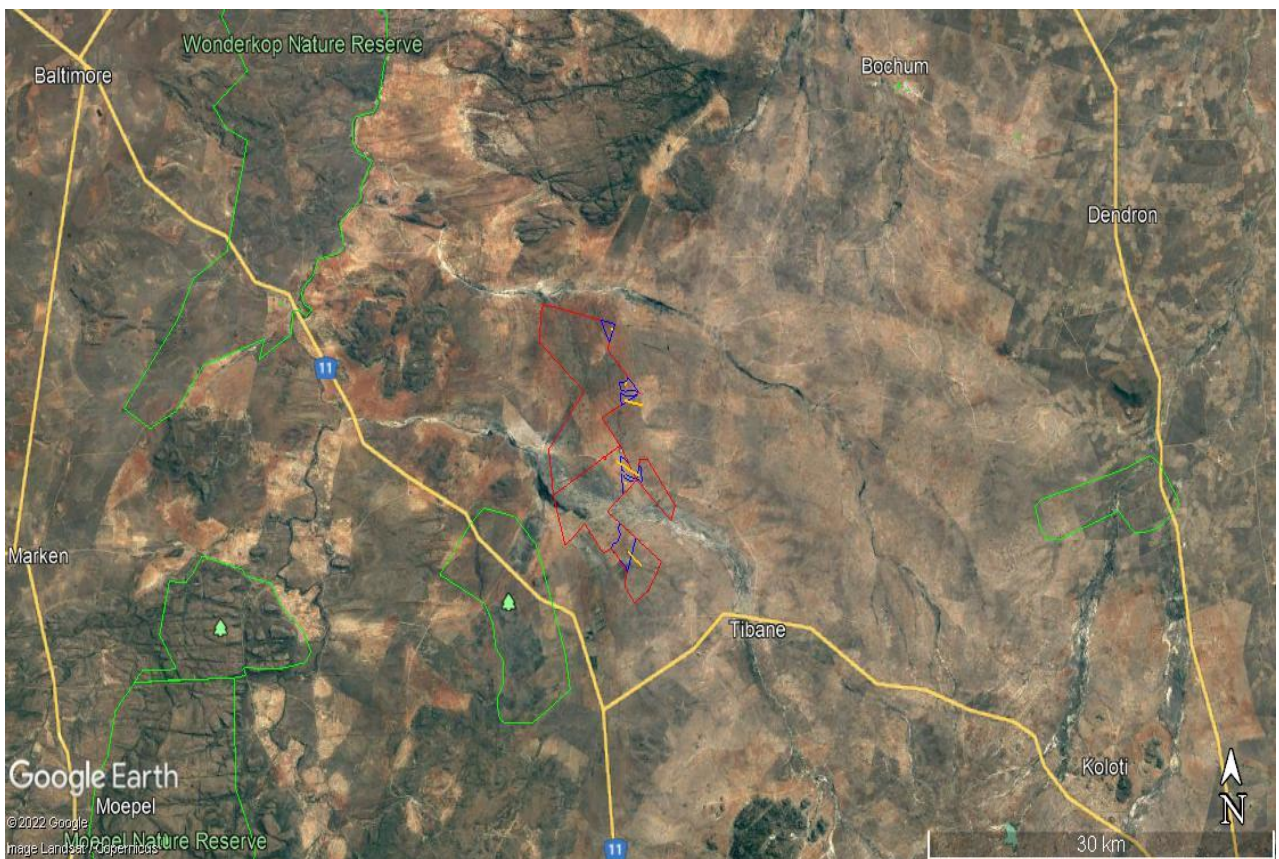


Figure 1: General location of the study & application area (Google Earth 2022).

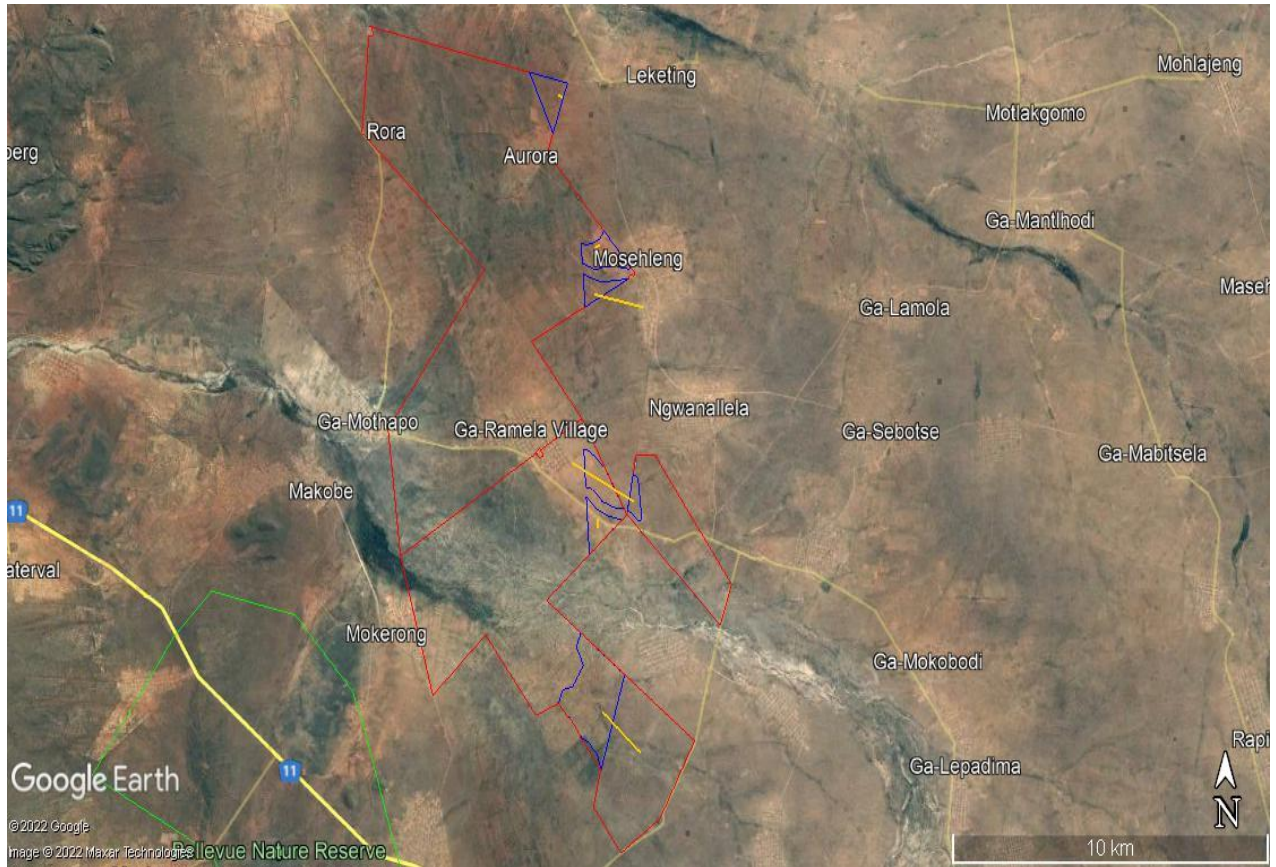
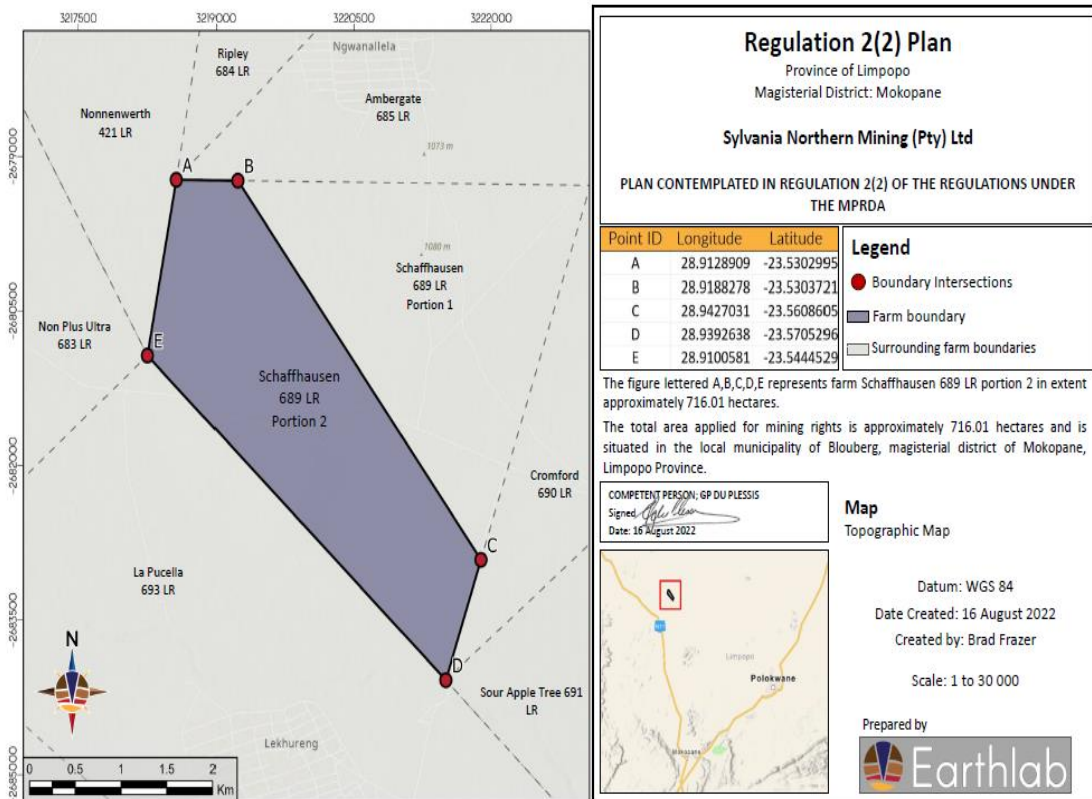


Figure 2: Closer view of the study & application area location (Google Earth 2022). The areas in blue indicate the proposed trenching and drilling areas, with the yellow lines the proposed access roads.



**Figure 3: Regulation 2(2) Plan for the Schaffhausen 689LR Prospecting Rights Area
(provided by Prescali Environmental Consultants)**

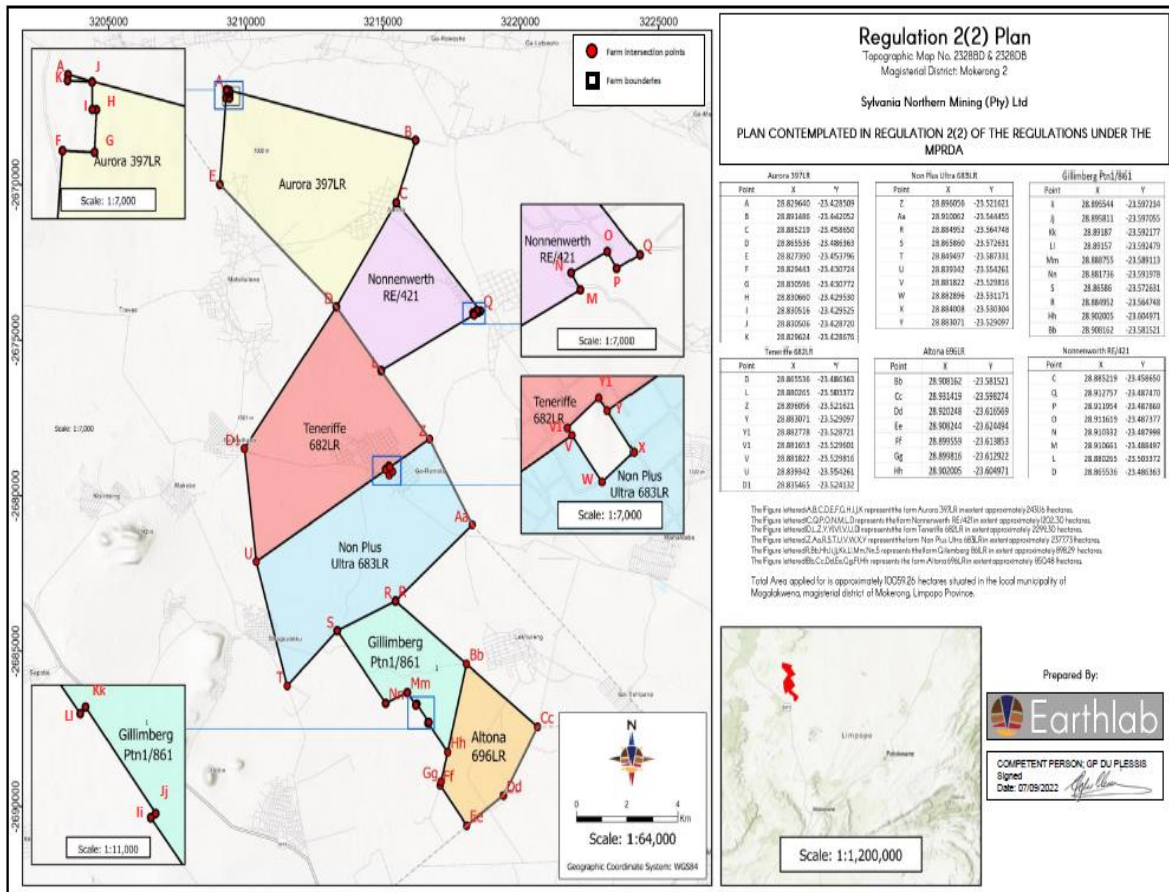


Figure 4: Regulation 2 (2) Plan for the other farms forming part of the Prospecting Rights Application (provided by Prescali Environmental Consultants)

6. DISCUSSION

The Stone Age is the period in human history when lithic (stone) material was mainly used to produce tools. In South Africa the Stone Age can be divided in basically into three periods. It is however important to note that dates are relative and only provide a broad framework for interpretation. A basic sequence for the South African Stone Age (Lombard et.al 2012) is as follows:

- Earlier Stone Age (ESA) up to 2 million – more than 200 000 years ago
- Middle Stone Age (MSA) less than 300 000 – 20 000 years ago
- Later Stone Age (LSA) 40 000 years ago – 2000 years ago

It should also be noted that these dates are not a neat fit because of variability and overlapping ages between sites (Lombard et.al 2012: 125).

No Stone Age sites (including rock art) are known to occur in the immediate study area. The closest known Stone Age sites are located at near Blouberg on the Makgabeng Plateau dating to the Later Stone Age (Bergh 1999: 4). A very large number of significant rock art sites (numbering in their hundreds) are located on the Makgabeng Plateau and on farms directly north of the study area. These rock art sites are representative of San, Khoi and

Northern-Sotho rock art traditions (J.van Schalkwyk Pers.Comm 2012-12-11) and is located on farms such Disseldorp 369LR and Bayswater 370LR north of the farms that form part of the current study (Eastwood et.al 2004; 2005), as well as other farms including Groenepunt, Kirstenspruit and Rosamond.

The possibility of finding Stone Age material in the study areas is always a possibility. These would however more specifically be individual artifacts and small scatters of artifacts in open-air contexts if they are present.

The Iron Age is the name given to the period of human history when metal was mainly used to produce metal artifacts. In South Africa it can be divided in two separate phases (Bergh 1999: 96-98), namely:

Early Iron Age (EIA) 200 – 1000 A.D
Late Iron Age (LIA) 1000 – 1850 A.D.

Huffman (2007: xiii) however indicates that a Middle Iron Age should be included. His dates, which now seem to be widely accepted in archaeological circles, are:

Early Iron Age (EIA) 250 – 900 A.D.
Middle Iron Age (MIA) 900 – 1300 A.D.
Late Iron Age (LIA) 1300 – 1840 A.D.

There are no known Iron Age sites in the immediate study area. Once again a large number of EIA and LIA sites are known to exist to the north of the study area on the Makgabeng Plateau (J.van Schalkwyk Pers.Comm. 2013-10-15).

Tom Huffman's research work shows that EIA, MIA and LIA sites, features or material could possibly be found in the area. This could include the so-called Happy Rest facies of the Kalundu Tradition dating to between AD500 and AD750 (Huffman 2007: 219); Diamant facies of the same tradition dating to between AD750 and AD1000 (p.223); Eiland facies of Kalundu dating to between AD1000 and AD1300 (p.227); the Icon facies of the Urewe Tradition dating to between AD1300 & AD1500 (p.183) and finally the Letsibogo facies of the same tradition dating to between AD1500 and AD1700 (Huffman 2007: 187).

The historical age started with the first recorded oral histories in the area. It includes the moving into the area of people that were able to read and write. The first European group to pass close by the area was that of Coenraad de Buys in 1821 and again 1825, followed by the Voortrekkers after 1844 (Bergh 1999: 12; 14). By 1848 the area formed part of the Soutpansberg Magisterial District (Bergh 1999: 17).

Results of previous assessments in the area

During previous assessments in the area by the author of this report (See **APAC013/71 & APAC014/47**) some cultural heritage sites and features were identified. These included

mainly recent historical settlement remains as well as graveyards and graves. No Stone Age or Iron Age sites or remains were identified during these previous field assessments.

The following sites were identified and recorded in the area during the 2013 & 2014 assessments:

Site 1 – Ruins of recent historical settlement: S23.42191 E28.84669

Site 2 – Ruins of recent historical settlement: S23.41329 E28.85336

Both these sites are on the farm Cracouw and are located outside of the current study & Application Area.

Sites 3 & 4 – Sections of low, stone-packed walls dating to recent historical periods: (3) S23 36 18.50 E28 54 19.80 & (4) S23 36 17.30 E28 54 21.20.

Their Cultural Heritage Significance was seen as Low and no Mitigation Measures were required.

Site 5 – Consists of 2 graveyards & the remains of a recent historical settlement: S23 34 20.70 E28 51 48.20

Sites 6 & 7 - Contains a single grave & 3 larger cemeteries respectively: (6) S23 34 14.20 E28 51 57.70 (grave); (7) S23 32 49.40 E28 54 35.10 (3 cemeteries).

Graves always carry a High Cultural Significance rating and should any of the recorded sites (and possible unmarked or unknown ones) be impacted by the proposed mining-related activities, mitigation measures will have to be implemented. This could either be the in situ preservation of the sites and graves, or the exhumation and relocation of the graves after social consultation and the requiring of the necessary permits. The older settlement remains should also be avoided if possible as they might contain unmarked burials (still-born or young infants/children) in close proximity, but if this is not possible these sites should also be recorded in more detail through social consultation and mapping.

