FLORAL, FAUNAL, WETLAND AND AQUATIC ASSESSMENT AS PART OF THE ENVIRONMENTAL AUTHORISATION PROCESS FOR THE PROPOSED COMMISSIESKRAAL COLLIERY, KWAZULU-NATAL PROVINCE

Prepared for

SLR Consulting (Africa) (Pty) Ltd.

October 2015

Section A: Executive Summary and Background Information

Prepared by: **Scientific Aquatic Services**
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Report Reference: **SAS 213081**
Date: **October 2015**

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EXECTIVE SUMMARY

Scientific Aquatic Services (SAS) was appointed to conduct a faunal and floral ecological investigation as well as an investigation of the wetland and aquatic resources associated with a proposed new underground coal mine and related surface infrastructure to support a mining operation on the farm Commissiekraal 90HT, hereafter referred to as “subject property”. The subject property is located approximately 28 km north of Utrecht in the eMadlangeni Local Municipality and the Amajuba District Municipality, KwaZulu-Natal. The main land uses at the time of assessment include agriculture, primarily livestock grazing with minor dryland crops, forestry, conservation and tourism.

The Commissiekraal project is located within an area of increased ecological importance and sensitivity when compared to most potential and current mining localities in South Africa. The terrestrial and wetland features within the majority of the subject property are in a largely natural to natural condition. Therefore, on this basis, should the project proceed it will have an ecological impact of high significance both within and potentially beyond the boundaries of the project. The potential for dewatering of the Pandana River during the later operational phase and beyond closure as well as post-closure impacts on water quality are of concern, along with the permanent alteration a surface area which is currently in a reasonably intact state. Therefore, unless ddewatering of the Pandana River can be avoided and it is considered economically feasible to treat and/or contain all potential sources of contaminated water which may affect the receiving environment post-closure indefinitely to pre-mining water quality standards in such a way as to support the post closure land use and land capability which supports the adjacent land uses and to ensure rehabilitation back to natural or largely natural land capability, the project is regarded as posing a very high long term impact on the region.

It is highly recommended that should it nonetheless be deemed appropriate to mine the resource from a cumulative sustainable development point of view, as much infrastructure as possible be moved to the areas where historical disturbance as a result of anthropogenic activity has occurred. In addition the infrastructure required to access the resource must be kept to the absolute minimum. Furthermore, extensive mitigation must be applied during the construction and operational phases of the project to ensure that no impact takes place beyond the surface infrastructure footprint. In this regard particular mention is made of the management of surface water quality and quantity and the dirty water management system of ther mine and the impact of mining related activities on surrounding sensitive terrestrial and wetland habitat. Exceptionally strict monitoring throughout the life of the mine and post-closure is required in order to ensure the health and functioning of the terrestrial, wetland and aquatic

ecosystems is retained, and monitoring data must be utilised to proactively manage any identified emerging issues in a well-managed and overseen Biodiversity Action Plan (BAP), which must be implemented through an automated Environmental Management System (EMS). The rehabilitation of the infrastructure during closure of the mine must take place in such a way as to ensure that the post closure land use objectives are met and that adjacent land uses and land potential is supported. The water resources will need to be rehabilitated in such a way as to support the larger drainage and wetland systems at the same level as those evident in the pre-mining condition and with particular mention of ensuring that no significant impact takes place on the downstream instream flow and water quality. In order to meet this objective, rehabilitation will need to be well planned and a suitably qualified ecologist must form part of the management team through the entire life cycle of the project and to guide the rehabilitation including concurrent rehabilitation) and closure objectives of the mine.

Of secondary concern is the potential for this project to create a precedent for further mining in this ecologically sensitive area. Mining within this area is contradictory to the Mining and Biodiversity Guidelines, as well as the NFEPA Guidelines, KZN C-Plan and the NPAES. This precedent could lead to future cumulative impacts in the region which could affect local and regional conservation initiatives significantly.

The objective of this study was to provide sufficient information on the ecology of the area, together with other studies on the physical and socio-cultural environment, in order for the Environmental Assessment Practitioner (EAP) and the relevant authorities to apply the principles of Integrated Environmental Management (IEM) and the concept of sustainable development. The needs for conservation as well as the risks to other spheres of the physical and socio-cultural environment need to compared and considered along with the need to ensure economic development of the country.

It is the opinion of the ecologists that this study provides the relevant information required in order to implement IEM and to ensure that the best long term use of the resources on the subject property will be made in support of the principle of sustainable development.

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GLOSSARY OF TERMS & ACRONYMS

Alien vegetation	Plants that do not occur naturally within the area but have been introduced either intentionally or unintentionally.
Biome	A broad ecological unit representing major life zones of large natural areas defined mainly by vegetation structure and climate.
Bush encroachment	A state where undesirable woody elements gain dominance within grassland, leading to depletion of the grass component. Typically due to disturbances and transformations as a consequence of veldt mismanagement (overgrazing, incorrect burning, etc.).
Decreaser grass	Grass abundant in veldt in good condition, which decreases when veldt is under- or over-utilized.
°C	Degrees Celsius.
Endangered	Organisms in danger of extinction if causal factors continue to operate.
Endemic species	Species that are only found within a pre-defined area. There can therefore be sub-continental (e.g. southern Africa), national (South Africa), provincial, regional or even within a particular mountain range.
Exotic vegetation	Vegetation species that originate from outside of the borders of the biome -usually international in origin.
Ex situ conservation	Where a plant (or community) cannot be allowed to remain in its original habitat and is removed and cultivated to allow for its ongoing survival.
Extrinsic	Factors that have their origin outside of the system.
ha	Hectares.
Indigenous vegetation	Vegetation occurring naturally within a defined area.
Increaser 1 grass	Grass species that increase in density when veld is under-utilized.
Increaser 2 grass	Grass species that increase in density in over-utilized, trampled or disturbed veld.
Increaser 3 grass	Grass species that increase in density in over and under-utilized veld.

In situ conservation	Where a plant (or community) is allowed to remain in its natural habitat with an allocated buffer zone to allow for its ongoing survival.
Karoid vegetation	A shrub-type vegetation that dominates in grasslands that have seen historical disturbances. Mainly due to over-grazing and mismanaged burning regimes. The shrubby vegetation eventually becomes dominant and out-competes the grassy layer.
m	Metres.
mm	Millimetres.
MAMSL	Metres above mean sea level.
MAP	Mean annual precipitation.
MAPE	Mean annual potential for evaporation.
MASMS	Mean annual soil moisture stress.
MAT	Mean annual temperature.
Orange Listed	Species that are not Red Data Listed, but are under threat and at risk of becoming RDL in the near future. Usually allocated to species with conservation status of *Near Threatened (NT), Least Concern (LC), Rare* and *Data Deficient (DD)*.
PES	Present Ecological State.
POC	Probability of occurrence.
PRECIS	Pretoria Computer Information Systems.
Pioneer species	A plant species that is stimulated to grow after a disturbance has taken place. This is the first step in natural veld succession after a disturbance has taken place.
QDS	Quarter degree square (1:50,000 topographical mapping references).
Rare	Organisms with small populations at present.
RDL (Red Data listed) species	Organisms that fall into the *Extinct in the Wild (EW), critically endangered (CR), Endangered (EN), Vulnerable (VU)* categories of ecological status.
RDSIS	Red Data Sensitivity Index Score.
SANBI	South African National Biodiversity Institute.
Veld retrogression	The ongoing and worsening ecological integrity state of a veld.

1 INTRODUCTION

1.1 Background

Scientific Aquatic Services (SAS) was appointed to conduct a faunal and floral ecological investigation as well as an investigation of the wetland and aquatic resources associated with a proposed new underground coal mine and related surface infrastructure to support a mining operation on the farm Commissiekraal 90HT, hereafter referred to as “subject property”. The subject property is located approximately 28 km north of Utrecht in the eMadlangeni Local Municipality and the Amajuba District Municipality, KwaZulu-Natal. The main land uses at the time of assessment include agriculture, primarily livestock grazing with minor dryland crops, forestry, conservation and tourism.