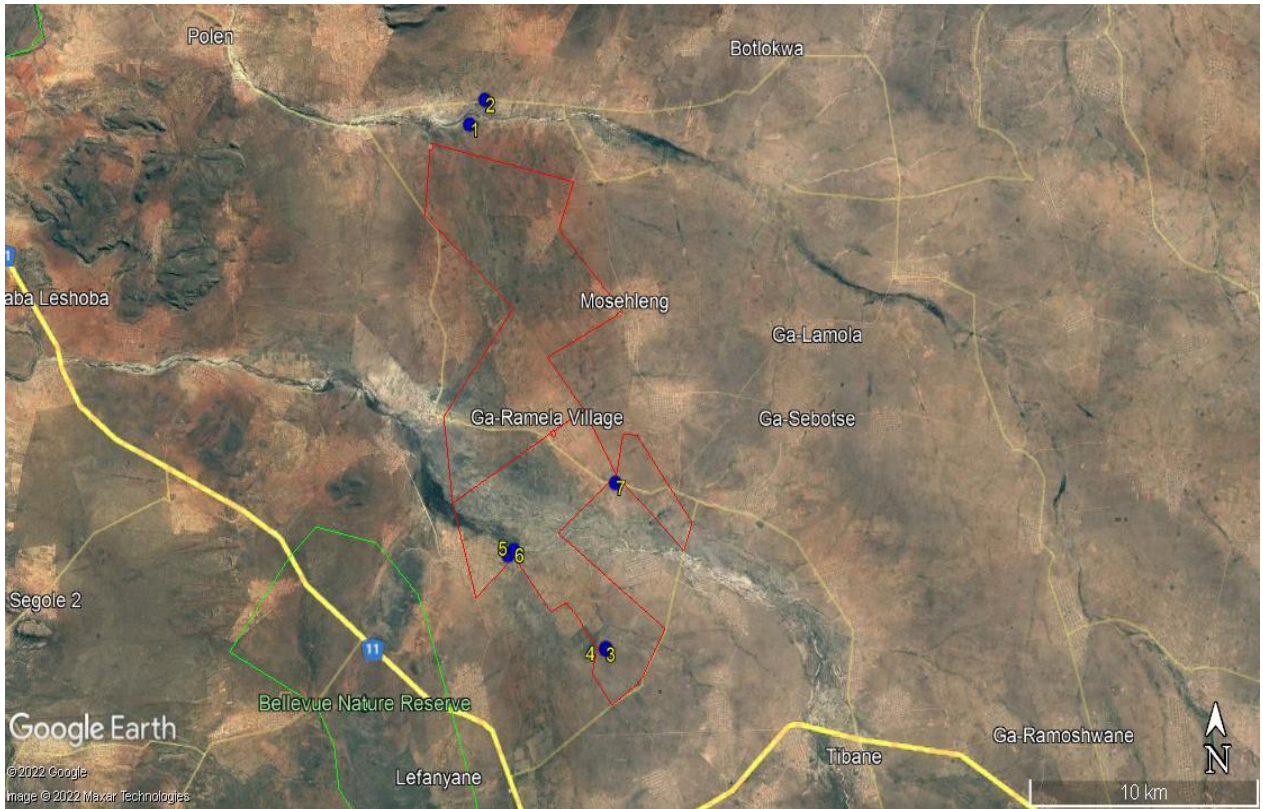


Figure 5: Location & distribution of sites identified during the 2013 & 2014 assessments (Google Earth 2022).



Figure 6: A view characteristic of the general area with a small rural village visible (picture taken in 2013).



Figure 7: A typical view of the landscape and vegetation in the area (taken in 2014).



Figure 8: The topography of the area is relatively flat and open with some areas showing the effects of overgrazing (taken in 2013).



Figure 9: Large sections of the area have been altered through agriculture and will therefore have no impacts on any heritage sites (taken in 2014).



Figure 10: Another view of a section of the study area. Open, eroded and overgrazed areas and rural residential developments are the norm (taken in 2014).



Figure 11: A section of low stone walling found in the area during 2014 (Sites 3 & 4).



Figure 12: Recent historical settlement remains in the area found in 2014 (Site 5).



Figure 13: The Site 5 cemetery recorded in 2014.



Figure 14: The single grave (Site 6) recorded in 2014.



Figure 15: One of the three cemeteries found at Site 7 during 2014.

No physical field assessment was undertaken for the Sylvania North Mining Prospecting/Mining Rights Application on Schauffhausen and the other farms that form part of the Study & Application Area. It is therefore not possible to say if there are any cultural heritage (archaeological and/or historical) sites, features or material located here that could possibly be negatively impacted by the proposed prospecting and related future mining activities here. Although some sites were found in the area on some of the other farms that make up the application area, it is always possible that many were missed during the earlier assessments as a result of various factors. These would include dense vegetation and access issues during the 2013 & 2014 studies.

It is however evident from the desktop study that archaeological/historical sites and finds do occur in the geographical landscape within which the study area is located. Based on this it is possible that open-air Stone Age sites could be found in the area, most likely in the form of individual stone tools or small scatters. The possibility of Iron Age sites (especially stone-walled Late Iron Age sites) in the areas can also not be excluded, although this is less likely. The likelihood of recent historical sites and features being present in the area is High, and will most be represented by the remnants of individual homesteads, rural settlements and both formal & informal cemeteries, individual graves and even previously unknown & unmarked graves.

The following is recommended on the way forward:

That the proposed Sylvania Northern Mining (Pty) Ltd Prospecting/Mining Rights Application on various farms in the Mokopane Magisterial District, 67km north-west of

Mokopane and 61km north-west of Polokwane, be allowed to continue with the condition that once the final detailed locations of the Prospecting Boreholes and Trenches has been determined that detailed field-based assessments be carried out in these areas to determine the impacts of these activities on any possible cultural heritage (archaeological and/or historical) sites and remains. Any resultant proposed future mining activities and related developments and operations will have to then be assessed as well.

7. CONCLUSIONS AND RECOMMENDATIONS

APelser Archaeological Consulting (APAC cc) was appointed by Prescali Environmental Consultants (Pty) Ltd, on behalf of Sylvania North Mining (Pty) Ltd, to conduct a Desktop-based Heritage Impact Assessment for the their Prospecting/Mining Rights Application on various farms in the Mokopane Magisterial District of the Limpopo Province. The study and project area is situated approximately 67km north-west of Mokopane & 61km north-west of Polokwane.

Background research indicates that there are several cultural heritage (archaeological & historical) sites and features in the larger geographical area within which the study area falls, and some in the study area and on a number of the farms that form part of the Application Area. These sites and heritage resources were identified during previous assessments conducted by APAC cc in the area.

During previous assessments in the area some cultural heritage sites and features were identified. These included mainly recent historical settlement remains as well as graveyards and graves. No Stone Age or Iron Age sites or remains were identified during these previous field assessments. No physical field assessment was undertaken for the Sylvania North Mining Prospecting/Mining Rights Application on Schauffhausen and the other farms that form part of the Study & Application Area. It is therefore not possible to say if there are any cultural heritage (archaeological and/or historical) sites, features or material located here that could possibly be negatively impacted by the proposed prospecting and related future mining activities here.

It is also evident from the desktop study that archaeological/historical sites and finds do occur in the geographical landscape within which the study area is located. Based on this it is possible that open-air Stone Age sites could be found in the area, most likely in the form of individual stone tools or small scatters. The possibility of Iron Age sites (especially stone-walled Late Iron Age sites) in the areas can also not be excluded, although this is less likely. The likelihood of recent historical sites and features being present in the area is High, and will most be represented by the remnants of individual homesteads, rural settlements and both formal & informal cemeteries, individual graves and even previously unknown & unmarked graves.

It is important to note here that Graves always carry a High Cultural Significance rating and should any of the recorded sites (and possible unmarked or unknown ones) be impacted by the proposed mining-related activities, mitigation measures will have to be implemented. This could either be the in situ preservation of the sites and graves, or the exhumation and

relocation of the graves after social consultation and the requiring of the necessary permits. Any recent historical homestead/settlement remains should also be avoided if possible as they might contain unmarked burials (still-born or young infants/children) in close proximity, but if this is not possible these sites should also be recorded in more detail through social consultation and mapping.

Finally it can be concluded that the proposed Sylvania Northern Mining (Pty) Ltd Prospecting/Mining Rights Application on various farms in the Mokopane Magisterial District in the Limpopo Province should be allowed to continue with the condition that once the final detailed locations of the Prospecting Boreholes and Trenches has been determined that detailed field-based assessments be carried out in these areas to determine the impacts of these activities on any possible cultural heritage (archaeological and/or historical) sites and remains. Any resultant proposed future mining activities and related developments and operations will have to then be assessed as well.

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Republic of South Africa. 1998. **National Environmental Management Act** (no 107 of 1998). Pretoria: The Government Printer.

APPENDIX A: DEFINITION OF TERMS:

Site: A large place with extensive structures and related cultural objects. It can also be a large assemblage of cultural artifacts, found on a single location.

Structure: A permanent building found in isolation or which forms a site in conjunction with other structures.

Feature: A coincidental find of movable cultural objects.

Object: Artifact (cultural object).

(Also see Knudson 1978: 20).

APPENDIX B: DEFINITION/ STATEMENT OF HERITAGE SIGNIFICANCE

Historic value: Important in the community or pattern of history or has an association with the life or work of a person, group or organization of importance in history.

Aesthetic value: Important in exhibiting particular aesthetic characteristics valued by a community or cultural group.

Scientific value: Potential to yield information that will contribute to an understanding of natural or cultural history or is important in demonstrating a high degree of creative or technical achievement of a particular period

Social value: Have a strong or special association with a particular community or cultural group for social, cultural or spiritual reasons.

Rarity: Does it possess uncommon, rare or endangered aspects of natural or cultural heritage.

Representivity: Important in demonstrating the principal characteristics of a particular class of natural or cultural places or object or a range of landscapes or environments characteristic of its class or of human activities (including way of life, philosophy, custom, process, land-use, function, design or technique) in the environment of the nation, province region or locality.

APPENDIX C: SIGNIFICANCE AND FIELD RATING:

Cultural significance:

- Low: A cultural object being found out of context, not being part of a site or without any related feature/structure in its surroundings.
- Medium: Any site, structure or feature being regarded less important due to a number of factors, such as date and frequency. Also any important object found out of context.
- High: Any site, structure or feature regarded as important because of its age or uniqueness. Graves are always categorized as of a high importance. Also any important object found within a specific context.

Heritage significance:

- Grade I: Heritage resources with exceptional qualities to the extent that they are of national significance
- Grade II: Heritage resources with qualities giving it provincial or regional importance although it may form part of the national estate
- Grade III: Other heritage resources of local importance and therefore worthy of conservation

Field ratings:

- i. National Grade I significance: should be managed as part of the national estate
- ii. Provincial Grade II significance: should be managed as part of the provincial estate
- iii. Local Grade IIIA: should be included in the heritage register and not be mitigated (high significance)
- iv. Local Grade IIIB: should be included in the heritage register and may be mitigated (high/medium significance)
- v. General protection A (IV A): site should be mitigated before destruction (high/medium significance)
- vi. General protection B (IV B): site should be recorded before destruction (medium significance)
- vii. General protection C (IV C): phase 1 is seen as sufficient recording and it may be demolished (low significance)

APPENDIX D: PROTECTION OF HERITAGE RESOURCES:

Formal protection:

National heritage sites and Provincial heritage sites – Grade I and II

Protected areas - An area surrounding a heritage site

Provisional protection – For a maximum period of two years

Heritage registers – Listing Grades II and III

Heritage areas – Areas with more than one heritage site included

Heritage objects – e.g. Archaeological, palaeontological, meteorites, geological specimens, visual art, military, numismatic, books, etc.

General protection:

Objects protected by the laws of foreign states

Structures – Older than 60 years

Archaeology, palaeontology and meteorites

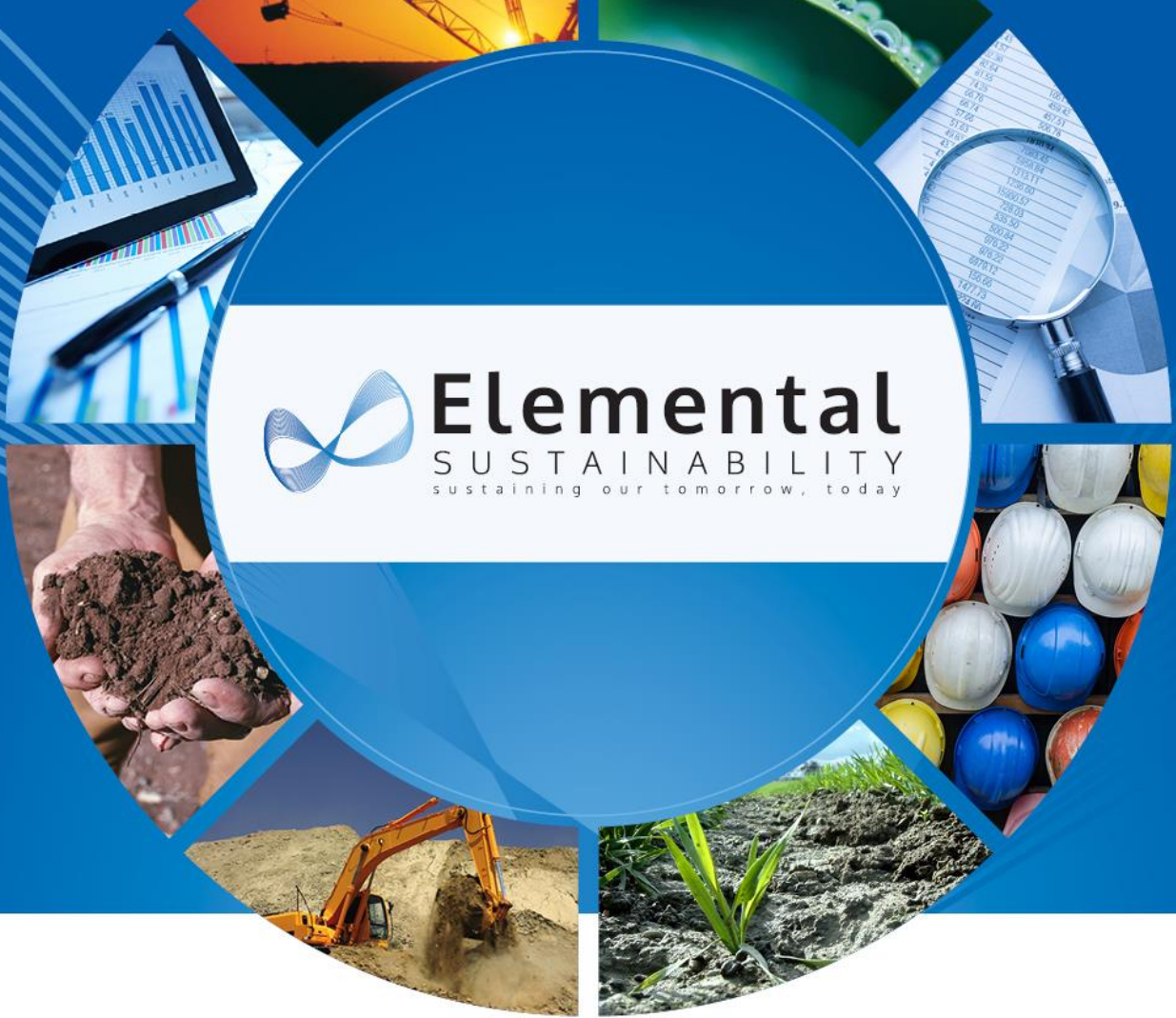
Burial grounds and graves

Public monuments and memorials

APPENDIX E: HERITAGE IMPACT ASSESSMENT PHASES

1. Pre-assessment or Scoping Phase – Establishment of the scope of the project and terms of reference.
2. Baseline Assessment – Establishment of a broad framework of the potential heritage of an area.
3. Phase I Impact Assessment – Identifying sites, assess their significance, make comments on the impact of the development and makes recommendations for mitigation or conservation.
4. Letter of recommendation for exemption – If there is no likelihood that any sites will be impacted.
5. Phase II Mitigation or Rescue – Planning for the protection of significant sites or sampling through excavation or collection (after receiving a permit) of sites that may be lost.
6. Phase III Management Plan – For rare cases where sites are so important that development cannot be allowed.

Soil, Land Use and Land Capability



**Desktop Soil, Land Use and Land Capability Assessment
for the
Proposed Sylvania Prospecting Project**

Final Report

Prepared for:

Sylvania Northern Mining (Pty) Ltd.

3 October 2022

Contact: Kumari Pillay – 072 062 5489

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PROJECT INFORMATION

DOCUMENT CONTROL

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Responsible Person	Petro Erasmus Environmental Assessment Practitioner (EAP) Prescali Environmental Consultants (Pty) Ltd 072 237 7305
Report Number	SNM-SLC-REP-062_22 0.0
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Report Date	3 October 2022

VERIFICATION AND ACCEPTANCE

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Date	3 October 2022	Date	3 October 2022

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SPECIALIST REPORT GUIDE IN ACCORDANCE WITH REGULATIONS

Protocol for the specialist assessment and minimum report content requirements for Environment Impacts on Agricultural Resources (GNR 320, 20 March 2020).

NR.	CONTENT	REFERENCE
2.1	The assessment must be undertaken by a specialist registered with the South African Council for Natural Scientific Professionals (SACNASP).	Page 6 – Annexure 1
2.2	The assessment must be undertaken on the preferred site and within the proposed development footprint.	Figure 1
2.3	The assessment must be undertaken based on a site inspection as well as an investigation of the current production figures, where the land is under cultivation or has been within the past 5 years, and must identify:	Section 6.5 and 6.6
2.3.1	the extent of the impact of the proposed development on the agricultural resources; and	Section 6
2.3.2	whether or not the proposed development will have an unacceptable impact on the agricultural production capability of the site, and in the event where it does, whether such a negative impact is outweighed by the positive impact of the proposed development on agricultural resources.	Section 6
2.4	The status quo of the site must be described, including the following aspects which must be considered as a minimum in the baseline description of the agro-ecosystem:	Section 6
2.4.1	the soil form/s, soil depth (effective and total soil depth), top and sub-soil clay percentage, terrain unit and slope;	Section 6
2.4.2	where applicable, the vegetation composition, available water sources as well as agro-climatic information;	Section 6
2.4.3	the current productivity of the land based on production figures for all agricultural activities undertaken on the land for the past 5 years, expressed as an annual figure and broken down into production units;	N/A
2.4.4	the current employment figures (both permanent and casual) for the land for the past 3 years, expressed as an annual figure; and	N/A
2.4.5	existing impacts on the site, located on a map (e.g., erosion, alien vegetation, non-agricultural infrastructure, waste, etc.).	Section 6.1
2.5	Assessment of impacts, including the following aspects which must be considered as a minimum in the predicted impact of the proposed development on the agro-ecosystem:	Section 8
2.5.1	change in productivity for all agricultural activities based on the figures of the past 5 years, expressed as an annual figure and broken down into production units;	N/A
2.5.2	change in employment figures (both permanent and casual) for the past 5 years expressed as an annual figure; and	N/A
2.5.3	any alternative development footprints within the preferred site which would be of “medium” or “low” sensitivity for agricultural resources as identified by the screening tool and verified through the site sensitivity verification.	Section 6.6
2.7	This report must contain the findings of the agro-ecosystem specialist assessment and the following information, as a minimum:	
2.7.1	details and relevant experience as well as the SACNASP registration number of the specialist preparing the assessment including a curriculum vitae;	Page 6
2.7.2	a signed statement of independence by the specialist;	Page 6
2.7.3	the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	N/A
2.7.4	a description of the methodology used to undertake the on-site assessment inclusive of the equipment and models used, as relevant;	N/A
2.7.5	a map showing the proposed development footprint (including supporting infrastructure) with a 50m buffered development envelope, overlaid on the agricultural sensitivity map generated by the screening tool;	N/A

2.7.6	an indication of the potential losses in production and employment from the change of the agricultural use of the land as a result of the proposed development;	N/A
2.7.7	an indication of possible long-term benefits that will be generated by the project in relation to the benefits of the agricultural activities on the affected land;	N/A
2.7.8	additional environmental impacts expected from the proposed development based on the current status quo of the land including erosion, alien vegetation, waste, etc.;	Section 6
2.7.9	information on the current agricultural activities being undertaken on adjacent land parcels;	Section 6
2.7.10	an identification of any areas to be avoided, including any buffers;	Section 6
2.7.11	a motivation must be provided if there were development footprints identified as per paragraph 2.5.3 above that were identified as having a “medium” or “low” agriculture sensitivity and that were not considered appropriate;	N/A
2.7.12	confirmation from the soil scientist or agricultural specialist that all reasonable measures have been considered in the micro-siting of the proposed development to minimise fragmentation and disturbance of agricultural activities;	Section 10
2.7.13	a substantiated statement from the soil scientist or agricultural specialist with regards to agricultural resources on the acceptability or not of the proposed development and a recommendation on the approval or not of the proposed development;	Section 10
2.7.14	any conditions to which this statement is subjected;	Section 10
2.7.15	where identified, proposed impact management outcomes or any monitoring requirements for inclusion in the Environmental Management Programme (EMPr); and	Section 8.2
2.7.16	a description of the assumptions made and any uncertainties or gaps in knowledge or data.	Section 2

All specialist reports must be prepared in accordance with Appendix 6 of the EIA Regulations of 2014 (as amended in 2017).

NR.	CONTENT	REFERENCE
a	A specialist report prepared in terms of these Regulations must contain— details of— i. the specialist who prepared the report; and ii. the expertise of that specialist to compile a specialist report including a curriculum vitae;	Page 6 – Annexure 1
b	A declaration that the specialist is independent in a form as may be specified by the competent authority;	Page 6
c	An indication of the scope of, and the purpose for which, the report was prepared;	Section 2
cA	<u>An indication of the quality and age of base data used for the specialist report;</u>	Section 5
cB	<u>A description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;</u>	Section 6 and 8
d	The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	N/A
e	A description of the methodology adopted in preparing the report or carrying out the specialised process <u>inclusive of equipment and modelling used;</u>	Section 5
f	<u>Details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;</u>	N/A
g	An identification of any areas to be avoided, including buffers;	Section 6
h	A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Section 6
i	A description of any assumptions made and any uncertainties or gaps in knowledge;	Section 2

j	A description of the findings and potential implications of such findings on the impact of the proposed activity [including identified alternatives on the environment] or activities;	Section 6, 7 and 8
k	Any mitigation measures for inclusion in the EMPr;	Section 8.2
l	Any conditions for inclusion in the environmental authorisation;	Section 8.2
m	Any monitoring requirements for inclusion in the EMPr or environmental authorisation;	None.
n	A reasoned opinion— i. [as to] whether the proposed activity, activities or portions thereof should be authorised; <u>(iA) regarding the acceptability of the proposed activity or activities; and</u> ii. if the opinion is that the proposed activity, <u>activities</u> or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	Section 10
o	A description of any consultation process that was undertaken during the course of preparing the specialist report;	N/A
p	A summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	N/A
q	Any other information requested by the competent authority.	None

SPECIALIST DECLARATION

I, DuToit Wilken, declare that:

- I acted as the independent specialist;
- I performed the work in an objective manner, even if the findings and conclusions are not favourable to the applicant;
- I do not have any financial interest in the undertaking of this project or projects, other than remuneration for the work performed in terms of the National Environmental Management Act 107 of 1998;
- There are no circumstances that may compromise my objectivity in performing such work;
- The contents of this report comply with the relevant legislative requirements, specifically in GNR 320 (20 March 2020) and where applicable Appendix 6 of the NEMA: EIA Regulations (2014, as amended in 2017);
- I have the relevant expertise required to conduct a specialist report of this nature in terms of the National Environmental Management Act (NEMA) (Act no. 107 of 1998);
- I understand that any false information published in this document is an offence in terms of Regulation 71 and is punishable in terms of Section 24F of the Act;
- I am a professionally registered scientist with the South African Council for Natural Scientific Professions (SACNASP);
- I undertake to disclose and provide to the competent authority all material and information in my possession regarding this project as required in terms of National Environmental Management Act 107 of 1998; and
- Based on the information provided to me by the client and in addition to information obtained during this study, I have presented the results and conclusion regarding this project to the best of my professional ability.
- I further declare that I was responsible for collecting data and compiling this report. All assumptions, assessments and recommendations are made in good faith and are considered to be correct to the best of my knowledge and the information available at this stage.



DuToit Wilken

Pr.Sci.Nat. (No. 118911)

3rd October 2022

TABLE OF CONTENTS

PROJECT INFORMATION	2
SPECIALIST REPORT GUIDE IN ACCORDANCE WITH REGULATIONS	3
SPECIALIST DECLARATION	6
LIST OF FIGURES	8
LIST OF TABLES	9
DEFINITION OF TERMS	9
1. INTRODUCTION	11
1.1 General Background and Project Description	11
1.1.1 Non-Invasive Activities	11
1.1.2 Invasive Activities	11
1.2 Locality	12
2. SCOPE OF WORK	15
2.1 Objectives of the Study	15
2.2 Terms of Reference	15
2.3 Assumptions	15
2.4 Limitations	15
3. DETAILS OF AUTHORS	16
4. LEGAL REQUIREMENTS	17
5. METHODOLOGY	18
5.1 Desktop Assessment	18
5.1.1 Land Capability Classification	19
5.1.2 Agricultural Potential Classification	22
6. BASELINE CONDITIONS AND DESCRIPTION OF AFFECTED ENVIRONMENT	23
6.1 Current Land Use	23
6.2 Climatic Conditions	23
6.3 Land Types	25
6.3.1 Land Type Ae334	25
6.3.2 Land Type Ae335	26
6.3.3 Land Type Bd51	27
6.3.4 Land Type Ia169	28
6.3.5 Land Type Fc731	30
6.4 SOTER Soil-Terrain Information	31
6.5 Land Capability Classification and Agricultural Potential	37
6.5.1 Class IV: Arable	37
6.5.2 Class V: Grazing	38

6.6 Agricultural Sensitivity	38
6.7 No Go Areas	43
7. POTENTIAL IMPACT OF THE PROPOSED PROSPECTING ACTIVITIES.....	44
8. IMPACT ASSESSMENT	45
8.1 Impact Assessment Methodology	45
8.1.1 Assessment Criteria	45
8.1.2 Mitigation	46
8.1.3 Assessment Weighting.....	47
8.2 Impact Assessment.....	49
8.3 Cumulative Impacts.....	53
9. COMMENTS AND RESPONSES	53
10. REASONED OPINION AND RECOMMENDATIONS	53
REFERENCES.....	55
APPENDIX A: SPECIALIST CURRICULUM VITAE.....	56

LIST OF FIGURES

Figure 1: Regional Locality Map of the proposed prospecting project area.	13
Figure 2: Proposed layout for the prospecting project.....	14
Figure 3: Schematic diagram depicting a conceptual presentation of a typical soil profile.....	21
Figure 4: Typical plinthic catena.....	22
Figure 5: General land cover on the proposed application area for the SPD Mining Project.	24
Figure 6: Terrain form sketch of Land Type Ae334.....	26
Figure 7: Terrain form sketch of Land Type Ae335.....	27
Figure 8: Terrain form sketch of Land Type Bd51.....	28
Figure 9: Terrain form sketch of Land Type Ia169.....	30
Figure 10: Terrain form sketch of Land Type Fc731.....	31
Figure 11: Land Types associated with the proposed prospecting project application area.	32
Figure 12: SOTER Landform associated with the proposed prospecting project application area.....	33
Figure 13: Generalised Soil Patterns associated with the proposed prospecting project application area.....	34
Figure 14: SOTER Soil Association map of the proposed prospecting project application area.....	35
Figure 15: Dominant SOTER Soils associated with the proposed prospecting project application area.....	36
Figure 16: Farming Land Capability of the proposed prospecting project application area (DEA – Screening Tool).....	39
Figure 17: Land Capability of the area according to Scotney <i>et al.</i> (1987).....	40
Figure 18: Agricultural sensitivity of the proposed prospecting project application area (DEA – Screening Tool).	41
Figure 19: Crop Fields sensitivity of the proposed prospecting project application area (DEA – Screening Tool).....	42

LIST OF TABLES

Table 1: Sampling site sizes and activities associated with the proposed invasive phase.....	12
Table 2: Land Capability Classification (Scotney <i>et al.</i> , 1987).	19
Table 3: National Land Capability Values (DAFF, 2017).....	20
Table 4: Typical Arrangement of Master Horizons in Soil Profile.	21
Table 5: Criteria for agricultural potential classification.	22
Table 6: Key climatic aspects of the region (Climate-data.org).....	23
Table 7: Land Type Ae334 Data.	25
Table 8: Land Type Ae335 Data.	26
Table 9: Land Type Bd51 Data.	27
Table 10: Land Type Ia169 Data.....	29
Table 11: Land Type Fc731 Data.....	30
Table 12: Identified activities for the different phases of prospecting.....	44
Table 13: Impact Assessment Criteria	45
Table 14: Significance-Without Mitigation	47
Table 15: Significance- With Mitigation	47
Table 16: Description of assessment parameters with its respective weighting.....	48
Table 17: Summary of the Impact Significance.....	50

DEFINITION OF TERMS

Calcareous	Containing calcium carbonate or magnesium carbonate.
Chromic	Having within ≤ 150 cm of the soil surface, a subsurface layer ≥ 30 cm thick, that has a Munsell colour hue redder than 7.5YR, moist.
Erosion	The group of processes whereby soil or rock material is loosened or dissolved and removed from any part of the earth's surface.
Ferralic	Having a ferralic horizon starting ≤ 150 cm of the soil surface.
Ferralic horizon	A subsurface horizon resulting from long and intense weathering, with a clay fraction that is dominated by low-activity clays and contains various amounts of resistant minerals such as Fe, Al, and/or Mn hydroxides.
Land capability	The ability of land to meet the needs of one or more uses under defined conditions of management.
Land type	(1) A class of land with specified characteristics. (2) In South Africa it has been used as a map unit denoting land, map able at 1:250000 scale, over which there is a marked uniformity of climate, terrain form and soil pattern.
Land use	The use to which land is put.

Lithic	Having continuous rock or technic hard material starting ≤ 10 cm from the soil surface.
Orthic A horizon	A surface horizon that does not qualify as organic, humic, vertic or melanic topsoil although it may have been darkened by organic matter.
Salinity	High Sodium Adsorption Ratio (SAR) above 15% are indicative of saline soils. The dominance of Sodium (Na) cations in relation to other cations tends to cause soil dispersion (deflocculation), which increases susceptibility to erosion under intense rainfall events.
Sodicity	High exchangeable sodium Percentage (ESP) values above 15% are indicative of sodic soils. Similarly, the soil dispersion.
Texture, soil	The relative proportions of the various size separate in the soil as described by the classes of soil texture shown in the soil texture chart. The pure sand, sand, loamy sand, sandy loam and sandy clay loam classes are further subdivided according to the relative percentages of the course, medium and fine sand sub-separates.

1. INTRODUCTION

1.1 General Background and Project Description

Elemental Sustainability (Pty) Ltd (hereafter referred to as Elemental) was appointed by Prescali Environmental Consultants (Pty) Ltd (hereafter referred to as Prescali) to undertake a Desktop Soil, Land Use and Land Capability Assessment for Sylvania Northern Mining (Pty) Ltd. (hereafter referred to as SNM) as part of the Environmental Impact Assessment (EIA) Process being undertaken for the proposed prospecting right. The proposed prospecting right activities will consist of both Non-Invasive and Invasive activities as outlined in the subsections below.

1.1.1 Non-Invasive Activities

Phase 1:

- Investigate academic data and liaise with communities - Year 1; Duration: 6 Months.
- Desktop study - Year 1; Duration: 1 month.
- Inventories, capture and QA/QC and database creation - Year 1; Duration: 5 months.
- Preliminary site visit - Year 1; Duration: 1 week.
- Regional geochemistry and geophysical interpretation - Year 1; Duration: 4 months.
- Integrate information and define exploration targets - Year 1; Duration: 1 month.

Phase 2:

- Ground geophysics and soil geochemical sampling - Year 2; Duration: 10 months.
- Trenching - Year 2; Duration: 5 months.

Phase 3:

- Drilling - Year 3; Duration: 8 months.
- Logging, sampling, and analysis - Year 3; Duration: 12 Months.
- Geological modelling - Year 3; Duration: 6 Months];

Phase 4:

- Resource drilling - Year 4; Duration: 4 Months.
- Estimation of resource - Year 4; Duration: 3 Months.
- Pre-feasibility study - Year 4; Duration: 12 Months.

Phase 5:

- Feasibility study - Year 5; Duration: 6 Months.

1.1.2 Invasive Activities

- **Ground geophysics and soil geochemical sampling** (*Year 2; Duration: 10 months*): Geochemical sampling campaigns with pre-designed sampling grids of 250 m x 250 m will be undertaken on the prospecting areas.

- **Trenching** (Year 2; Duration: 5 months): Eight (8) short (25m x 2m x 2 m) trenches will be excavated over the outcrop positions of the defined orebodies. The trenches will be geologically mapped, and the sidewalls of the trenches will be sampled. Once this is complete, the trenches will be refilled. During the trenching and mapping, temporary barriers will be erected around the excavation to prevent people/animals from falling into the trenches.
- **Resource drilling** (Year 3; Duration: 8 months): Drilling (diamond or RC) of the prospective areas will commence establishing the presence of mineralisation in the prospect areas. Geological borehole logging, downhole geophysical logging, core magnetic susceptibility measurement and sampling will also be carried out. It is anticipated that initially approximately four (4) drill holes will be drilled. Drill holes could vary in depth from 150 m to 350 m, with an average depth of 250 m. The total amount of drilling to be budgeted for at this stage is 750 meters. Depending on the results of this drilling further 1 drill hole totalling 250 meters depth may be required.

Table 1: Sampling site sizes and activities associated with the proposed invasive phase.

	Farm Names	
	Altona 696 LR, Gillemberg 861 LR, Non Plus Ultra 683 LR, Teneriffe 682 LR, Aurora 397 LR, Nonnenwerth 421 LR	Schaffhausen
Drill Site	10m x 10m Drill Sites 1 Drill site= 100 m ² Total Drill Site Areas (6) = 600 m ²	10m x 10m Drill Sites 1 Drill site= 100 m ² Total Drill Site Areas: (4) = 400 m ²
Trenching	25m x 2m x 2m Trench Sites 1 Trench = 50 m ² Total Trench Areas (25) = 1 250 m ²	25m x 2m x 2m Trench Sites 1 Trench = 50 m ² Total Trench Areas: (8) = 400 m ²
Contractor's camp	N/A	400 m ²
Rehabilitation and Closure	1 850 m ²	1 200 m ²

The assessment entailed evaluating available desktop soil and land capability data and current limitations to various land use purposes.

1.2 Locality

The proposed prospecting right area (hereafter referred to as the “study site”) will be situated on sections of the Farm Altona 696 LR, sections of the Farm Schaffhausen 689 LR, sections of the Farm Nonnenwerth 421 LR, the Farm Aurora 397 LR, the Farm Teneriffe 682 LR, the Farm Gillemberg 861 LR and the Fam Non Plus Ultra 683 LR, within the Limpopo Province (**Figure 1**). Central coordinates for the site are as follows: 23°31'37.15"S, 28°51'48.92"E.

The proposed areas of focus, where the proposed prospecting activities as discussed in Table 1 will take place, is presented in **Figure 2** below.

2. SCOPE OF WORK

2.1 Objectives of the Study

The objective of the Desktop Soil, Land Use and Land Capability study is to fulfil the requirements of the most recent South African Environmental Legislation with reference to the assessment and management of these natural resource aspects (stipulated in Section 4). The purpose of the desktop study is to determine and describe the baseline soil properties, land capabilities and land uses associated with the proposed project area from a site survey and desktop data currently available. Mitigation and management measures are recommended to minimise negative impacts and maximise land rehabilitation success towards successful closure at the end of the project's life.

2.2 Terms of Reference

The Desktop Soil, Land Use and Land Capability Assessment entailed the following aspects:

- A desktop review of existing land type maps, to establish broad baseline conditions and areas of environmental sensitivity and sensitive agricultural areas.
- Classify and describe soils using the South African Soil Classification: A Natural and Anthropogenic System for South Africa (2018).
- Compile various maps depicting the on-site conditions, soil types and land capability based on desktop review of existing data.
- Compile a report presenting the results of the desktop study. Identification and assessment of potential soil, land use and land capability impacts resulting from the proposed prospecting project including impacts associated with the construction, operational, and decommissioning phases of the project.
- Provide recommended mitigation measures and management practices to implement in order to comply with applicable legislation.
- The findings of the study provides a baseline analysis of existing conditions.

2.3 Assumptions

- It is assumed that there are no alternative locations for the proposed activities and that the assessment, therefore, focussed only on the proposed prospecting application area.
- The prospecting activities will only take place in the focus areas as identified. The specific locations of the activities will be identified during phase 1 and the sensitivity of the specific locations will be assessed by the ECO to ensure that the impacts are kept to a minimal and no-go areas are avoided.
- The assessment was undertaken during the planning stage of the project and is based on the information available at that time.