This report, after consideration and description of the ecological integrity of the subject property, must guide the Environmental Assessment Practitioner (EAP), authorities and potential developers, by means of recommendations, as to viability of the proposed mining development from an ecological point of view.

1.2 Project Scope

Specific outcomes in terms of this report are outlined below:

Terrestrial Ecological Assessment:

- To conduct a Red Data Listed (RDL) species assessment, including potential for species to occur on the subject property and the implementation of a Red Data Sensitivity Index Score (RDSIS) for the subject property;
- To provide faunal and floral inventories of species as encountered on site;
- To determine and describe habitats, communities and the ecological state of the subject property;
- To describe the spatial significance of the subject property with regards to surrounding natural areas;
- To identify and consider all sensitive landscapes including rocky ridges, wetlands and/or any other special features;
- To determine the environmental impacts of the proposed development activities on the terrestrial ecology within the subject property; and

- To present management and mitigation measures which should be implemented during the various development phases to assist in minimising the impact on the receiving terrestrial environment.

Wetland Assessment:

- To define the Present Ecological State (PES) of the Hydrogeomorphic (HGM) Units within the subject property;
- To characterise the identified HGM Units according to the Classification System for Wetlands (Ollis *et al*., 2013);
- To determine the functioning and the environmental and socio-cultural services that each HGM Unit provide;
- To advocate a Recommended Ecological Class (REC) for each HGM Unit;
- To delineate all wetlands or riparian zones occurring within the subject property;
- To determine the environmental impacts of the proposed development activity on the wetland areas within the subject property; and
- To present management and mitigation measures which should be implemented during the various development phases to assist in minimising the impact on the receiving aquatic environment.

Aquatic Assessment:

- To define the Present Ecological State (PES) of the aquatic resources on the subject property through the assessment of:
    - Historical database searches
    - Biota Specific Water Quality
    - Habitat analyses
        - General habitat integrity (IHIA)
        - Habitat suitability for aquatic macro-invertebrates (IHAS)
        - Habitat suitability for fish (HCR)
    - Riparian vegetation assessments (VEGRAI)
    - Aquatic macro-invertebrate community assessments (SASS5 and MIRAI)
    - Fish community assessments (FRAI)
- Based on the findings of the assessment define the Ecological Importance and Sensitivity (EIS) of the system;
- To determine the environmental impacts of the proposed development activity on the wetland areas within the subject property as well as areas downstream of the proposed activity; and

- To present management and mitigation measures which should be implemented during the various development phases to assist in minimising the impact on the receiving aquatic environment, should the mining project proceed.

1.3 Assumptions and Limitations

The following assumptions and limitations are applicable to this report:

- The ecological assessment is confined to the subject property and does not include the neighbouring and adjacent properties; these were however considered as part of the desktop assessment.
- Due to the nature and habits of most faunal taxa it is unlikely that all species would have been observed during a site assessment of limited duration. Therefore, site observations are compared with extensive literature studies where necessary.
- Sampling by its nature, means that not all individuals are assessed and identified. With ecology being dynamic and complex, some aspects (some of which may be important) may have been overlooked due to seasonal and temporal variances. It is, however, expected that most faunal and floral communities have been accurately assessed and considered.
- The wetland assessment is confined to the subject property, as well as areas of relevance immediately adjacent to the subject property and does not include the neighbouring and adjacent properties. The general surroundings were however considered in the desktop assessment of the subject property.
- The wetland delineation as presented in this report is regarded as a best estimate of the wetland boundary based on the site condition present at the time of the assessment and limitations in the accuracy of the delineation due to disturbances created by grazing, existing development and anthropogenic disturbances are deemed possible.
- Wetland and terrestrial areas form transitional areas where an ecotone is formed as vegetation species change from terrestrial species to facultative and obligate wetland species. Within the transition zone some variation of opinion on the wetland boundary may occur, however if the Department of Water Affairs (DWA), 2005 method is followed, all assessors should get largely similar results.
- Weather conditions during two rounds of assessment wer enot ideal. The rivers were in spate and made aquatic assessments of some sites impossible and futile. The rainy weather led to field assessments being abandoned. In addition faunal assessment and observation was severely hampered.

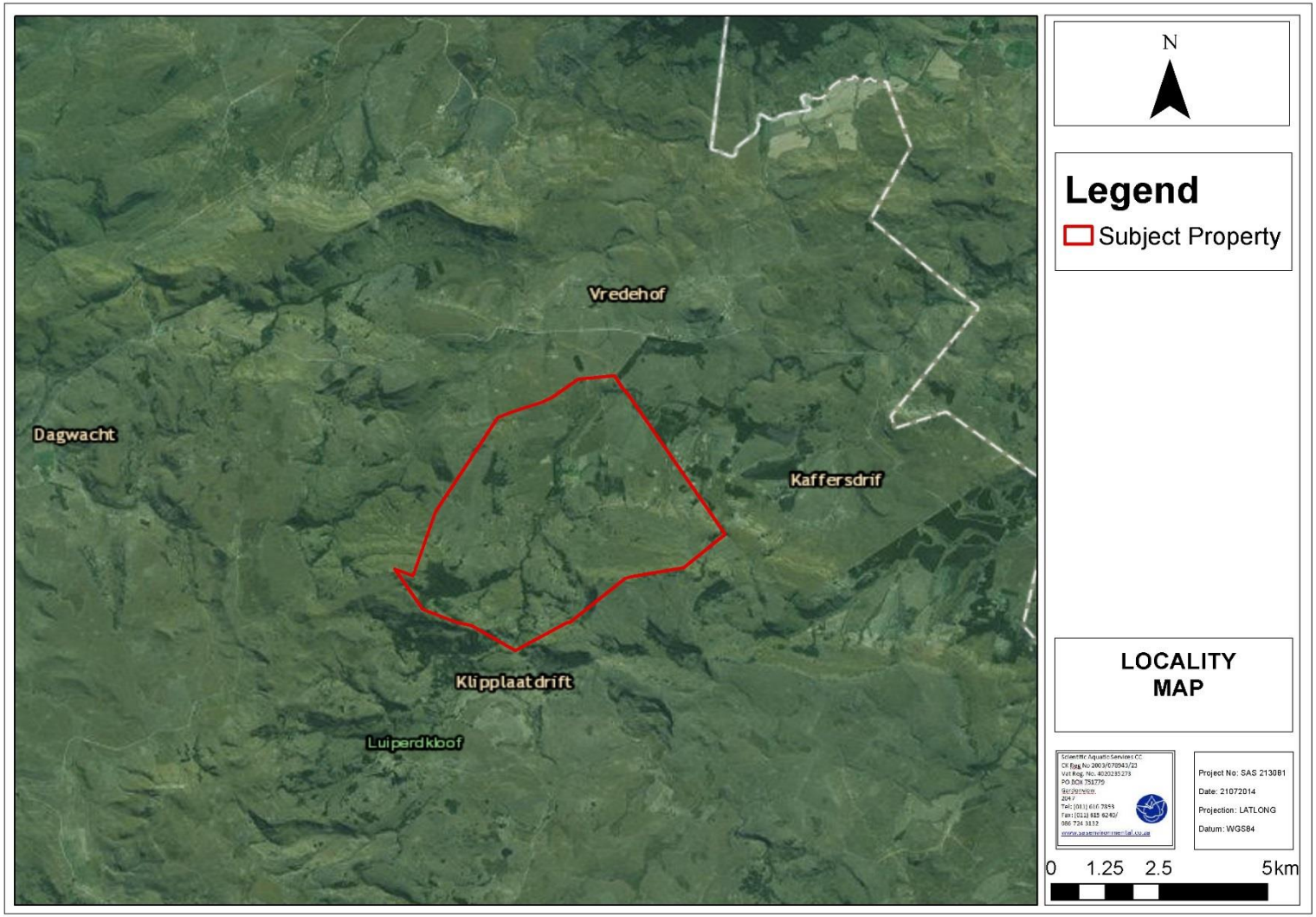

Figure 1: Digital Satellite image depicting the location of the subject property in relation to surrounding areas.