2.4 Limitations

- This study was done only via desktop methodologies and no site assessment or in-field soil sampling took place.
- The study does not include a land contamination assessment to determine preconstruction soil pollution levels (should there be any present).

3. DETAILS OF AUTHORS

NAME:	QUALIFICATION & EXPERTISE
DuToit Wilken Author	<ul style="list-style-type: none"> • M.Sc. University of Pretoria • Pr.Sci.Nat. (118911) • 12+ years' experience in the environmental management field
<p>DuToit Wilken is an Environmental Scientist with more than 12 years of experience in applying the principles of Integrated Environmental Management, and in applying the Environmental Legislation to a number of development projects and initiatives in Southern Africa. He is registered as a Pr.Sci.Nat. (SACNASP), Natural Scientist, Registration number 118911. He has co-ordinated and managed number of diverse projects and programs related to the Environment and Mining within both the public and private sectors and for national, multi-national and international companies. His interpersonal and organisational skills have enabled him to efficiently direct these projects from initiation to implementation.</p> <p>He is a specialist in soil and agricultural studies with a focus on mine closure. His M.Sc thesis related to the amelioration of acid mine soils with class F fly ash. He has completed a number of soil and agricultural studies for mine related project.</p> <p>His proficient report-writing skills have been utilised for the compilation of a wide variety of reports, which include but is not limited to Specialist studies (Soil and Agricultural Assessments, Closure and Closure Planning) Basic Assessment Reports, Scoping and Environmental Impact Assessment Reports, Environmental Management Plans (Planning, Construction, Operation and Closure), Environmental Audit Reports, Opportunities and Constraints Analyses, Waste License Applications, Water-Use Application Reports and Mining Right Applications.</p>	
NAME:	QUALIFICATION & EXPERTISE
Liezl Landman Project Reviewer	<ul style="list-style-type: none"> • M.Sc. Environmental Ecology, University of Pretoria • Pr.Sci.Nat. (118084) • 7 years' experience in the environmental management field
<p>Liezl Landman is an Ecological Specialist and Environmental Consultant with more than six years of experience in the field of environmental management. Her core experience and expertise are in the mining and industrial sectors, focusing on Ecological and Biodiversity Assessments, both Terrestrial and Aquatic, along with Wetland Delineation and Functionality Assessments, Visual Impact Assessments, Water and Air Quality Assessments, GIS Mapping and SASS 5 Aquatic Biomonitoring.</p> <p>Liezl is registered as a professional scientist in the field of ecological science and environmental science with SACNASP and a member of the IAIA, SAWS, and SASAqS.</p>	

4. LEGAL REQUIREMENTS

The following South African Environmental Legislation needs to be considered for any new or expanding developments with reference to the management of soil and land use:

- The Conservation of Agricultural Resources (Act 43 of 1983) states that the degradation of the agricultural potential of soil is illegal. This Act requires the protection of land against soil erosion and the prevention of water logging and salinisation of soils by means of suitable soil conservation works to be constructed and maintained. The utilisation of marshes, water sponges and watercourses are also addressed.
- The Bill of Rights states that environmental rights exist primarily to ensure good health and well-being, and secondarily to protect the environment through reasonable legislation, ensuring the prevention of the degradation of resources.
- The Environmental right is furthered in the National Environmental Management Act 107 of 1998 (NEMA), which prescribes three principles, namely the precautionary principle, the “polluter pays” principle and the preventive principle.
- An Environmental Management Programme Report (EMPr) is required under NEMA.
- In addition to this, the National Water Act (Act 36 of 1998) deals with the protection of wetlands. This Act defines wetlands as “land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.” This Act therefore makes it necessary to also assess soil for its hydrogeological properties.
- Regulations on use of water for mining and related activities aimed at the protection of water resources, GN. 704, GG 20119, 4 June 1999 (GN. 704 of 1999) published under the National Water Act 36 of 1998 aimed at the protection of water resources.
- National norms and standards for the remediation of contaminated land and soil quality in the Republic of South Africa, GN. 331, GG 37603, 2 May 2014 published under the National Environmental Management: Waste Act 59 of 2008 provide a uniform national approach to determine the contamination status of an investigation area; and minimum standards for assessing necessary environmental protection measures for remediation activities.
- It is stated in the above-mentioned Act that the individual/group responsible for the degradation/pollution of natural resources is required to rehabilitate the polluted source; Soils and land capability are protected under the National Environmental Management Act 107 of 1998, the Environment Conservation Act 73 of 1989, the Mineral and Petroleum Resources Development Act 28 of 2002 and the Conservation of Agricultural Resources Act 43 of 1983.
- The National Veld and Forest Fire Bill of 10 July 1998 and the Fertiliser, Farm Feeds, Agricultural Remedies and Stock Remedies Act 36 of 1947 can also be applicable in some cases.

- The National Environmental Management Act 107 of 1998 requires that pollution and degradation of the environment be avoided or, where it cannot be avoided, be minimized and remedied.
- The Conservation of Agriculture Resources Act 43 of 1983 requires the protection of land against soil erosion and the prevention of water logging and salinisation of soils by means of suitable soil conservation works to be constructed and maintained. The utilisation of marshes, water sponges and watercourses are also addressed.

5. METHODOLOGY

This section provides the methodology used in the compilation of the Desktop Soil, Land Use and Land Capability Assessment report.

5.1 Desktop Assessment

The following data was obtained and studied for the desktop study:

- Land type data for the grid connection corridor was obtained from the Institute for Soil Climate and Water (ISCW) of the Agricultural Research Council (ARC) (Land Type Survey Staff, 1972 – 2006). The land type data is presented at a scale of 1:250 000 and entails the division of land into land types, typical terrain cross sections for the land type and the presentation of dominant soil types for each of the identified terrain units (in the cross section). The soil data is classified according to the Binomial System (MacVicar *et al.*, 1977). The soil data was interpreted and re-classified according to the Taxonomic System (MacVicar *et al.*, 1991).
 - These maps and the accompanying reports provide a statistical estimate of the different soils that can be expected in the area.
- The newly released National Land Capability Evaluation Raster Data Layer was obtained from the Department of Agriculture, Forestry and Fisheries (DAFF) to determine the land capability classes of the grid connection corridor according to this system. The new data was developed by DAFF to address the shortcomings of the 2002 national land capability data set. The new data was developed using a spatial evaluation modelling approach (DAFF, 2017).
- The most recent aerial photography of the area available from Google Earth was obtained. The aerial photography analysis was used to determine areas of existing impact, land uses within the grid connection corridor as well as the larger landscape, wetland areas and preferential flow paths.

5.1.1 Land Capability Classification

The anticipated impacts of the proposed land use on soil and land capability were assessed to inform the necessary mitigation measures. The land capability of the proposed activities was assessed in accordance with the definitions and system outlined by Scotney *et al.* (1987) and updated for South African soils by the Agricultural Research Council (Schoeman, 2000). The criteria used as general guidelines to place soil and land into capability classes are indicated below. This system is based on the Land Capability Classification system of the United States Department of Agriculture (USDA) Soil Conservation Service by Klingelbiel and Montgomery (1961). The soils were classified into eight (8) capability classes (**Table 2**) based on varying limitations (restrictions for rain-fed cropping) of the following soil parameters:

- Effective Depth (D)
- Soil Texture (T)
- Flood Hazard (F)
- Erosion Hazard (E)
- Internal Drainage (W)
- Mechanical limitations (M)

Table 2: Land Capability Classification (Scotney *et al.*, 1987).

Land Capability Group	Land Capability Class	Increased intensity of use									Limitations
Arable	I	W	F	LG	MG	IG	LC	MC	IC	VIC	No or few limitations. Very high arable potential. Very low erosion hazard
	II	W	F	LG	MG	IG	LC	MC	IC	-	Slight limitations. High arable potential. Low erosion hazard
	III	W	F	LG	MG	IG	LC	MC	-	-	Moderate to severe limitations. Some erosion hazards
	IV	W	F	LG	MG	IG	LC	-	-	-	Severe limitations. Low arable potential. High erosion hazard
Grazing	V	W	-	LG	MG	-	-	-	-	-	Water course and land with wetness limitations
	VI	W	F	LG	MG	-	-	-	-	-	Limitations preclude cultivation. Suitable for perennial vegetation
	VII	W	F	LG	-	-	-	-	-	-	Very severe limitations. Suitable only for natural vegetation
Wildlife	VIII	W	-	-	-	-	-	-	-	-	Extremely severe limitations. Not suitable for grazing or afforestation.

Key to the **Table 2** above.

W – Wildlife	F – Forestry	LG – Light Grazing
MG – Moderate Grazing	IG – Intensive Grazing	LC – Light Cultivation
MC – Moderate Cultivation	IC – Intensive Cultivation	VIC – Very Intensive Cultivation

The land capability of the proposed development area was compared to the National Land Capability which was refined in 2014- 2016. The National Land Capability methodology is based on a spatial evaluation modelling approach and a raster spatial data layer consisting of fifteen (15) land capability evaluation values (**Table 3**), usable on a scale of 1:50 000 – 1:100 000 (DAFF, 2017). The previous system is based on a classification approach, with 8 classes (**Table 2**).

Table 3: National Land Capability Values (DAFF, 2017).

Land Capability Evaluation Value	Land Capability Description
1	Very Low
2	
3	Very Low to Low
4	
5	Low
6	Low to Moderate
7	
8	Moderate
9	Moderate to High
10	
11	High
12	High to Very High
13	
14	Very High
15	

The third approach is contained in the Coaltech Research Association and the Chamber of Mines of South Africa Guidelines for the Rehabilitation of Mined Land, 2007. These 2007 Guidelines recommend the following classes of post mining rehabilitated land: arable, grazing, wilderness, and wetland.

- Arable: The soil depth exceeds 0.6 m, the soil material is not sodic or acidic and slope percentage is such that when multiplied by the soil erodibility factor K, the product does not exceed a value of 2.0;
- Grazing: The soil depth is less than 0.6 m but more than 0.25 m;
- Wilderness: The soil depth is less than 0.25 m but more than 0.15 m; and
- Wetland: The soil depths are as for grazing but soil must be used for the construction of wetlands. These wetland soils must be separately stockpiled.

Table 4: Typical Arrangement of Master Horizons in Soil Profile.

Soil	Zone in which soil processes are maximally expressed	Arrangement of master horizons			
		O-Organic	C- Regic sand (c), Stratified alluvium, (c), Man -Made Soil Deposits	A	Humic, Vertic, Melanic, Orthic
B	E				
	Red Apedal, yellow Brown Apedal, Soft Plinthic, Hard Plinthic, Prismatic, Pedocutanic, Lithocutanic, Neocutanic, Neocarbonate, Podzol, Podzol with placic pan				
C	Dorbank, Soft Carbonate horizon, Hard Carbonate horizon, Saprolite, Unconsolidated without signs of wetness, Unconsolidated with signs of wetness, Unspecified material with signs of wetness				
		R-Hard Rock			

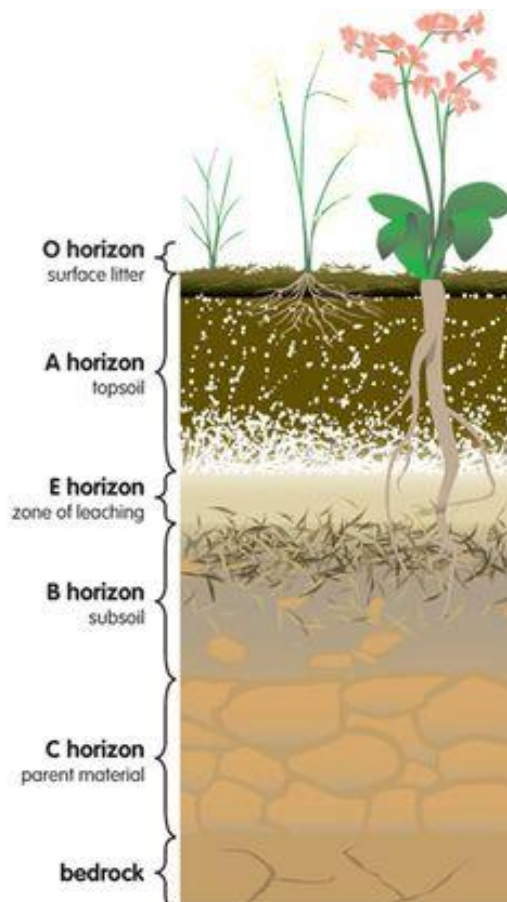


Figure 3: Schematic diagram depicting a conceptual presentation of a typical soil profile.

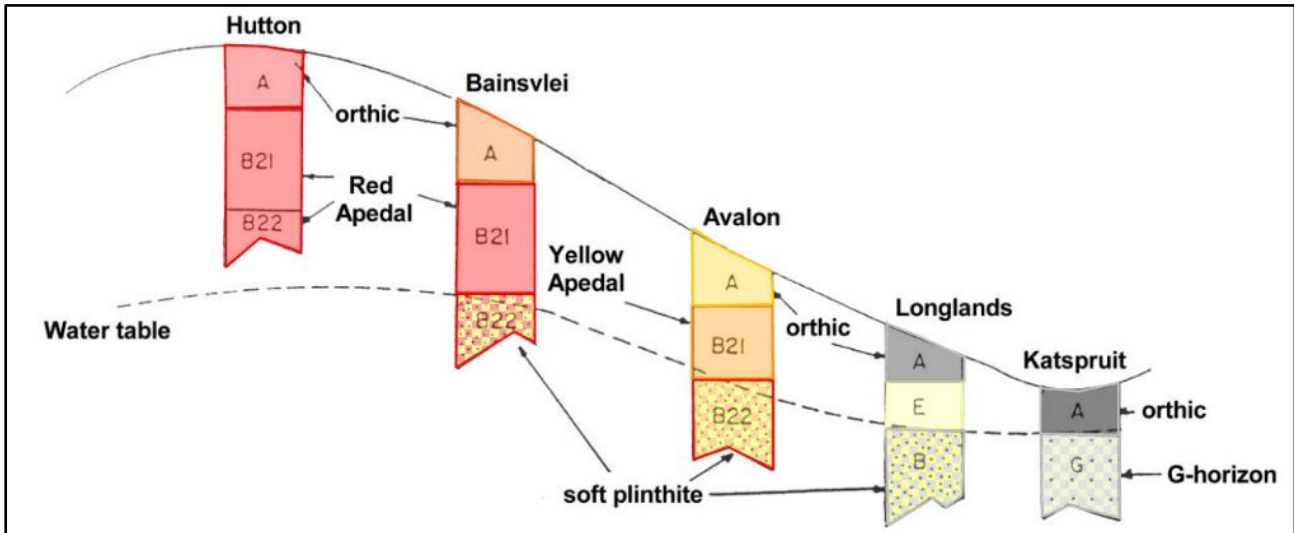


Figure 4: Typical plinthic catena.

5.1.2 Agricultural Potential Classification

Land Capability Classification (LCC) categorises soils into groups based on the ability to sustain typical cultivated rain-fed crops, which do not require intensive site conditioning or amelioration. The capability classification groups individual soil types (soil mapping units) into groups of similar soils (capability units or classes) based on the criteria for the eight capability classes. Land with higher LCC typically has lower crop production input costs, producing higher yields than land with lower LCC (Singer, 2006). The LCC system thus provides an economic estimation of the soil agricultural capability (or potential). The soil agricultural potential for this study was determined based on the LCC, by assigning qualitative criteria ratings such as high, moderate, moderate to low (Table 5) to the land capability classes.

Table 5: Criteria for agricultural potential classification.

LCC	Soil Agricultural Potential
I – III	High
V – VI	Moderate
VII - VIII	Moderate to Low

6. BASELINE CONDITIONS AND DESCRIPTION OF AFFECTED ENVIRONMENT

This section of the report provides a description of the status of the environment in which the activities are planned. This ultimately provides a baseline context for the impact assessment of the proposed activities.

6.1 Current Land Use

The proposed prospecting project area falls within the Limpopo Province under the jurisdiction of the Blouberg Local Municipality, situated within the Capricorn District Municipality. The towns / villages of Ga-Ramela, Ngwanallela, Ga-Tshipana, Mokerong, Makobe, Ga-Mothapo, Mosehleng, Rora, Aurora, and Ga-Raweshe are located on, or near, the proposed application area (**Figure 1**). The study site and surrounding area is characterised by a mix of land uses, including natural veld, cultivation (subsistence farming and small-scale annual crops), degraded areas, and urban built-up areas (villages) (**Figure 5**).

6.2 Climatic Conditions

The proposed prospecting project area is situated near Tibane, which is characterised by summer rainfall and very dry winters. The climate can generally be described as hot and dry. An overview of the key climatic characteristics of the region is provided in **Table 6** below.

Table 6: Key climatic aspects of the region (Climate-data.org).

Aspect	Description
Mean Annual Precipitation (mm):	400 - 550 mm
Mean Maximum Annual Temperature (°C):	37°C
Frost:	Frequent

According to the Department of Agriculture in co-operation with ARC-Grain Crops Institute, 350 to 450 mm of rain per annum is required for successful maize production. The project area is very marginal for rain-fed maize production with its average annual rainfall of 415 mm.

6.3 Land Types

The proposed prospecting application area traverses through five (5) land types i.e., Land Type Ae334, Land Type Ae335, Land Type Bd51, Land Type Ia169 and Land Type Fc731. Each of the Land Types are described below:

6.3.1 Land Type Ae334

Land Type Ae334 has three (3) different terrain positions (**Table 7**). The underlying geology is described as Sand of the Quaternary System.

Table 7: Land Type Ae334 Data.

Climate Zone	2275S										
Map Occurrence	2328 Pietersburg (58413 ha)										
Area	58413 ha										
Estimated area unavailable for agriculture	8000 ha										
Terrain Type	A1										
Terrain Unit	1			4			5				
% of land type:	10			80			10				
Area:	5841			46730			5841				
Slope:	1 – 3			1 - 3			1 – 3				
Slope length:	100 - 300			500 - 3000			100 - 300				
Slope shape:	Y			Z-X			X				
MB0, MB1 (ha):	5549			46730			5549				
MB2 - MB4 (ha):	292			0			292				
Soil series or land classes	Depth (mm)	MB	ha	%	ha	%	ha	%	Total ha	Total %	
Rock		4	292	5			292	5	584	1.0	
Zwartfontein Hu34, Portsmouth Hu35	>1200	0	1168	20	37384	80	1168	20	39721	68.0	
Portsmouth Hu35, Zwartfontein Hu34	400-600	0	2920	50	4673	10	1168	20	8762	15.0	
Shorrocks Hu36, Blinkklip Cv36	600-900	0	292	5	2336	5	1752	30	4381	7.5	
Platt Gs14, Glenrosa Gs15, Mispah Ms10	300-400	1	1168	20	2336	5			3505	6.0	
Leeufontein Oa16, Letaba Oa26, Herschel Va30	>900	0					1460	25	1460	2.5	



Figure 6: Terrain form sketch of Land Type Ae334.