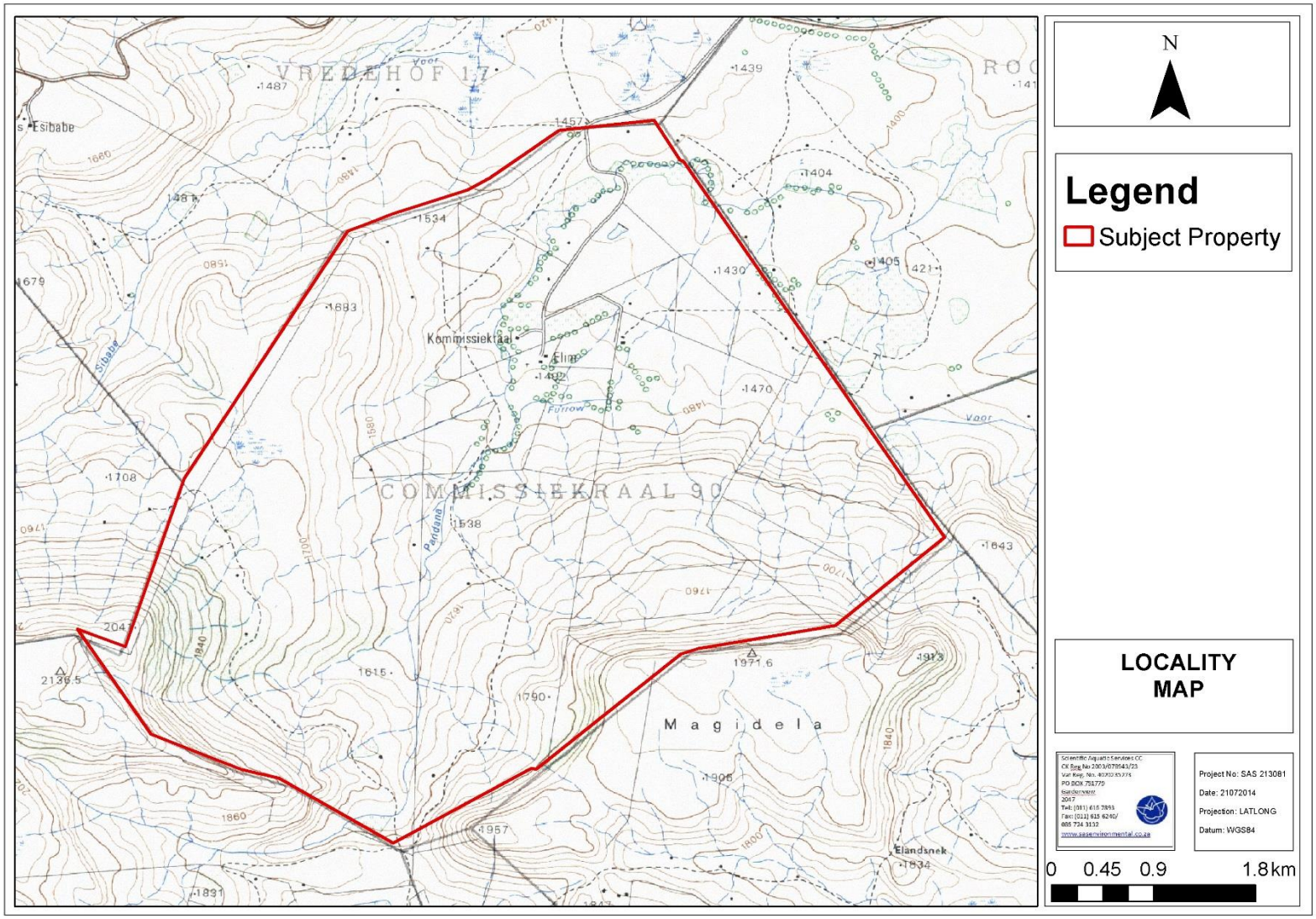

Figure 2: Subject property depicted on a 1:50 000 topographical map in relation to its surrounding area.

2 SCIENTIFIC AQUATIC SERVICES AND THE PROJECT TEAM

2.1 History

Scientific Aquatic Services (SAS) was initiated in March 2003 as a specialist consulting business focusing on aquatic resource management. Over time the frequency of requests by clients for related studies and procedures has increased and the company has expanded through the employment of professional consultants with the relevant expertise to facilitate studies on terrestrial ecological assessments and biodiversity assessments as well as highly specialised studies on specific endangered species, including grass owls, arachnids, invertebrates and various vegetation species. Professional consultants presently employed by SAS include:

- 3 Aquatic ecologists
- 4 Wetland ecologists
- 2 Zoologists
- 4 Botanists
- 1 GIS technician

2.2 Track Record and Geographical Areas of Expertise

SAS has a track record spanning 11 years with an ever increasing project volume:

- 2010 184 projects
- 2011 217 projects
- 2012 255 projects
- 2013 318 projects
- 2014 to date 225 projects

SAS has experience in the following geographical areas:

- South Africa (all provinces)
- Mozambique
- Lesotho
- Southern Africa
    - Botswana
    - Lesotho
    - Zambia
- Central Africa
    - DRC

- Western Africa
  - Angola
  - Guinea-Bissau
  - Liberia
  - Ghana

2.3 Specific Project Related Experience

The following selected large coal projects, among several others, have been conducted by SAS:

- Faunal, floral, wetland and aquatic ecological assessment of the proposed Ibutho Fuleni Anthracite mine;
- Wetland assessment and delineation of wetlands on the Exxaro Strathrae Colliery covering approximately 15000ha;
- Weltevreden coal project (25 000 ha current full terrestrial and aquatic assessment);
- Emarenthia Colliery (400 ha current full terrestrial and aquatic assessment);
- Wonderfontein Colliery (400 ha full terrestrial and aquatic assessment);
- Vlakfontein coal project (2000 ha current full terrestrial and aquatic assessment);
- Polmaise Colliery (200 ha full terrestrial and aquatic assessment);
- Langkloof Colliery (300 ha full terrestrial and aquatic assessment);
- Goedehoop Colliery (270 ha full terrestrial and aquatic assessment);
- Zonnebloem Colliery (400 ha full terrestrial and aquatic assessment);
- Jikama colliery (700 ha full terrestrial and aquatic assessment);
- Yzermyn coal Project, Dirkiesdorp (wetland assessment);
- Generaal and Chapudi coal projects, Limpopo (wetland and aquatic assessments).

2.4 Project Team

Stephen van Staden

SACNASP REG.NO: 400134/05

Stephen van Staden completed an undergraduate degree in Zoology, Geography and Environmental Management at RAU. On completion of this degree, he undertook an honours course in Aquatic health through the Zoology department at RAU. In 2002 he began a Masters degree in environmental management, where he did his mini dissertation in the field of aquatic resource management, also undertaken at RAU. At the same time, Stephen began building a career by first working at an environmental consultancy specialising in town planning developments, after which he moved to a larger firm in late 2002.

From 2002 to the end of 2003, he managed the monitoring division and acted as a specialist consultant on water resource management issues and other environmental processes and applications. In late 2003, Stephen started consulting as an independent environmental scientist, specialising in water resource management under the banner of Scientific Aquatic Services. In addition to aquatic ecological assessments, clients started enquiring about terrestrial ecological assessments and biodiversity assessments. Stephen, in conjunction with other qualified ecologists, began facilitating these studies as well as highly specialised studies on specific endangered species, including grass owls, arachnids, invertebrates and various vegetation species. Scientific Aquatic Services soon became recognised as a company capable of producing high quality terrestrial ecological assessments. Stephen soon began diversifying into other fields, including the development of EIA process, EMPR activities and mine closure studies.