6.3.2 Land Type Ae335

Land Type Ae335 has three (3) different terrain positions (Table 8). The underlying geology is described as Medium-grained, yellowish, laminated sandstone of the Makgabeng Formation of the Waterberg Group, also sand of the Quaternary System.

Table 8: Land Type Ae335 Data.

Climate Zone	2275S										
Map Occurrence	2328 Pietersburg (128224 ha)										
Area	128224 ha										
Estimated area unavailable for agriculture	1279 ha										
Terrain Type	A2										
Terrain Unit	1			4			5				
% of land type:	25			60			15				
Area:	32056			76934			19234				
Slope:	1 – 5			1 – 5			1 – 5				
Slope length:	50 - 300			200 - 1000			50 - 150				
Slope shape:	Y			X-Z			X				
MB0, MB1 (ha):	22439			69241			16349				
MB2 - MB4 (ha):	9617			7693			2885				
Soil series or land classes	Depth (mm)	MB	ha	%	ha	%	ha	%	Total ha	Total %	
Rock		4	9617	30	7693	10	962	5	18272	14.3	
Portsmouth Hu35, Zwartfontein Hu34	>1200	0	6411	20	38467	50	3847	20	48725	38.0	
Shorrocks Hu36, Portsmouth Hu35, Zwartfontein Hu34, Blinkklip Cv36	400-600	1	12822	40	23080	30	1923	10	37826	29.5	
Platt Gs14, Glenrosa Gs15, Williamson Gs16	200-400	1	3206	10	7693	10	1923	10	12822	10.0	
Herschel Va30, Arniston Va31, Valsrivier Va40	>900	0					5770	30	5770	4.5	

Dudfield Cv46, Limpopo									
Oa46, Leeufontein Oa16, Letaba Oa26	>1000	0			2885	15	2885	2.3	
Stream beds		4			1923	10	1923	1.5	

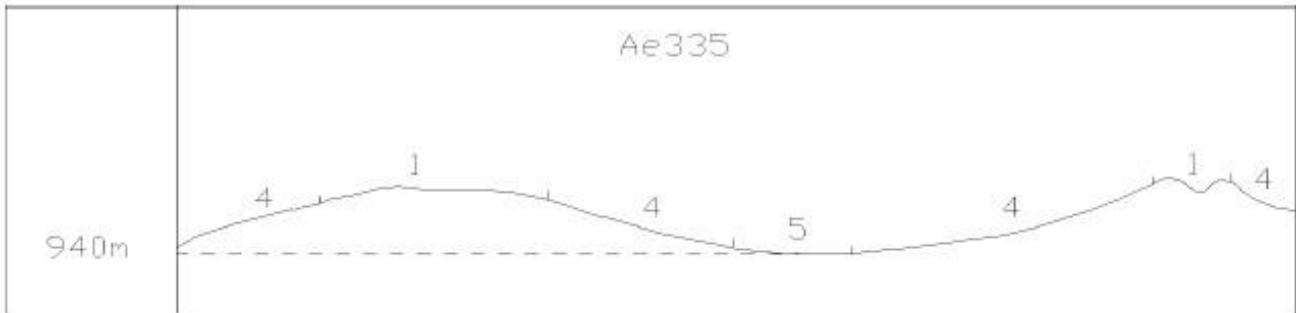


Figure 7: Terrain form sketch of Land Type Ae335.

6.3.3 Land Type Bd51

Land Type Bd51 has three (3) different terrain positions (**Table 9**). The underlying geology is described as Leucocratic migmatite and gneiss, grey and pink hornblende-biotite gneiss, grey biotite gneiss; minor muscovite-bearing granite, pegmatite and gneiss of the Hout River Gneiss. Also sand and alluvium of the Quaternary System.

Table 9: Land Type Bd51 Data.

Climate Zone	2275S										
Map Occurrence	2328 Pietersburg (316053 ha)										
Area	316053 ha										
Estimated area unavailable for agriculture	3150 ha										
Terrain Type	A2										
Terrain Unit	1			4			5				
% of land type:	20			60			20				
Area:	63211			189632			63211				
Slope:	0 – 2			0 – 2			0 – 2				
Slope length:	200 - 500			400 - 3000			200 - 500				
Slope shape:	Y-Z			X-Z			X				
MB0, MB1 (ha):	41719			161187			56890				
MB2 - MB4 (ha):	21492			28445			6321				
Soil series or land classes	Depth (mm)	MB	ha	%	ha	%	ha	%	Total ha	Total %	
Rock		4	2528	4	5689	3	3161	5	11378	3.6	

Shorrock Hu36, Blinkklip Cv36	400-900	1	22124	35	28445	15	3161	5	53729	17.0
Soetmelk Av36	700-950	0			24652	13	17067	27	41719	13.2
Zwartfontein Hu34, Portsmouth Hu35	350-600	0	6321	10	28445	15			34766	11.0
Makuya Cv34, Denhere Cv35, Torquay Cv44	300-700	1	6321	10	24652	13	3161	5	34134	10.8
Platt Gs14, Glenrosa Gs15, Trevanian Gs17	200-350	3	11378	18	18963	10			30341	9.6
Leksand Av24, Heidelberg Av34, Kareekuul Bv34	500-1000	0			11378	6	6321	10	17699	5.6
Mkambati Kd14, Chitsa Lo32, Winterton Lo13, Wesselsnek Gc25	200-1100	0	3161	5	9482	5	3161	5	15803	5.0
Jozini Oa36, Limpopo Oa46	500-1200	0			5689	3	9482	15	15171	4.8
Mispah Ms10, Loskop Ms12, Kalkbank Ms22	100-400	3	7585	12	3793	2	3161	5	14538	4.6
Lonetree Bv26, Wedgewood Bv35, Bainsvlei Bv36	400-750	0			9482	5	2528	4	12010	3.8
Avalon Av26, Klerksdorp Pn36	700-900	0			7585	4	3161	5	10746	3.4
Paddock We31, Davel We32	200-400	0	1896	3	3793	2	3161	5	8849	2.8
Dudfield Cv46	400-700	0	1896	3	1896	1	3793	6	7585	2.4
Windmeul Av35	400-500	0			1896	1	1896	3	3793	1.2
Shigalo Hu46	700-1200	0			3793	2			3793	1.2

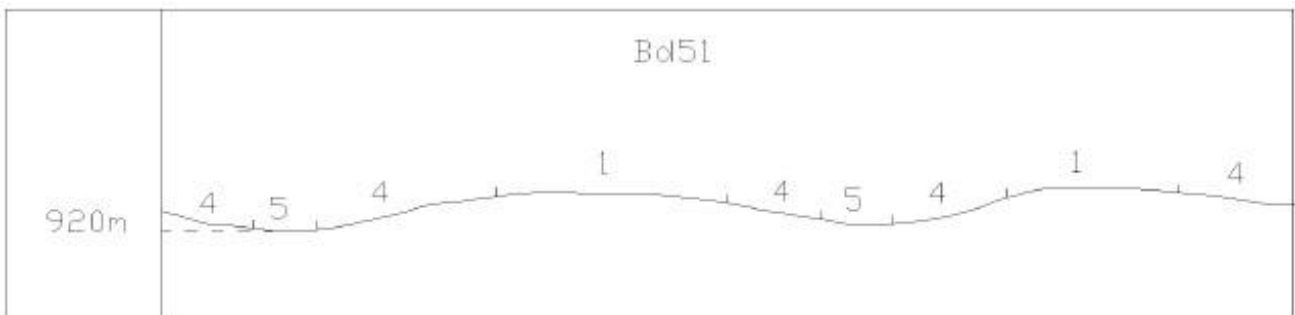


Figure 8: Terrain form sketch of Land Type Bd51.

6.3.4 Land Type Ia169

Land Type Ia169 has two (2) different terrain positions (**Table 10**). The underlying geology is described as sand alluvium and calcrete of the Quaternary System.

Table 10: Land Type la169 Data.

Climate Zone	1835S							
Map Occurrence	2328 Pietersburg (12572 ha)							
Area	12572 ha							
Estimated area unavailable for agriculture	100 ha							
Terrain Type	A2							
Terrain Unit	4	5						
% of land type:	60	40						
Area:	7543	5029						
Slope:	1 – 4	1 – 4						
Slope length:	100 - 800	100 - 300						
Slope shape:	X-Z	X						
MB0, MB1 (ha):	7543	4274						
MB2 - MB4 (ha):	0	754						
Soil series or land classes	Depth (mm)	MB	ha	%	ha	%	Total ha	Total %
Jozini Oa36, Limpopo Oa46, Dundee Du10, Calueque Oa45	900-1200	0	2263	30	1257	25	3520	28.0
Letaba Oa26, Shigalo Hu46, Shorrocks Hu36, Portsmouth Hu35, Blinkklip Cv36	900-1200	0	1509	20	754	15	2263	18.0
Mutale Oa47, Arniston Va31, Lindley Va41, Glengazi Bo31, Inhoek Ik20	>1200	0	1131	15	754	15	1886	15.0
Vaalrivier Oa33, Levubu Oa34, Sandspruit Cv31, Dundee Du10	>1200	0	754	10	503	10	1257	10.0
Zuiderzee Va20, Sunnyside Va10	>1200	0	754	10	503	10	1257	10.0
Arcadia Ar40, Antioch Ss27, Willowbrook Wo11	>1200	0	377	5	503	10	880	7.0
Lomondo Gs25, Lekfontein Gs26, Kalkbank Ms22	300-500	0	754	10			754	6.0
Stream beds		4			754	15	754	6.0

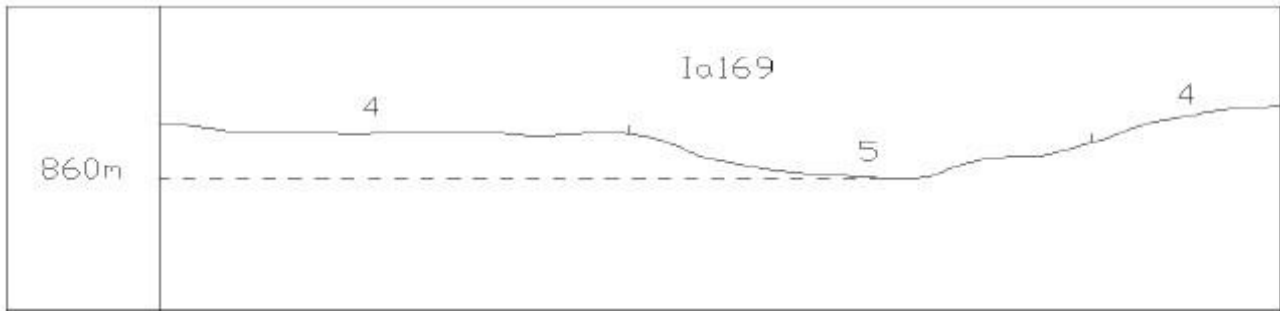


Figure 9: Terrain form sketch of Land Type Ia169.

6.3.5 Land Type Fc731

Land Type Fc731 has three (3) different terrain positions (**Table 11**). The underlying geology is described as alluvium, sand and calcrete of the Quaternary System.

Table 11: Land Type Fc731 Data.

Climate Zone	2275S										
Map Occurrence	2328 Pietersburg (17511 ha)										
Area	17511 ha										
Estimated area unavailable for agriculture	174 ha										
Terrain Type	A3										
Terrain Unit	1			4			5				
% of land type:	15			50			35				
Area:	2627			8756			6129				
Slope:	1 – 3			1 – 3			1 – 5				
Slope length:	10 - 50			100 - 300			50 - 100				
Slope shape:	Y			X-Z			X-Z				
MB0, MB1 (ha):	1051			6567			4597				
MB2 - MB4 (ha):	1576			2189			1532				
Soil series or land classes	Depth (mm)	MB	ha	%	ha	%	ha	%	Total ha	Total %	
Rock		4	263	10	438	5	306	5	1007	5.8	
Dudfield Cv46, Skipskop Cv45	400-700	0	788	30	2627	30	1226	20	4640	26.5	
Letaba Oa26, Shigalo Hu46, Shorrocks Hu36	600-1200	0	263	10	2627	30	1226	20	4115	23.5	
Lomondo Gs25, Lekfontein Gs26, Kalkbank Ms22	100-300	3	1314	50	1751	20	613	10	3677	21.0	
Limpopo Oa46, Calueque Oa45, Jozini Oa36, Dundee Du10	>900	0			876	10	1226	20	2101	12.0	

Valsrivier Va40, Lindley									
Va41, Weenen Bo40, Inhoek Ik20	>1200	0	438	5	919	15	1357	7.8	
Stream beds		4			613	10	613	3.5	

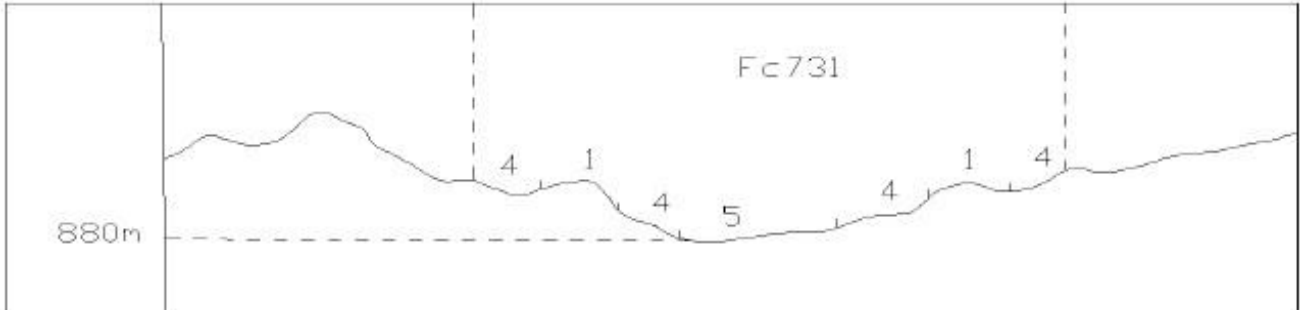


Figure 10: Terrain form sketch of Land Type Fc731.

6.4 SOTER Soil-Terrain Information

According to the Soil and Terrain (SOTER) Landform database, the proposed prospecting right area is situated on two landform types, namely LP3 type landform on the southern section of the site, with the LV3 type landform forming most of the site (**Figure 12**). The LP3 type landform refers to level land, plain at a medium level. The LV3 type landform refers to level land, valley at a medium level. With reference to SOTER Generalised Soil Patterns associated with the area, the proposed prospecting project application area consists of three soil patterns (**Figure 13**). Most of the northern half of the study site consists of red-yellow, well drained soils, soils with a high base status. Soils with limited pedological development occurs in the southern section; these soils are usually shallow, on hard or weathering rock. Lime is generally present in the landscape. The remaining sections are classed as soils with a plinthic horizon; these are red, yellow and / or greyish soils with a high base status. As small section on the northwest border is classed as sandy soils with no profile development.

The SOTER Soil Association map categorises the proposed prospecting project application area as either an “A4” type landscape in the northern and southern sections and as “E1” type landscape in the central south section (**Figure 14**). “E1” is characterised by “Soils with minimal development, usually shallow on hard or weathering rock, with or without intermittent diverse soils. (Association of Leptosols, Regosols, Calcisols and Durisols. In addition one or more of Cambisols, Luvisols)”. “A4” type landscape is characterised by “Red, massive or weakly structured soils with high base status (association of well drained Lixisols, Cambisols and Luvisols)”. The dominant soil types, according to the SOTER database, are Ferric Luvisols (LVf) in the northern half and most southern section and Calcic Solonchaks (Sck) in the southern central half of the proposed prospecting project application area (**Figure 15**).

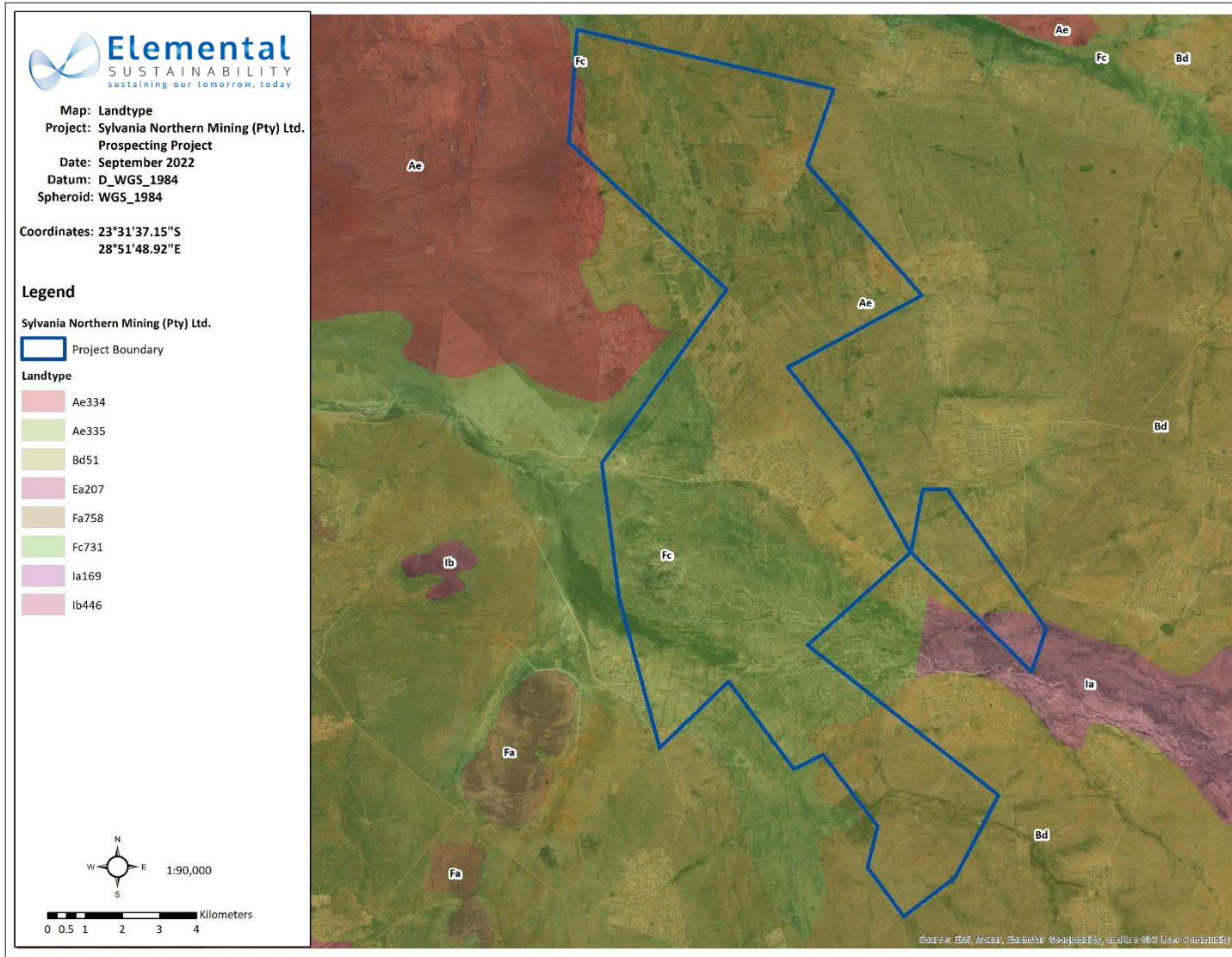


Figure 11: Land Types associated with the proposed prospecting project application area.

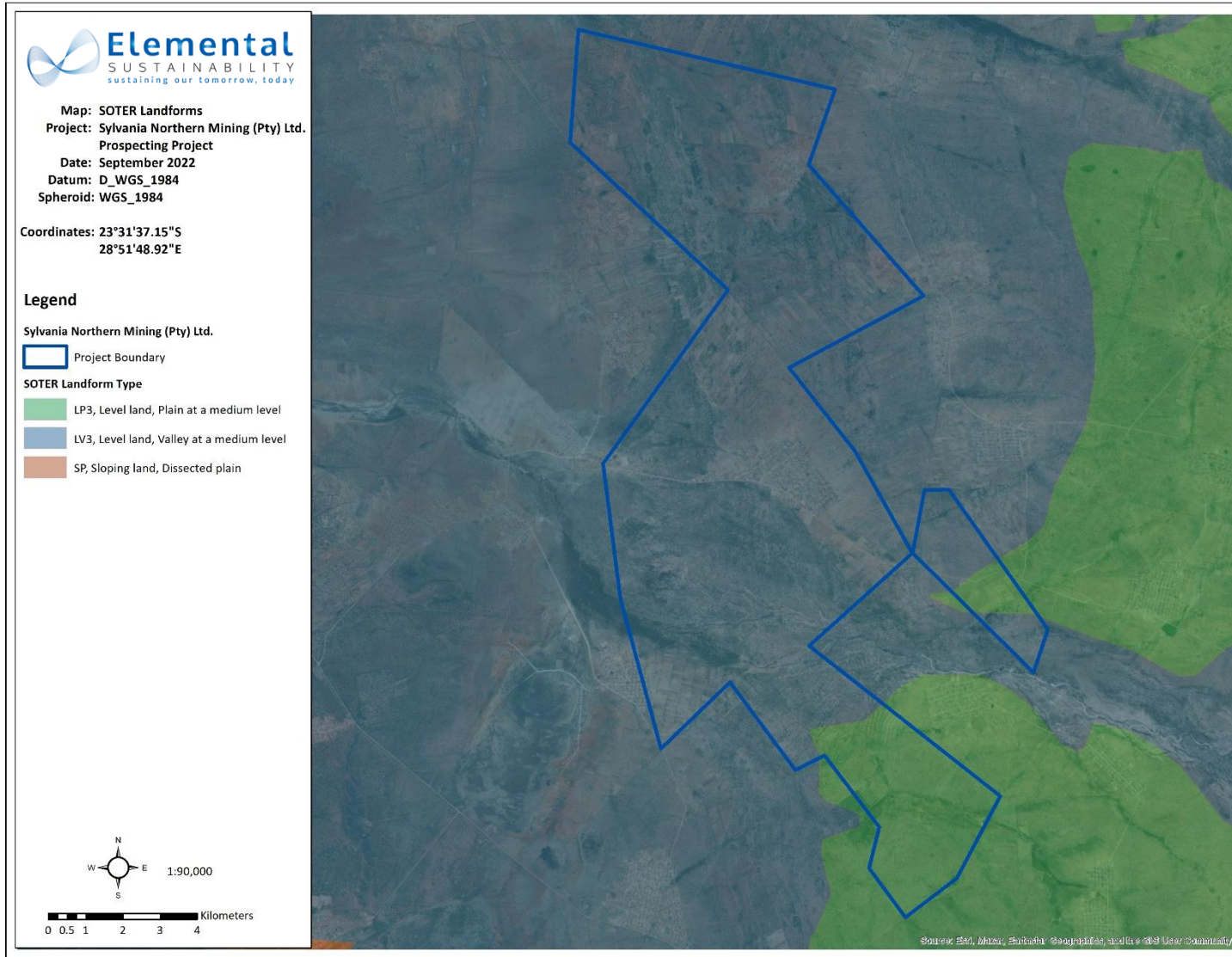


Figure 12: SOTER Landform associated with the proposed prospecting project application area.

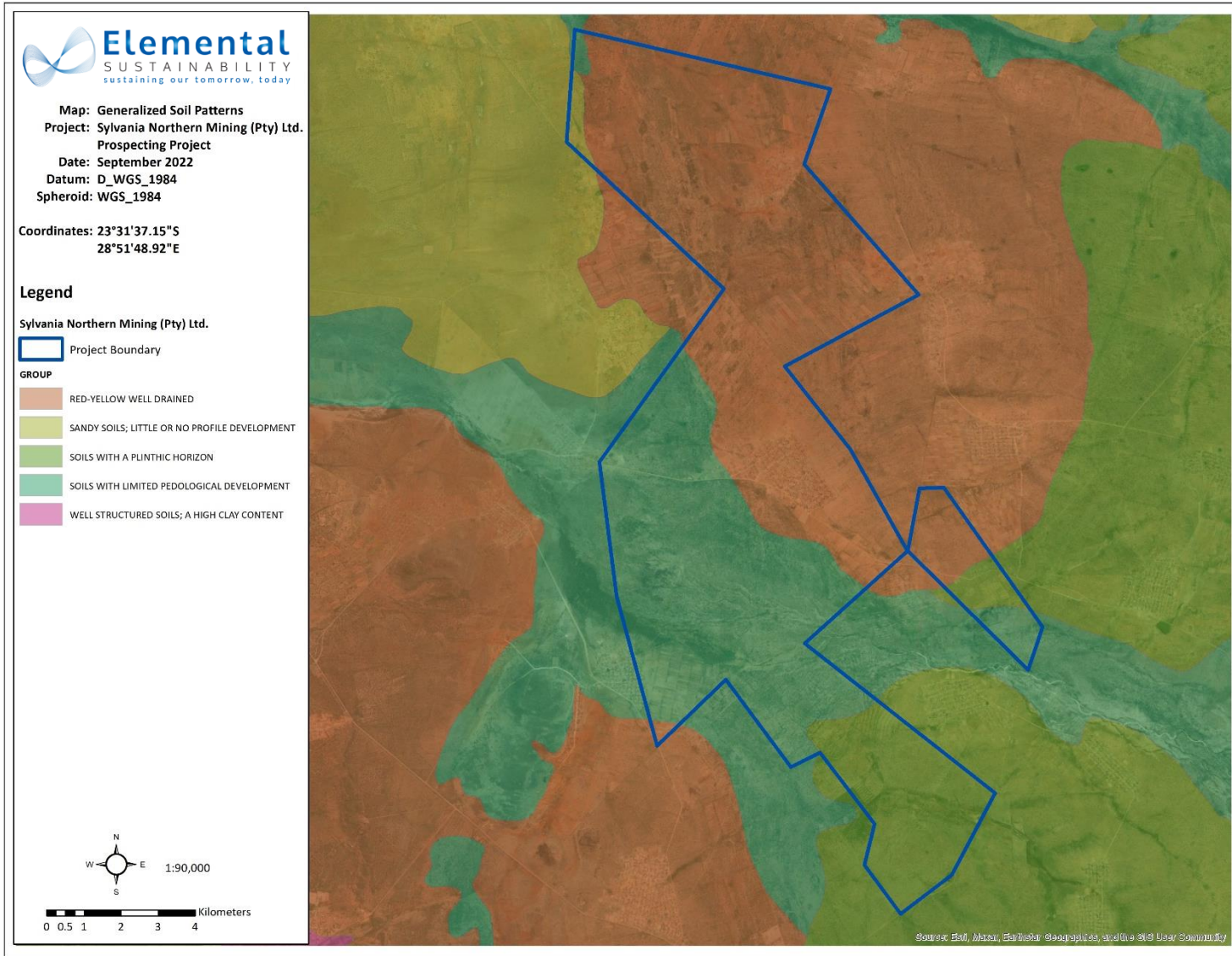


Figure 13: Generalised Soil Patterns associated with the proposed prospecting project application area.

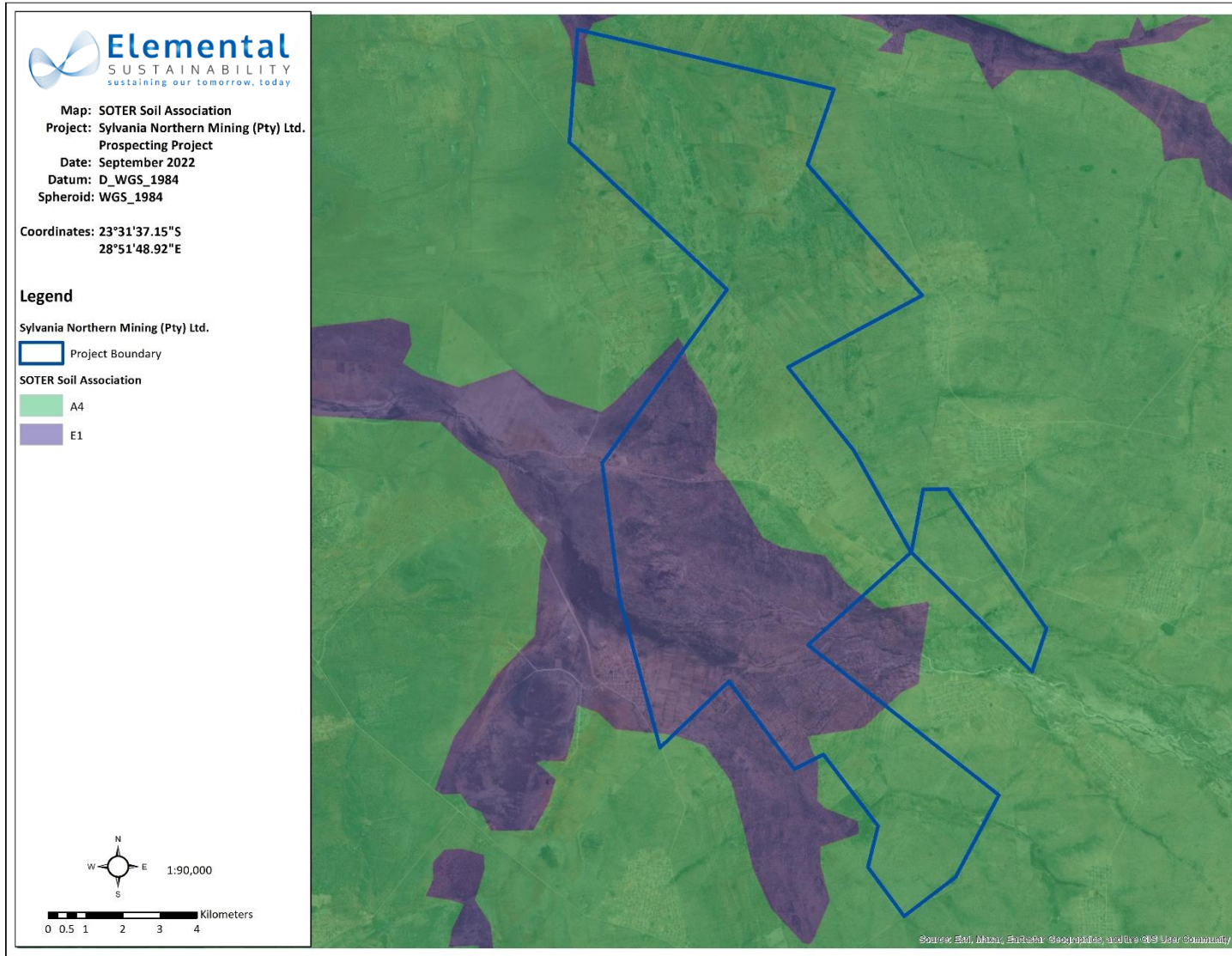


Figure 14: SOTER Soil Association map of the proposed prospecting project application area.

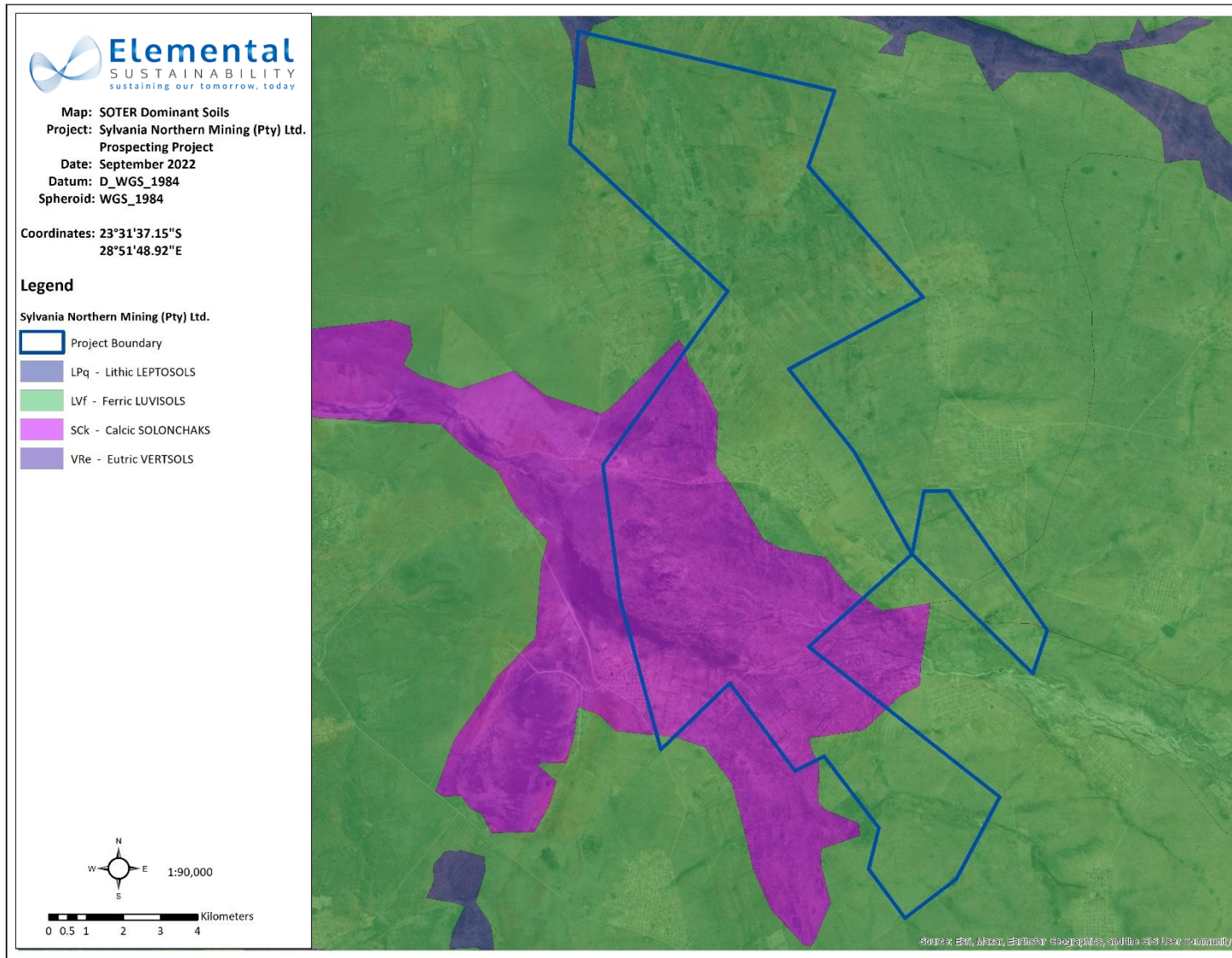


Figure 15: Dominant SOTER Soils associated with the proposed prospecting project application area.

6.5 Land Capability Classification and Agricultural Potential

Land capability can be defined as “the extent to which land can meet the needs of one or more uses under defined conditions of management” (Schoeman, 2002). The land capability of an area is the combination of the inherent soil properties and the climatic conditions as well as other landscape properties such as slope and drainage patterns that may inhibit agricultural land use or result in the development of specific land functionality such as wetlands.

The National Land Capability Classification was undertaken at a national scale, using the land type data on a scale of 1:250 000 (DAFF, 2017). Classes 1 to 7 are of very low land capability making it only suitable for wilderness and grazing with a variety of management measures. Classes 8 to 15 are considered to have arable land capability with the potential for high yields increasing with the number of the land capability class.

The distribution of the various land capability classes for the proposed application area, as defined in the National Land Capability for South Africa, is presented in **Figure 16**. The area proposed for prospecting is mostly classed as 06. Low-Moderate to 08. Moderate according to the National Land Capability Assessment (DAFF, 2017), with a small section of the Farm Schaffhausen 689 LR being classed as 09. Moderate-High/10. Moderate-High.

However, in accordance with Scotney *et al.*'s (1987) 8 classes, the proposed prospecting area has a Land Capability Class of 4 (IV) in the northern half and most southern section (**Figure 17**). This means that the land is classed as Arable but has severe limitations (**Section 6.5.1**). These areas are suitable for the following: Wildlife (W), Forestry (F), Light Grazing (LG), Moderate Grazing (MG), Intensive Grazing (IG), and Light Cultivation (LC) (Refer to **Table 1**). A Land Capability Class of 5 (V) is present in the southern central areas. This means that the land is classed as Grazing but has wetness limitations (**Section 6.5.2**).