Stephen has experience on well over 1000 environmental assessment projects with specific mention of aquatic and wetland ecological studies, as well as terrestrial ecological assessments and project management of environmental studies. Stephen has a professional career spanning more than 10 years, of which almost the entire period has been as the owner and Managing member of Scientific Aquatic Services and the project manager on most projects undertaken by the company. Stephen has also obtained extensive experience in wetland and aquatic assessments in the Limpopo Plains aquatic ecoregion.

Stephen is registered by the SA RHP as an accredited aquatic biomonitoring specialist and is also registered as a Professional Natural Scientist with the South African Council for Natural Scientific Professions (SACNASP) in the field of ecology. Stephen is also a member of the Gauteng Wetland Forum and South African Soil Surveyors Association (SASSO).

Emile van der Westhuizen
SACNASP REG.NO: 100008/15

Emile van der Westhuizen is currently employed by Scientific Aquatic Services and focuses in the facilitation of Ecological Assessments, EIA, EMPR, Basic Assessment and Biodiversity Action Plan processes. Emile is a passionate field biologist with more than 8 years' experience in ecological assessments throughout Southern, Eastern, Central and West Africa. Further skills include GIS and Wetland Delineation processes. He started to build his career in 2007 with a firm specialising in EIA's, BA's, Water Use Licensing and the development of Rehabilitation Plans, Landscape plans and Visual Assessments. He has extensive experience in all the above mentioned fields of practice, and decided to diversify his fields of expertise

and focus on his passion for botany and ecology by joining Scientific Aquatic Services early in 2008.

He has since been involved in various projects throughout Africa (including South Africa, Ghana, the DRC and Mozambique) focusing on terrestrial ecological assessments which involve phytosociological community assessments, RDL faunal and floral species assessments, alien and invasive species control methods and rehabilitation plans. Further to this, he also performs wetland delineation and function assessments, along with rehabilitation plans for disturbed wetland areas. Such projects include several large scale urban developments, gold and copper mines in the Democratic Republic of the Congo (southern and central areas), gold mines and airports in Mozambique and large scale urban developments in Ghana. He holds a BSc Botany and Environmental Management degree from UNISA and holds a BSc (Hons) Plant science degree with specialisation in terrestrial plant ecology from the University of Pretoria (UP). He is also registered as a Candidate Natural Scientist with the South African Council for Natural Scientific Professions (SACNASP) in the field of botany.

Nelanie Cloete
SACNASP REG.NO: 400503/14

Nelanie completed an undergraduate degree in Zoology and Botany at Rand Afrikaans University. On completion of this degree, she undertook an honours course in Plant physiology through the Botany and Biotechnology department at the University of Johannesburg. In 2006 she started a Master's degree in Botany and Biotechnology, where she completed her mini dissertation in the field of plant pathogens (Biotechnology), also undertaken at the University of Johannesburg. In 2009 she attended a short course in Legal Enforcement and Compliance for Environmental Management at UNISA. In 2010 she began another Master's degree in Environmental Management, where she completed a number of short modules such as Environmental law, Environmental Impact Assessments, general biodiversity studies and concepts and Auditing (ISO standards). In 2013 she finished her mini dissertation in the field of water quality and factors influencing the quality; through Rand Water and the University of Johannesburg.

Nelanie began building a career by working for an environmental consultancy specialising in Ecological studies, Basic assessments and Environmental Impact Assessments. Since 2008 to the current date she acted as a specialist consultant on floral and wetland assessments and other environmental processes and applications such as permit applications for Red Data Listed (RDL) floral and protected tree species, Water Use Licence Applications (WULA) and performance appraisals for environmental and waste processes. Nelanie expanded her abilities within the environmental management field by conducting processed such as Basic

Assessments, Scoping reports as part of the Environmental Management Assessment (EIA) process, Public participation and Environmental Management Programs for developments. She underwent a Water Use Licence (WUL) course at the Department of Water Affairs in October 2012, where Section 21 and the WUL process formed part of the training. Nelanie has conducted several Biodiversity Action Plans (BAP) for numerous mines within the Mpumalanga and Limpopo Province.

Currently Nelanie is also involved as a junior project manager for numerous projects within the company, managing specialist within and outside of the company, arranging and managing site assessments, project administration, guidance and interpretation of field data and liaising with clients.

Nelanie is registered at the South African Association of Botanists (SAAB) and is also registered as a Professional Natural Scientist with the South African Council for Natural Scientific Professions (SACNASP), currently in the process of registering as a Professional Natural Scientist with SACNASP. Nelanie is also a professional member of the Grassland Society of South Africa (GSSA) and member of the International Affiliation for Impact Assessments (IAIAsa) group.

Christopher Hooton

Chris's working career spans various departments, organizations and fields. A year was spent working for the Special Investigations Unit of the then Gauteng Department of Agriculture, Conservation and Environment (GDACE), focusing on the enforcement of the Nature Conservation Ordinance of Gauteng, CITES and TOPS in the Gauteng and North West province. Here he focussed primarily on the control of illegal trade in endangered species, with special focus on Red Data List and CITES species and products thereof. Whilst working for GDACE Chris actively involved himself in the provincial game reserves, assisting with floral and faunal assessments.

As part of his BTech studies, Chris went to work for the Lowveld Wild Dog Project, based in Savé Valley Conservancy, Zimbabwe. Here he gained invaluable field experience in large carnivore work. Whilst in Zimbabwe, Chris assisted with the collaring, tracking and population management of the Wild Dogs, and also helped with a lion and leopard collaring project with his supervisor and the reserve ecologist. After leaving Zimbabwe, Chris moved to Phinda Private Game Reserve to start his research for his thesis project. This research involved using total species counts and call-up methods to gain benchmark population numbers in order to confirm population numbers calculated from the camera trap method, in order to show that hyaena populations can be successfully calculated through the use of camera traps and a

capture recapture methodology. Following his work on Spotted Hyaenas, Chris joined Scientific Aquatic Services in November 2013 as a junior ecologist, specialising in faunal studies.

Marc Hanekom

Marc has worked overseas in England compiling and expanding on field work and data analysis techniques, where he became involved in the conducting and managing various data analysis processes. In addition, he has managed to bring expertise to the faunal field work assessments.

Over the course of his career, Marc has completed several reports on aquatic and faunal impact studies, and has had the opportunity to apply his knowledge through rehabilitation design, planning, specification and implementation.

He is registered at the Zoological Society of Southern African (ZSSA), the Entomological Society of South Africa (ESSA), is an active beekeeper and is a member of the South Africa Bee Industry Organization (SABIO, TA number 1175) and is registered as an accredited aquatic biomonitoring specialist by the SA RHP standards of South Africa.

Dionne Crafford

SACNASP REG.NO: 400146/14

Dionne Crafford matriculated in 1993 and obtained a BSc Ecology degree from the University of Pretoria in 1996. He obtained his BSc (Hons) Zoology degree with distinction at the same university in 1997, where he was awarded the Zoological Society of Southern Africa (ZSSA) award for the best honours student in Zoology. His honours project focused on behavioural ecology (grass owl acoustics).

He spent 1998 in the United States of America exploring various warm water fly fishing opportunities, before returning to enrol for an MSc in Zoology at the Rand Afrikaans University in 1999. He obtained the degree with distinction in 2000 and was awarded the Neitz Medallion for the best MSc in Zoology by the Parasitological Society of Southern Africa (PARSA). His MSc project was on aquatic environmental management/biological monitoring using catfish and their parasites as indicators of water quality.

From 2001 to 2006 he was first employed as "Veterinary Researcher" and later "Specialist Veterinary Researcher" by former Intervet at their Malelane research facility. From 2003 to 2006 he also performed part-time fly fishing guiding services for the former Fly Fishing Outfitters (Nelspruit). He moved to Bloemfontein in 2007 where he was employed as "Assistant

Manager: Endoparasitology" at ClinVet International (Pty) Ltd from 2007 to 2012. In 2009 he enrolled for a part-time PhD in Zoology (monogenean parasites of freshwater fish) at the University of Johannesburg and received his degree in 2013. As from 2013 he is employed as Associate Scientific Writing Manager at ClinVet and also performs scientific writing services for Scientific Aquatic Services. In the latter capacity he has participated in a number of studies relating to aquatic baseline studies, biomonitoring and toxicity testing.