6.5.1 Class IV: Arable

Land in Class IV has very severe limitations that restrict the choice of plants, require very careful management, or both. It may be used for cultivated crops, but more careful management is required than for Class III and conservation practices are more difficult to apply and maintain. Restrictions to land use are greater than those in Class III and the choice of plants is more limited. It may be well suited to only two or three of the common crops or the harvest produced may be low in relation to inputs over long period of time. In sub-humid and semiarid areas, land in Class IV may produce good yields of adapted cultivated crops during years of above average rainfall and failures during years of below average rainfall. Use for cultivated crops is limited because of the effects of one or more permanent features such as:

- Steep slopes
- Severe susceptibility to water or wind erosion or severe effects of past erosion
- Shallow soils
- Low water-holding capacity
- Frequent flooding accompanied by severe crop damage
- Excessive wetness with continuing hazard of waterlogging after drainage
- Severe salinity or sodicity

- Moderately adverse climate

6.5.2 Class V: Grazing

Land in Class V has little or no erosion hazard but have other limitations impractical to remove, that limit its use largely to pasture, range, woodland or wildlife food and cover. These limitations restrict the kind of plants that can be grown and prevent normal tillage of cultivated crops. Pastures can be improved and benefits from proper management can be expected. It is nearly level. Some occurrences are wet or frequently flooded. Other are stony, have climatic limitations, or have some combination of these limitations. Examples of Class V are:

- Bottomlands subject to frequent flooding that prevents the normal production of cultivated crops.
- Nearly level land with a growing season that prevents the normal production of cultivated crops.
- Level or nearly level stony or rocky land.
- Pondered areas where drainage for cultivated crops is not feasible but which are suitable for grasses or trees.

6.6 Agricultural Sensitivity

In accordance with the Land Capability Classification (LCC), **Figure 18** indicates that the areas where the proposed prospecting activities are to take place is situated in areas of Medium Agricultural Sensitivity and overlaps with areas of High Field Crop Sensitivity for Subsistence Farming (**Figure 19**).

Considering all the baseline properties of the soils, and the weather conditions of the region, the areas proposed for the prospecting application is suitable for small-scale and subsistence dry land agriculture and impacts are expected to be moderate. These baseline land capabilities are also used as a benchmark for rehabilitation, and thus the area can be returned to Class 4 (IV) and 5 (V) during project decommissioning and rehabilitation if effective mitigation is applied. The proposed activities may impact on the subsistence farming, as it overlaps with suitable areas.

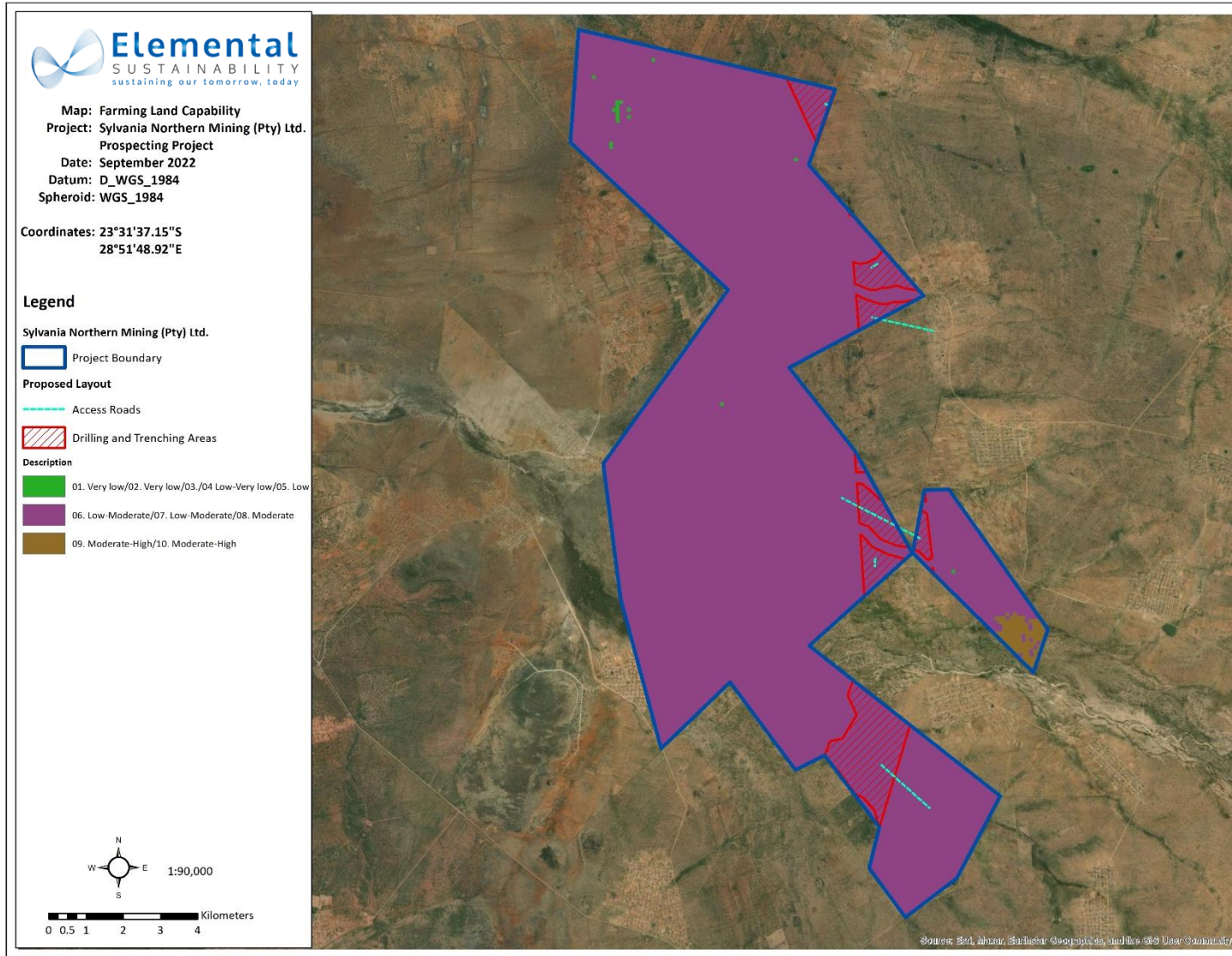


Figure 16: Farming Land Capability of the proposed prospecting project application area (DEA – Screening Tool).

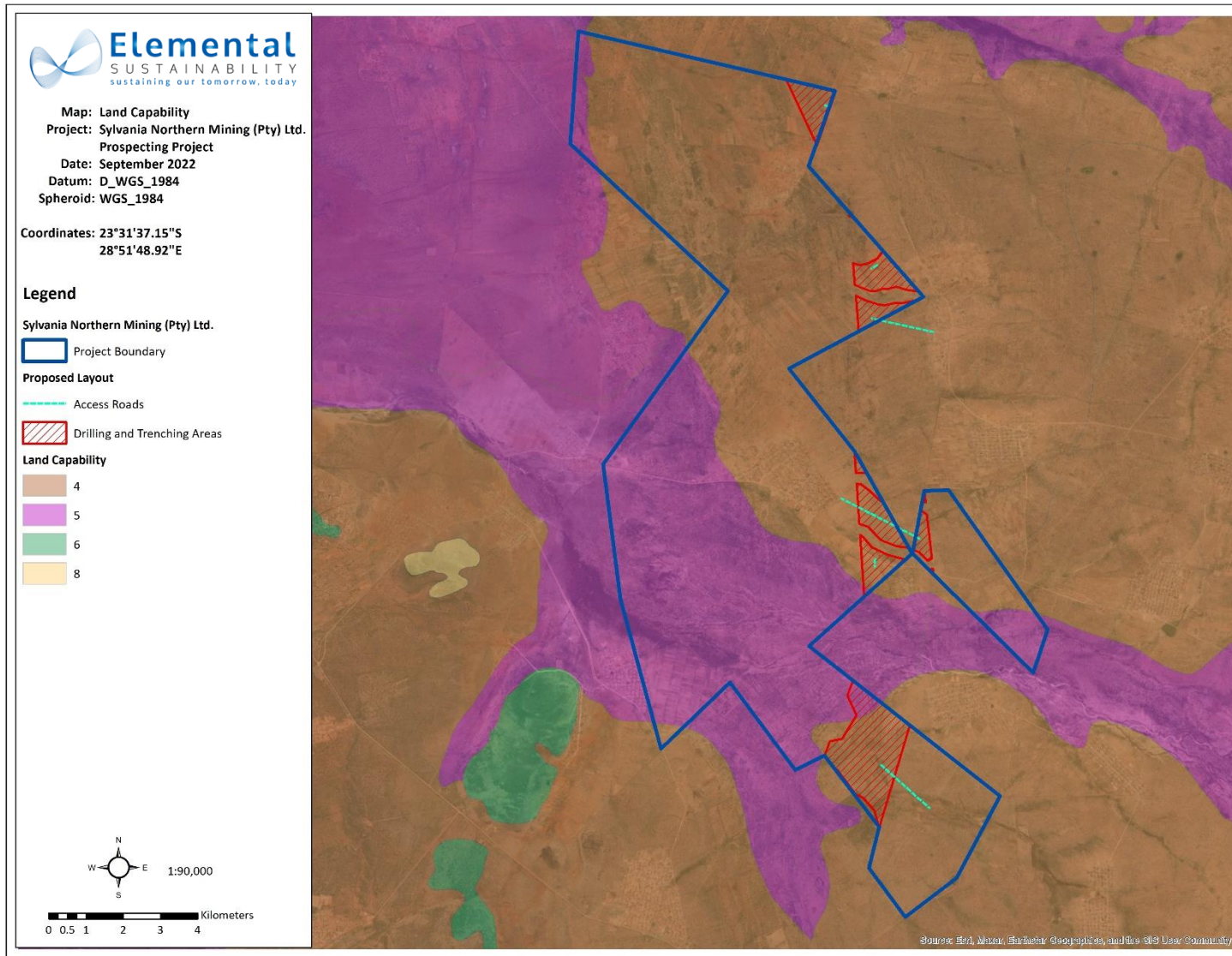


Figure 17: Land Capability of the area according to Scotney *et al.* (1987).

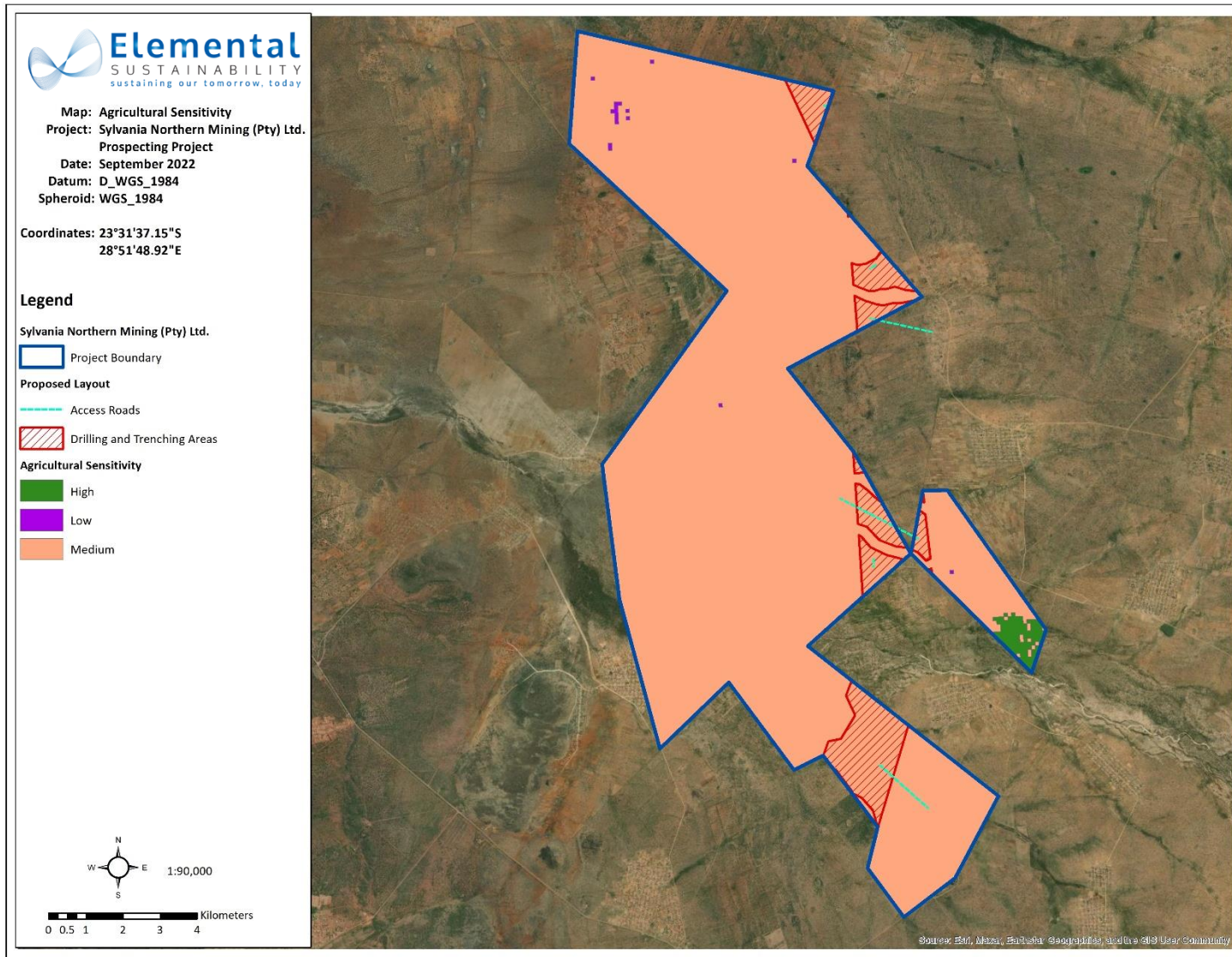


Figure 18: Agricultural sensitivity of the proposed prospecting project application area (DEA – Screening Tool).

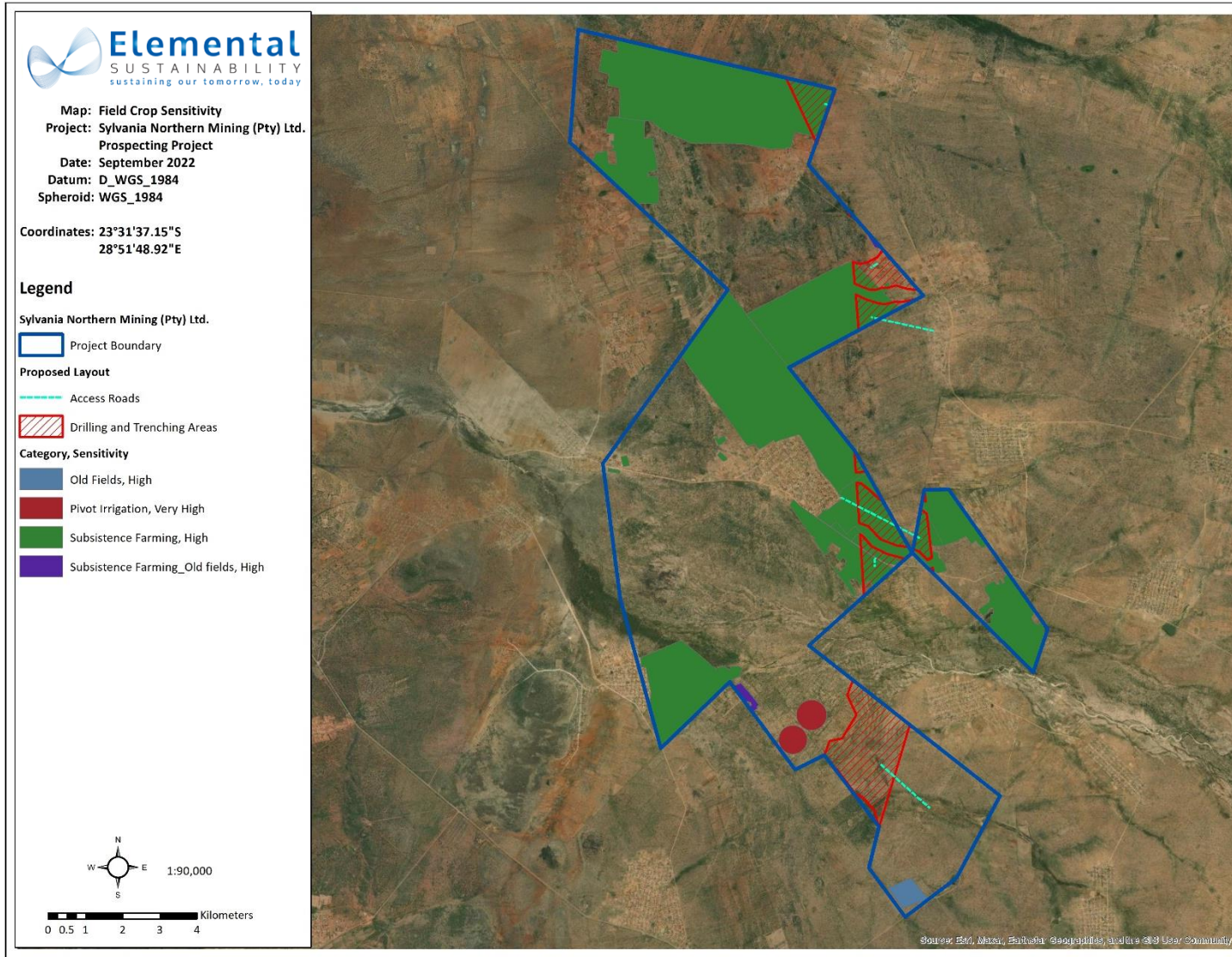


Figure 19: Crop Fields sensitivity of the proposed prospecting project application area (DEA – Screening Tool).

6.7 No-Go Areas

Any Pivot Irrigation (Very High) agricultural area should be considered as no-go areas and no prospecting activities should take place in these areas. No other areas have been identified within the application area that can be classified as no-go areas based on the sensitivity of the soils or agricultural potential.

This report is only a desktop assessment and do not take irrigation areas not indicated into consideration. This report does not take any heritage areas, river systems, drainage lines into or sensitive mountains areas into consideration and the no-go areas or buffer zones from the other specialist studies (i.e., Heritage, Wetland, River assessment) should be taken into consideration.

7. POTENTIAL IMPACT OF THE PROPOSED PROSPECTING ACTIVITIES

The major impact associated with proposed drilling and trenching activities is the disturbance of the naturally occurring soil profiles consisting of soil horizons and will impact the current soil hydrological properties and functionality of soil. Three phases of the project were assessed and consisted of the following:

- Site Establishment Phase – Preparation
- Operational Phase – Invasive Prospecting
- Decommissioning Phase - Rehabilitation

Table 12: Identified activities for the different phases of prospecting.