3 DESKTOP ASSESSMENT METHODOLOGY

3.1 General Approach to Biodiversity Projects

Scientific Aquatic Services strives to ensure the highest quality of documentation and to utilise best practice procedures in order to ensure that products are concise, yet informative and that they are written in such a way that will allow for easy interpretation by readers and that the needs of stakeholders requiring the information are met. The general approach followed for biodiversity projects are illustrated in the diagram below.

In order to accurately determine the Present Ecological State (PES) of subject property and capture comprehensive data with respect to faunal and floral taxa and their associated habitats the following methodology was used:

- The Ezemvelo KZN Guidelines for Biodiversity Impact Assessments in KZN (2013) were consulted and followed.
- Maps, aerial photographs and digital satellite images were consulted prior to the field assessment in order to determine broad habitats, vegetation types and potentially sensitive sites. An initial visual on-site assessment of the subject property was made in order to confirm the assumptions made during consultation of the maps.
- Literature review with respect to habitats, vegetation types and species distribution was conducted.
- Relevant data bases considered during the assessment of the subject property included SANBI [Threatened species programme (TSP) and PRECIS], the SANBI Biodiversity GIS database (BGIS) and the relevant conservation databases and species lists applicable to the Kwa-Zulu Natal Province.
- Field visits were conducted to determine the baseline ecological conditions of the subject property;
- Field data was analysed and species collected were identified;
- Draft reports were developed to present the findings of the initial site assessment;

- Gaps in knowledge were identified and additional field assessments were undertaken to address these gaps;
- The baseline reports were finalised and sensitivity maps were developed, after which the proposed mine plan was overlaid;
- Based on the data in consideration with the proposed mining plan, the anticipated impacts of the proposed mine on the receiving ecological environment was assessed;
- The results of the baseline ecological assessments were presented during an internal peer review and specialist workshop process;
- The baseline ecological assessment reports were made available to the EAP and relevant stakeholders for review and comment;
- The EAP and stakeholder comments were addressed and incorporated into the baseline ecological assessments, whereafter the reports were finalised and submitted as part of the finalised EIA document.

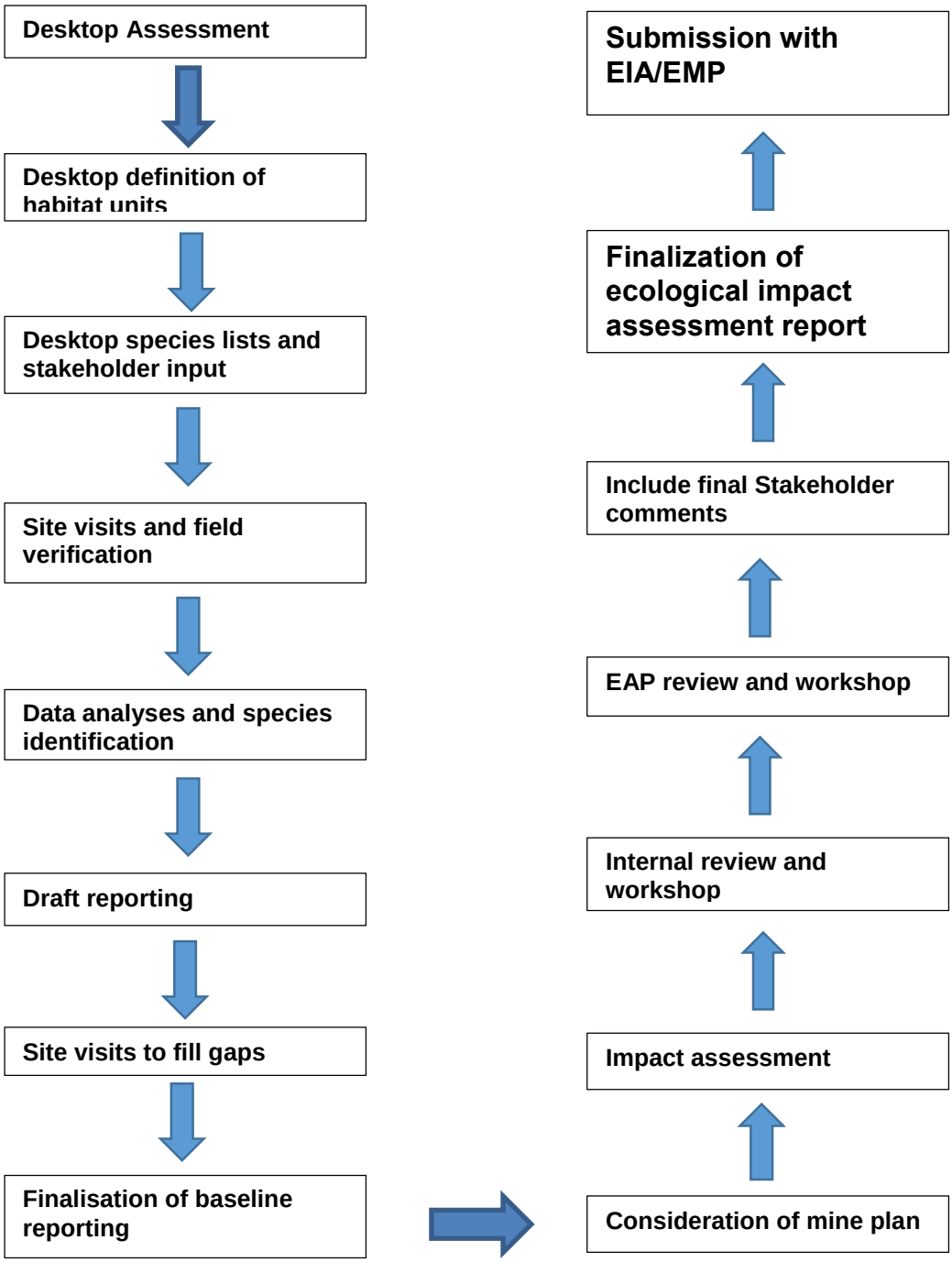

Figure 3: General Approach to Biodiversity Projects

4 CONSERVATION CHARACTERISTICS OF THE SUBJECT PROPERTY

4.1 National List of Threatened Terrestrial Ecosystems for South Africa (2011)

The Biodiversity Act (Act 10 of 2004) provides for listing of threatened or protected ecosystems, in one of four categories: critically endangered, endangered, vulnerable or protected. 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).

According to the National List of Threatened Terrestrial Ecosystems (2011) the subject property contains sections of the remaining extent of the vulnerable *Paulpietersburg Moist Grassland* and *Northern Afrotemperate Forest* vegetation types. These vegetation type have undergone ecosystem degradation and a loss of integrity (Figure 4).

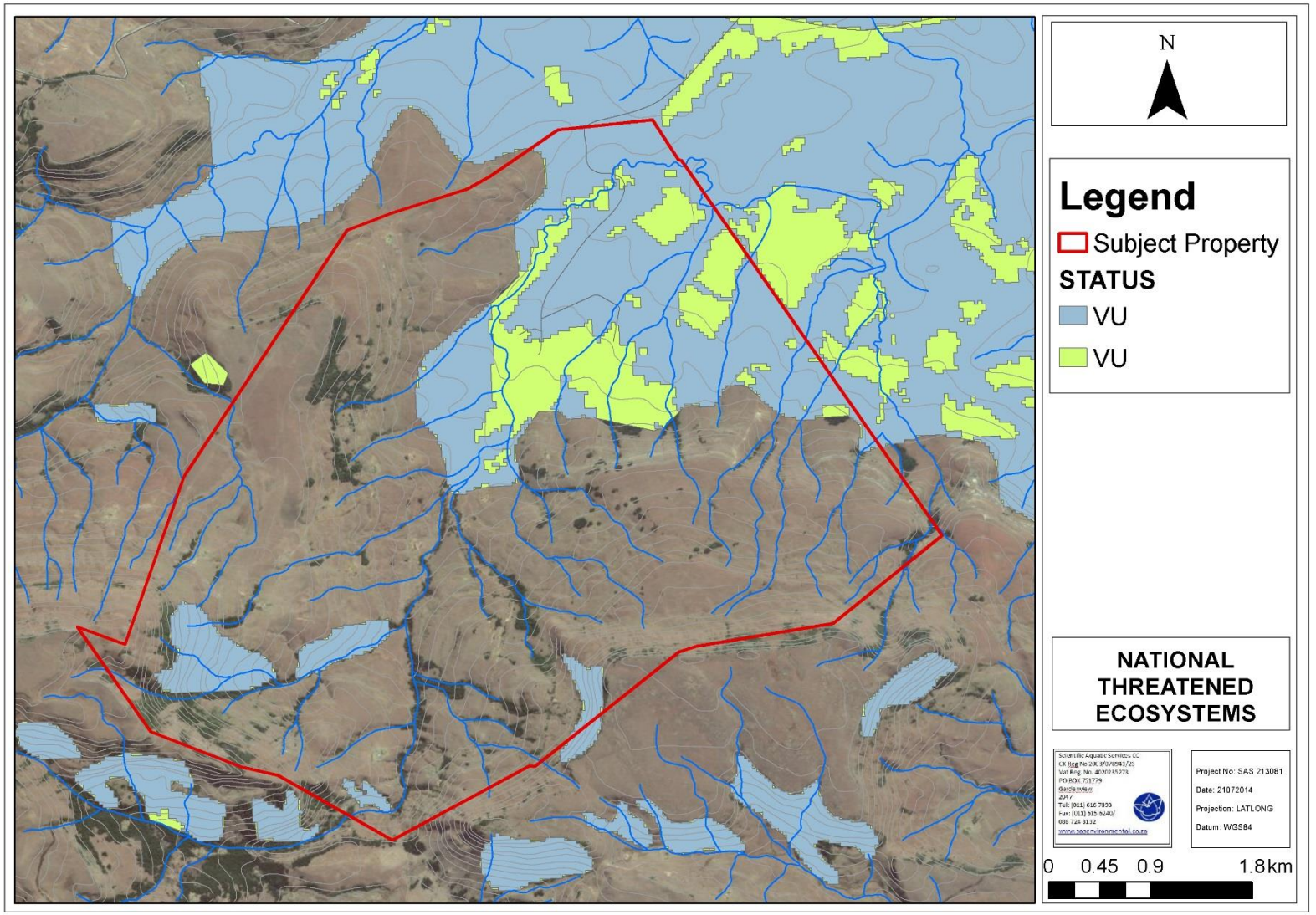

Figure 4: Threatened terrestrial ecosystems associated with the subject property

4.2 The National Protected Areas Expansion Strategy, 2010 (NPAES)

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).

According to the NPAES, the subject property is not located within a NPAES protected area (formal or informal). However, a NPAES focus area is located within the southeastern portion of the subject property (Figure 5). NPAES Focus Areas are focus areas for land-based protected area expansion. Focus areas are large, intact and unfragmented areas of high importance for biodiversity representation and ecological persistence, suitable for the creation or expansion of large protected areas.

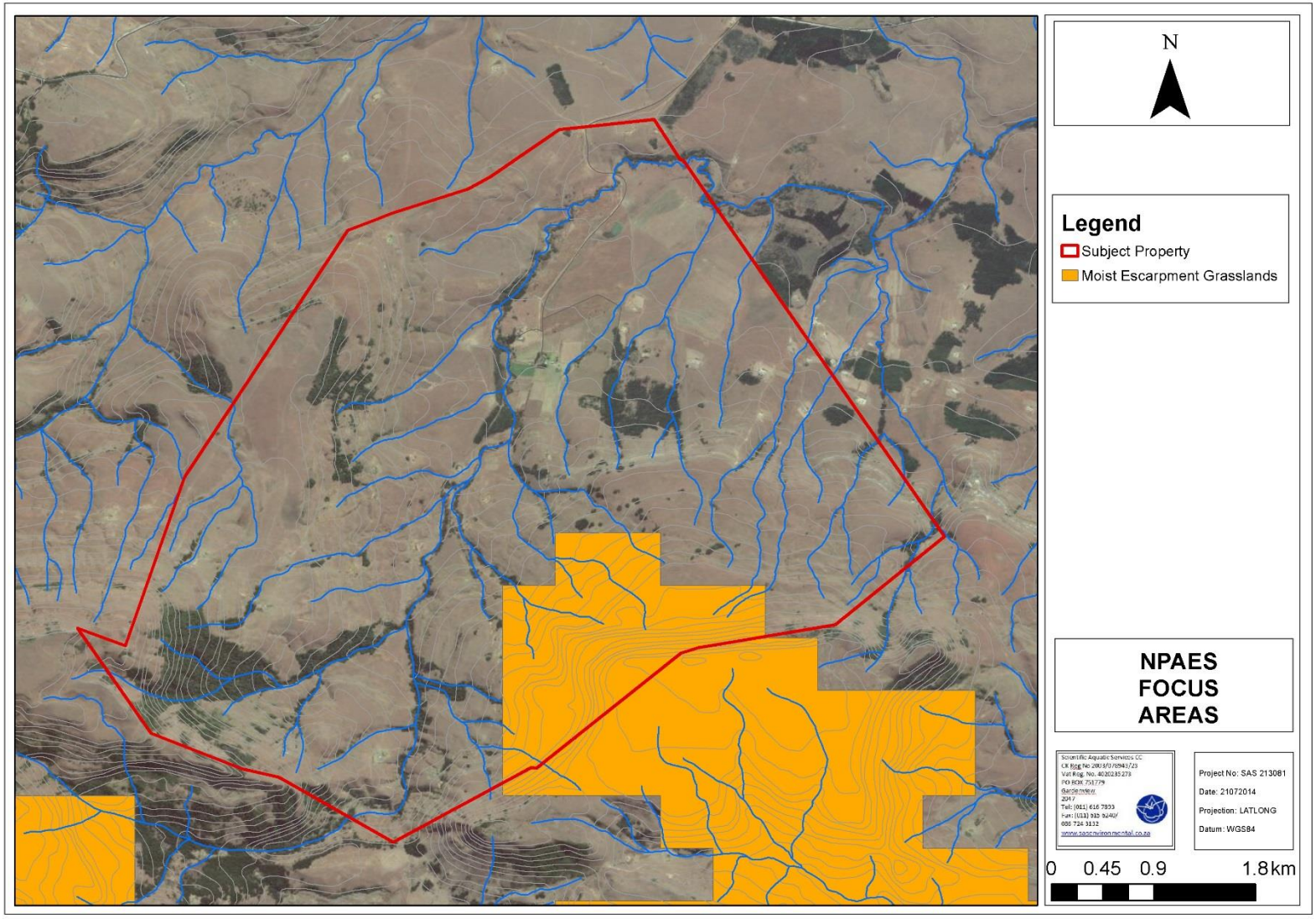

Figure 5: NPAES Focus Area associated with the subject property.

4.3 Formally or Informally Protected Areas, 2011 (NBA)

The recently completed NBA (2011) provides an assessment of South Africa's biodiversity and ecosystems, including headline indicators and national maps for the terrestrial, freshwater, estuarine and marine environments. The NBA 2011 was led by the South African National Biodiversity Institute (SANBI) in partnership with a range of organisations, including the DEA, CSIR and SanParks. It follows on from the National Spatial Biodiversity Assessment 2004, broadening the scope of the assessment to include key thematic issues as well as a spatial assessment. The NBA 2011 includes a summary of spatial biodiversity priority areas that have been identified through systematic biodiversity plans at national, provincial and local levels (SANBI BGIS).