Project Phases	Activities to Impact
Site Establishment Phase – Preparation	Vegetation Clearance Establishing access routes to sample sites Establishing the sampling camp (stores, ablution, security)
Operational Phase – Invasive Prospecting	Drilling of exploration boreholes Excavation of trenches Rehabilitation and re-vegetation
Decommissioning Phase - Rehabilitation	Rehabilitation Re-vegetation

The main impacts associated with the proposed prospecting activities include the following:

- Soil compaction and topsoil loss leading to reduced fertility.
- The change of land use from natural vegetation (Alteration of the land and its capacity to support current land uses). This includes loss of agricultural soil and loss of grazing land, which could lead to a loss of food production and impact on food security.
- Soil pollution from hydrocarbon spills and contamination of soils by use of dirty water for road wetting (dust suppression).
- Soil erosion due to slope and vegetation clearance.
- Decline in organic matter content and biological activity.

Limited impacts are expected outside of the proposed application area, with the exception along unpaved roads within the region, where erosion can impact on adjacent areas.

8. IMPACT ASSESSMENT

8.1 Impact Assessment Methodology

The methodology utilised to determine the risk of the activities to the environment is explained below.

8.1.1 Assessment Criteria

The criteria for the description and assessment of environmental impacts were drawn from the EIA Guidelines, National Environmental Management Act (Act No. 107 of 1998): EIA Regulations (2014) and as amended from time to time. The level of detail as depicted in the EIA Guidelines was fine-tuned by assigning specific values to each impact. To establish a coherent framework within which all impacts could be objectively assessed, it was necessary to establish a rating system, which was applied consistently to all the criteria. For such purposes, each aspect was assigned a value, ranging from one (1) to five (5), depending on its definition. This assessment is a relative evaluation within the context of all the activities and the other impacts within the framework of the project. An explanation of the impact assessment criteria is defined below.

Table 13: Impact Assessment Criteria

EXTENT	
Classification of the physical and spatial scale of the impact	
Footprint	The impacted area extends only as far as the activity, such as footprint occurring within the total site area.
Site	The impact could affect the whole, or a significant portion of the site.
Regional	The impact could affect the area including the neighbouring farms, the transport routes and the adjoining towns.
National	The impact could have an effect that expands throughout the country (South Africa).
International	Where the impact has international ramifications that extend beyond the boundaries of South Africa.
DURATION	
The lifetime of the impact that is measured in relation to the lifetime of the proposed development.	
Short term	The impact will either disappear with mitigation or will be mitigated through a natural process in a period shorter than that of the construction phase.
Short to Medium term	The impact will be relevant through to the end of a construction phase (1.5 years).
Medium term	The impact will last up to the end of the development phases, where after it will be entirely negated.
Long term	The impact will continue or last for the entire operational lifetime i.e. exceed 30 years of the development, but will be mitigated by direct human action or by natural processes thereafter.
Permanent	This is the only class of impact, which will be non-transitory. Mitigation either by man or natural process will not occur in such a way or in such a time span that the impact can be considered transient.
INTENSITY	
The intensity of the impact is considered by examining whether the impact is destructive or benign, whether it destroys the impacted environment, alters its functioning, or slightly alters the environment itself. The intensity is rated as	
Low	The impact alters the affected environment in such a way that the natural processes or functions are not affected.
Medium	The affected environment is altered, but functions and processes continue, albeit in a modified way.
High	Function or process of the affected environment is disturbed to the extent where it temporarily or permanently ceases.

PROBABILITY	
This describes the likelihood of the impacts actually occurring. The impact may occur for any length of time during the life cycle of the activity, and not at any given time. The classes are rated as follows:	
Improbable	The possibility of the impact occurring is none, due either to the circumstances, design or experience. The chance of this impact occurring is zero (0 %).
Possible	The possibility of the impact occurring is very low, due either to the circumstances, design or experience. The chances of this impact occurring is defined as 25 %.
Likely	There is a possibility that the impact will occur to the extent that provisions must therefore be made. The chances of this impact occurring is defined as 50 %.
Highly Likely	It is most likely that the impacts will occur at some stage of the development. Plans must be drawn up before carrying out the activity. The chances of this impact occurring is defined as 75 %.
Definite	The impact will take place regardless of any prevention plans, and only mitigation actions or contingency plans to contain the effect can be relied on. The chance of this impact occurring is defined as 100 %.

The status of the impacts and degree of confidence with respect to the assessment of the significance must be stated as follows:

- **Status of the impact:** A description as to whether the impact would be positive (a benefit), negative (a cost), or neutral.
- **Degree of confidence in predictions:** The degree of confidence in the predictions, based on the availability of information and specialist knowledge.

Other aspects to take into consideration in the specialist studies are:

- Impacts should be described both before and after the proposed mitigation and management measures have been implemented.
- All impacts should be evaluated for the full lifecycle of the proposed development, including construction, operation, and decommissioning.
- The impact evaluation should take into consideration the cumulative effects associated with this and other facilities which are either developed or in the process of being developed in the region.
- The specialist studies must attempt to quantify the magnitude of potential impacts (direct and cumulative effects) and outline the rationale used. Where appropriate, national standards are to be used as a measure of the level of impact.

8.1.2 Mitigation

The impacts that are generated by the development can be minimised if measures are implemented to reduce the impacts. The mitigation measures ensure that the development considers the environment and the predicted impacts to minimise impacts and achieve sustainable development.

8.1.2.1 Determination of Significance-Without Mitigation

Significance is determined through a synthesis of impact characteristics as described in the above paragraphs. It provides an indication of the importance of the impact in terms of both tangible and intangible characteristics. The significance of the impact “without mitigation” is the prime determinant of the nature and degree of mitigation required. Where the impact is positive, significance is noted as “positive”. Significance is rated on the following scale:

Table 14: Significance-Without Mitigation

NO SIGNIFICANCE	The impact is not substantial and does not require any mitigation action.
LOW	The impact is of little importance but may require limited mitigation.
MEDIUM	The impact is of importance and is therefore considered to have a negative impact. Mitigation is required to reduce the negative impacts to acceptable levels.
HIGH	The impact is of major importance. Failure to mitigate, with the objective of reducing the impact to acceptable levels, could render the entire development option or entire project proposal unacceptable. Mitigation is therefore essential.

8.1.2.2 Determination of Significance- With Mitigation

Determination of significance refers to the foreseeable significance of the impact after the successful implementation of the necessary mitigation measures. Significance with mitigation is rated on the following scale:

Table 15: Significance- With Mitigation

NO SIGNIFICANCE	The impact will be mitigated to the point where it is regarded as insubstantial.
LOW	The impact will be mitigated to the point where it is of limited importance.
LOW TO MEDIUM	The impact is of importance, however, through the implementation of the correct mitigation measures such potential impacts can be reduced to acceptable levels.
MEDIUM	Notwithstanding the successful implementation of the mitigation measures, to reduce the negative impacts to acceptable levels, the negative impact will remain of significance. However, taken within the overall context of the project, the persistent impact does not constitute a fatal flaw.
MEDIUM TO HIGH	The impact is of major importance but through the implementation of the correct mitigation measures, the negative impacts will be reduced to acceptable levels.
HIGH	The impact is of major importance. Mitigation of the impact is not possible on a cost-effective basis. The impact is regarded as high importance and taken within the overall context of the project, is regarded as a fatal flaw. An impact regarded as high significance, after mitigation could render the entire development option or entire project proposal unacceptable.

8.1.3 Assessment Weighting

Each aspect within an impact description was assigned a series of quantitative criteria. Such criteria are likely to differ during the different stages of the project’s life cycle. To establish a defined base upon which it becomes feasible to make an informed decision, it was necessary to weigh and rank all the criteria.

8.1.3.1 Ranking, Weighting and Scaling

For each impact under scrutiny, a scaled weighting factor is attached to each respective impact (**Table 16**). The purpose of assigning weights serves to highlight those aspects considered the most critical to the various stakeholders and ensure that each specialist's element of bias is considered. The weighting factor also provides a means whereby the impact assessor can successfully deal with the complexities that exist between the different impacts and associated aspect criteria.

Simply, such a weighting factor is indicative of the importance of the impact in terms of the potential effect that it could have on the surrounding environment. Therefore, the aspects considered to have a relatively high value will score a relatively higher weighting than that which is of lower importance.

Table 16: Description of assessment parameters with its respective weighting

EXTENT		DURATION		INTENSITY		PROBABILITY		WEIGHTING FACTOR (WF)		SIGNIFICANCE RATING (SR)	
Footprint	1	Short term	1	Low	1	Probable	1	Low	1	Low	0-19
Site	2	Short to Medium	2			Possible	2	Low to Medium	2	Low to Medium	20-39
Regional	3	Medium term	3	Medium	3	Likely	3	Medium	3	Medium	40-59
National	4	Long term	4			Highly Likely	4	Medium to High	4	Medium to High	60-79
International	5	Permanent	5	High	5	Definite	5	High	5	High	80-100
MITIGATION EFFICIENCY (ME)						SIGNIFICANCE FOLLOWING MITIGATION (SFM)					
High		0.2		Low		0 - 19					
Medium to High		0.4		Low to Medium		20 - 39					
Medium		0.6		Medium		40 - 59					
Low to Medium		0.8		Medium to High		60 - 79					
Low		1.0		High		80 - 100					

8.1.3.2 Identifying the Potential Impacts Without Mitigation Measures (WOM)

Following the assignment of the necessary weights to the respective aspects, criteria are summed and multiplied by their assigned weightings, resulting in a value for each impact (prior to the implementation of mitigation measures).

Equation 1:

$$\text{Significance Rating (WOM)} = (\text{Extent} + \text{Intensity} + \text{Duration} + \text{Probability}) \times \text{Weighting Factor}$$

8.1.3.3 Identifying the Potential Impacts with Mitigation Measures (WM)

In order to gain a comprehensive understanding of the overall significance of the impact, after implementation of the mitigation measures, it was necessary to re-evaluate the impact.

8.1.3.4 Mitigation Efficiency (ME)

The most effective means of deriving a quantitative value of mitigated impacts is to assign each significance rating value (WOM) a mitigation efficiency (ME) rating. The allocation of such a rating is a measure of the efficiency and effectiveness, as identified through professional experience and empirical evidence of how effectively the proposed mitigation measures will manage the impact.

Thus, the lower the assigned value the greater the effectiveness of the proposed mitigation measures and subsequently, the lower the impacts with mitigation.

Equation 2:

$$\text{Significance Rating (WM)} = \text{Significance Rating (WOM)} \times \text{Mitigation Efficiency}$$

or $\text{WM} = \text{WOM} \times \text{ME}$

8.1.3.5 Significance Following Mitigation (SFM)

The significance of the impact after the mitigation measures are taken into consideration. The efficiency of the mitigation measure determines the significance of the impact. The level of impact is therefore seen in its entirety with all considerations taken into account.

8.2 Impact Assessment

The impact assessment as presented in **Table 17**, is aimed at assessing the impacts (as listed in Section 7) related to the various activities.

Table 17: Summary of the Impact Significance

Aspect	Potential Impact	Nature	Extent	Duration	Intensity	Probability	Weighting Factor	Significance	Mitigation measures	Mitigation Efficiency	Significance
								Pre-Mitigation			Post-Mitigation
Site Establishment - Preparation											
Soil stripping	Soil Erosion	Negative	1	2	1	2	2	12	<ul style="list-style-type: none"> Land clearance must only be undertaken within the prospecting footprint. Follow adequate soil stripping guidelines. Unnecessary land clearance must be avoided. Only the designated access routes are to be used. 	0,2	2,4
Vehicles driving on the soil surface	Compaction and loss of soil structure	Negative	1	2	1	2	3	18	<ul style="list-style-type: none"> The Stormwater Management measures to be implemented where required Any loss in production or agricultural potential to be compensated where applicable. 	0,2	3,6
Spillages of hydrocarbons	Soil pollution and contamination	Negative	1	2	1	2	3	18	<ul style="list-style-type: none"> Revegetate cleared areas as soon as possible after site establishment. Keep the project footprint as small as possible. 	0,2	3,6
Operational Phase											
Soil stripping	Soil Erosion	Negative	2	3	3	4	4	48	<ul style="list-style-type: none"> Current land use practices should not be impacted by proposed activities. All proposed activities must take place on the outer edges of current land use practices, 500 m from any wetlands and 100 m from any rivers or riparian habitats. Main mitigation of the expected impacts will consist of compensation to the 	0,4	19,2

Soil Stripping / Trenching and Drilling	Dilution of topsoil through mixing with subsoil; Loss of topsoil as a resource	Negative	2	4	2	3	3	33	farmer equivalent to the possible loss of agricultural income and food security.	0,4	13,2
Soil Stripping / Trenching and Drilling	Decline in organic matter & biological activity	Negative	2	3	2	3	4	40	<ul style="list-style-type: none"> Follow adequate stripping guidelines. Unnecessary land clearance must be avoided. Topsoil should be stripped by means of an excavator bucket and loaded onto dump trucks. If possible, topsoil should be stripped when soil is dry, as to reduce compaction. Ensure topsoil is stored in dedicated stockpiles, 5 m high and away from drainages lines and surface water. Soil stockpiles must be dampened with dust suppressant or equivalent. Soil stockpiles must be located away from any waterway or preferential water flow path in the landscape, to minimise soil erosion from these. 	0,4	16
Soil Stripping / Trenching and Drilling	Loss of water holding capacity	Negative	2	3	2	3	4	40	<ul style="list-style-type: none"> The Stormwater Management measures should provide for a drainage system sufficiently designed to prevent water run-off which will cause soil erosion. Revegetate cleared areas, which will not form part of operational areas, as soon as possible. 	0,4	16
Vehicles driving on the soil surface	Compaction and loss of soil structure	Negative	2	4	3	4	4	52	<ul style="list-style-type: none"> Only the designated access routes are to be used. Stockpiles are to be maintained in a fertile and erosion free state. High level maintenance must be undertaken on all vehicles and construction/maintenance machinery to prevent hydrocarbon spills. Spills of fuel and lubricants from vehicles and equipment must be 	0,6	31,2

Soil Stripping / Trenching and Drilling	Loss of land capability and land use	Negative	2	4	4	4	4	56	<ul style="list-style-type: none"> contained using a drip tray with plastic sheeting filled with adsorbent material. Spill kits should be available on site and should be serviced regularly. Waste disposal at the site and during operation must be avoided by separating, trucking out and recycling of waste. Potentially contaminating fluids and other wastes must be contained in containers stored on hard surface levels in bunded locations. 	0,8	44,8
Spills from vehicles, accidental spills of hazardous chemicals	Soil pollution and contamination	Negative	2	3	3	4	3	36	<ul style="list-style-type: none"> Accidental spillage of potentially contaminating liquids and solids must be cleaned up immediately by trained staff with the correct equipment and protocols. Concurrent rehabilitation and re-vegetation of the excavated areas should take place. 	0,2	7,2
Closure / Decommissioning Phase											
Stockpiling of Soil	Loss of Topsoil as a Resource: Compaction and Erosion	Negative	1	2	2	3	3	24	<ul style="list-style-type: none"> All trenches and drill sites must be backfilled and rehabilitated. Backfill should be done in such a manner that topsoil is not mixed with subsoil or material containing rocks. Deep rip compacted areas to allow for natural vegetation regrowth. Ensure proper storm water management designs are in place. Soils must be replaced according to the soil types. 	0,2	4,8
Backfilling of soil material layers	Loss of land capability	Negative	1	2	2	3	3	24	<ul style="list-style-type: none"> Compaction of the topsoil should be avoided. Post-closure monitoring and maintenance to be undertaken. Area to be rehabilitated, re-vegetated and soil amelioration to be undertaken. Contour slopes to minimise erosion and run-off. 	0,4	9,6

8.3 Cumulative Impacts

All no-go areas to be avoided to limit any impact on very high agricultural areas. The area is utilised for subsistence farming and grazing. The impact on the local food security on the areas where prospecting activities will take place, will be moderate as the capacity of the area to sustain large number of grazing animals is moderate and high for subsistence farming. With the expected soil degradation occurring and most areas proposed for prospecting overlapping with high subsistence farming potential, a decline in the overall soil quality and health is expected and may hinder the future land use for grazing and crop production on the areas where prospecting will take place.

Rehabilitation of disturbed areas aims to restore land capability. Soil quality deteriorates during stockpiling and replacement of the soil materials into soil profiles during rehabilitation cannot imitate natural soil quality properties. A change in land capability then forces a change in land use. Arable land capability changes to grazing land capability. The impact on soil is high because soil horizons are stripped and stockpiled for later use in rehabilitation or completely removed for analysis during prospecting. Soil fertility will be impacted because stripped soil horizons are usually thicker than the defined topsoil horizons. The impact is only expected on the areas where prospecting activities are proposed.

The cumulative impact on local land capability and land use is moderate on the areas where prospecting will take place and will have a possible impact on the local area as crop production land and grazing land may be lost, which will have a negative impact on food security. The main mitigation of the expected impacts will consist of compensation to the farmer equivalent to the possible loss of agricultural income and food security. This will be higher for trenching impacts than for drilling impacts.

9. COMMENTS AND RESPONSES

No comments have been received yet on the Desktop Soils, Land Use and Land Capability Impact Assessment and if received, this section of the report will be updated to include the comments and responses provided.

10. REASONED OPINION AND RECOMMENDATIONS

The areas where proposed prospecting will take place is situated in areas of Medium Agricultural Sensitivity and overlaps with areas of High Field Crop Sensitivity for Subsistence Farming. As a result of the climatic conditions and the limitations associated with the soils, the area is moderately suitable for small-scale dry land crop production and moderate intensity grazing. The proposed project, on the areas where the activities will take place, will have a moderate impact on soil and land capability as well as current land uses in the areas where the footprint will result in surface disturbance. Cumulative impacts are related to an increase in loss in available subsistence crop farming and grazing area. These impacts can be reduced by keeping the footprints minimised where possible and strictly following soil management measures as presented in this report. If soil management measures are followed as outlined in this report and the land rehabilitated to the highest standard possible, grazing or even crop production will be possible on the rehabilitated land. The main mitigation of the expected impacts will consist of compensation to the farmer, equivalent to the possible loss of agricultural income and food security.

It is therefore the opinion of the author that the activity should be authorised, and that the layout proposed for the development is acceptable from a soil and agricultural potential perspective if mitigation is applied. It follows that the recommendations and mitigation requirements as set out in this report should form part of the conditions of the environmental authorisation for the proposed project.

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APPENDIX A: SPECIALIST CURRICULUM VITAE