According to the South African Protected Area Database (SAPAD) completed in 2014, the subject property is not located within either a formal or informal protected area or within a national park. However, the Pongola Bush Protected Environment is located approximately 10km north of the subject property, along with several other formally and informally protected areas on a wider scale (Figure 6).

Additonally, the proposed Elandsberg Protected Environment is situated adjacent to the subject property, on its southwestern, northwestern and northeastern boundaries (Figure 7). This protected environment forms part of phase 3 of the South African Biodiversity Institute (SANBI) upper Pongola biodiversity stewardship initiative. WWF-SA is the implementing agency for SANBI (WWF-SA, 2012).

4.4 Importance According to the Mining and Biodiversity Guideline (2012)

The Mining Biodiversity Guideline (2012) provides explicit direction in terms of where mining-related impacts are legally prohibited, where biodiversity priority areas may present high risks for mining projects, and where biodiversity may limit the potential for mining. The Guideline distinguishes between four categories of biodiversity priority areas in relation to their importance from a biodiversity and ecosystem service point of view as well as the implications for mining. These categories include: Legally Protected Areas, Highest Biodiversity Importance, High Biodiversity Importance and Moderate Biodiversity Importance.

According to the Mining Biodiversity Guidelines the majority of the subject property falls within an area considered to be of Highest Biodiversity Importance. Highest Biodiversity Importance areas include areas where mining is not legally prohibited, but where there is a very high risk that due to their potential biodiversity significance and importance to ecosystem services (e.g.

water flow regulation and water provisioning) that mining projects will be significantly constrained or may not receive necessary authorisations.

Areas within the remainder of the subject property fall within isolated areas considered to be of Moderate Biodiversity Importance (Figure 8). Moderate Biodiversity Importance areas are typically associated with ecological support areas and vulnerable ecosystems. These areas pose a moderate risk to mining. Authorisations may set limits and specify biodiversity offsets that would be written into license agreements and/or authorisations.

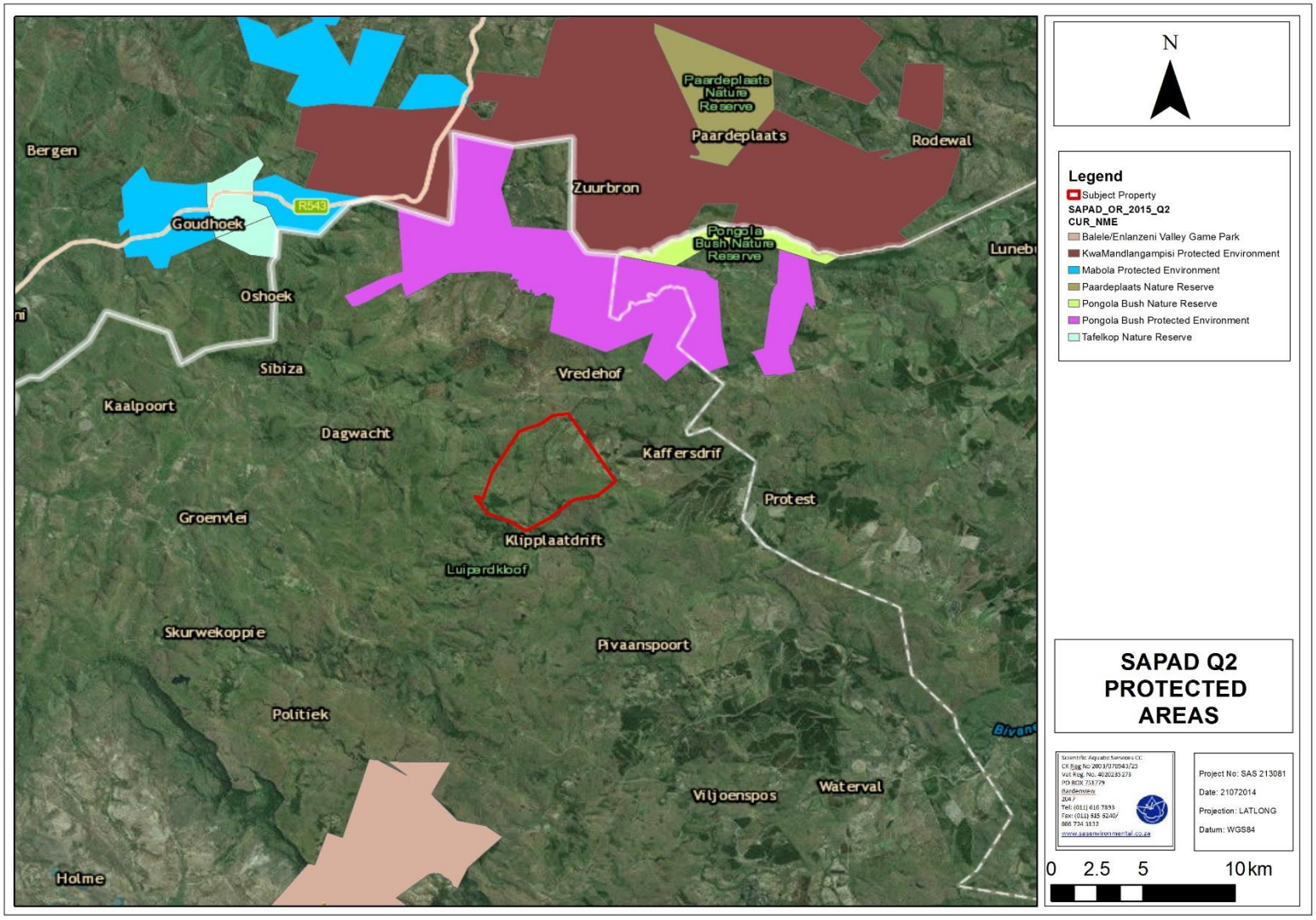

Figure 6: Formally protected areas associated with the subject property (SAPAD 2014).

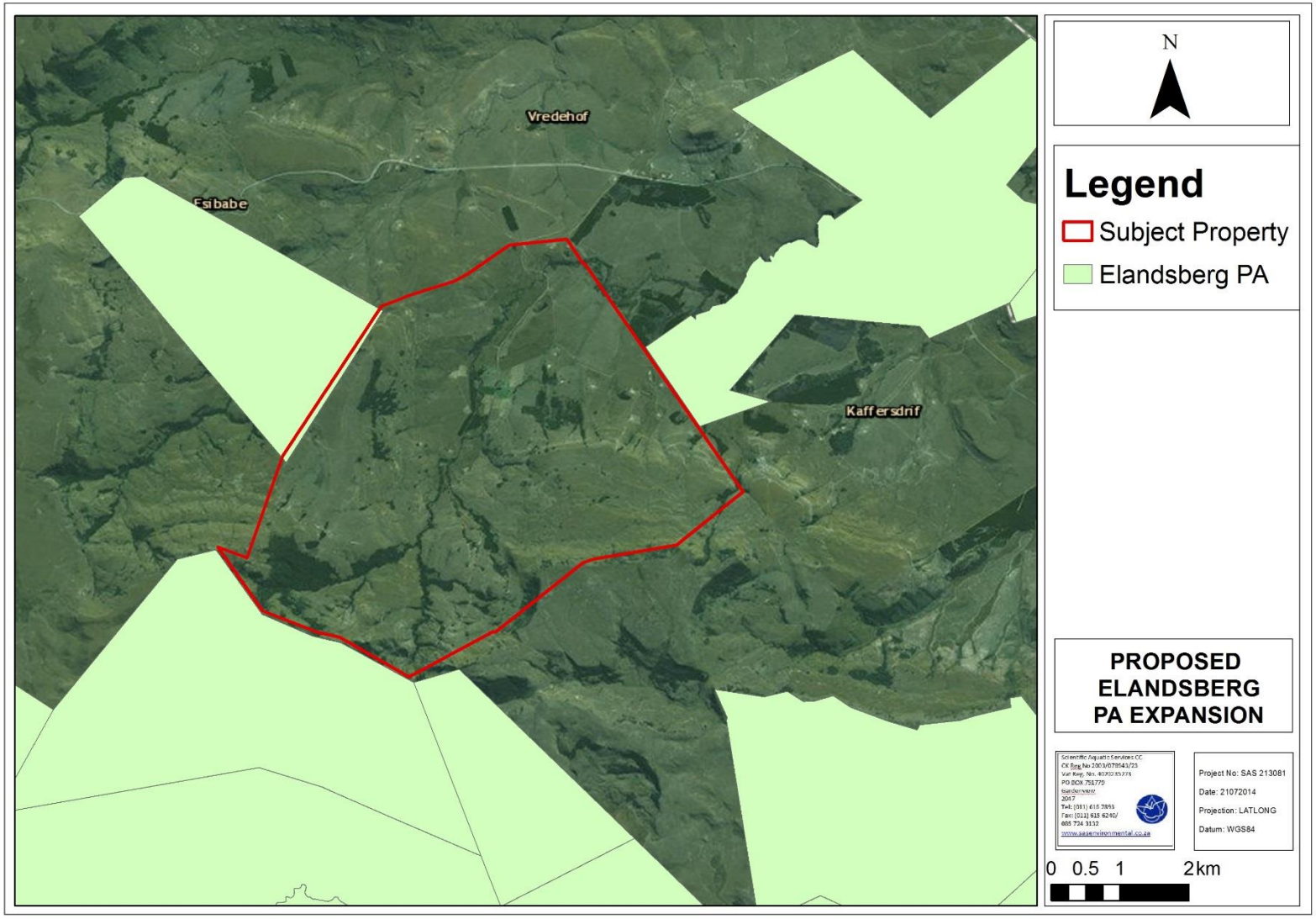

Figure 7: The proposed Elandsberg Protected Environment in relation to the subject property.

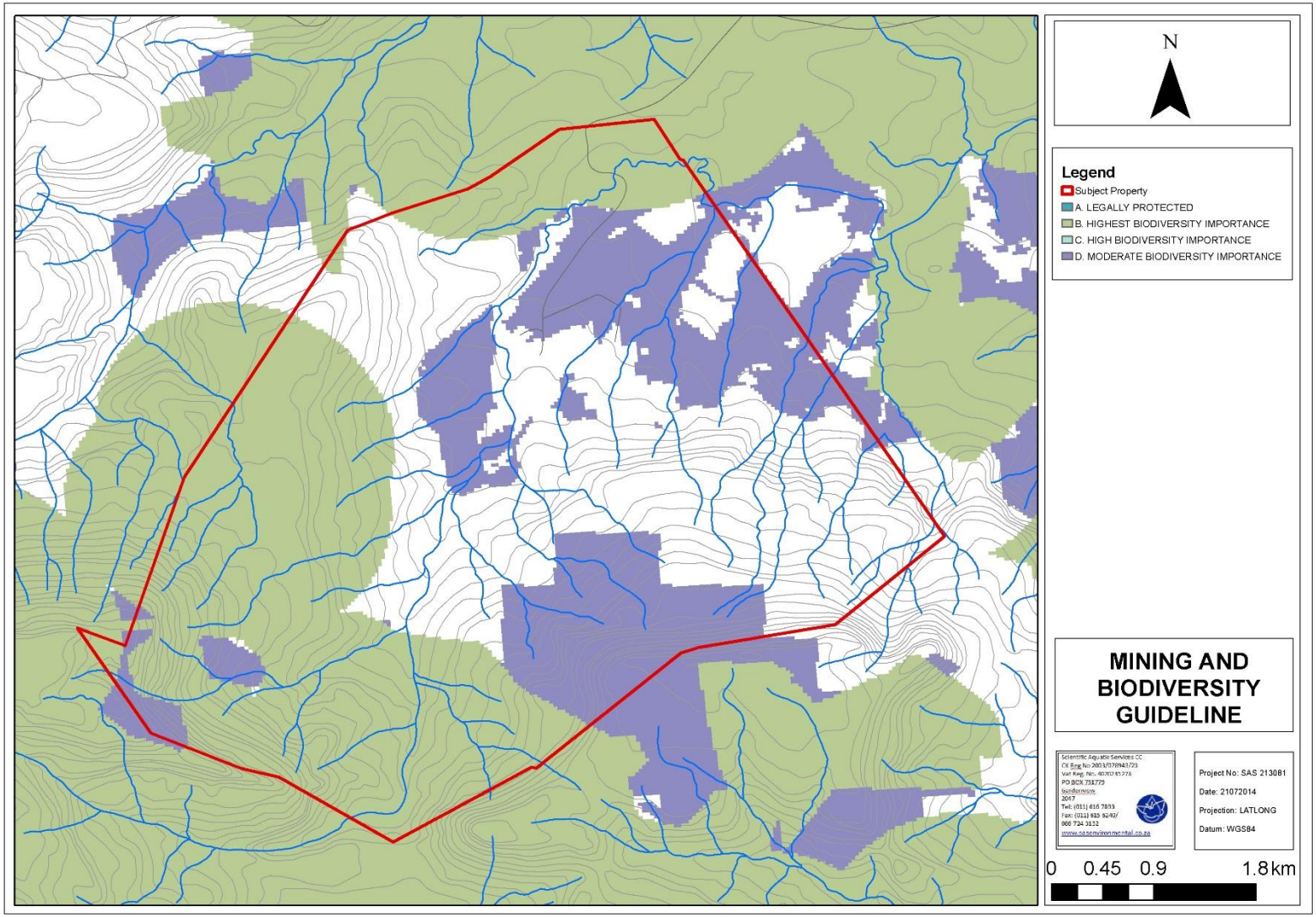

Figure 8: Importance of the subject property in terms of the Mining and Biodiversity Guidelines (2012).

4.5 KwaZulu-Natal Land-Use Categories, 2008

In order to appropriately monitor development and derive useful conservation plans, we need appropriate measures of the state of the landscape and extent of transformation. The KwaZulu-Natal (KZN) Land Cover Dataset is a single, contiguous land-cover dataset covering the entire KZN Province that has been generated from multi-date SPOT2/4 imagery acquired primarily in 2005, and represents the final 2005 KZN Province Land-Cover product. Following the successful completion of the 2005 KZN Provincial land cover dataset, a request was made to generate an updated version in order to better understand the ongoing land cover and land-use changes that are occurring within KZN (2008).

According to the KZN Land Cover Dataset the land cover of the subject property is a combination of irrigated and dryland cropfields, plantations, grassland, dense bush, bushland, grassland/bushclump mix, degraded grassland, wetlands, dams and freshwater systems (SANBI BGIS).

4.6 KwaZulu Natal Terrestrial Biodiversity Priority Areas

According to the KwaZulu-Natal Terrestrial Conservation Plan (Figure 9) the subject property contains areas specified as Biodiversity Priority Areas 1 (Critical Biodiversity Areas (CBAs) 1 Mandatory) and Biodiversity Priority Areas 3 (CBA 3 Optimal).

The CBA 1 Mandatory areas are based on the C-Plan Irreplaceability analyses. Identified as having an Irreplaceability value of 1, these planning units represent the only localities for which the conservation targets for one or more of the biodiversity features contained within can be achieved i.e. there are no alternative sites available.

CBA 3 Optimal areas reflect the negotiable sites with an Irreplaceability score of less than 0.8. Even though these areas may display a lower Irreplaceability value it must be noted that these areas, together with CBA 1s and CBA 2s, collectively reflect the minimal reserve design required to meet the Systematic Conservation Plans targets and as such, they are also regarded as CBA areas.

Biodiversity areas not highlighted in MINSET are not open for wholesale development. Important species are still located within them and should be accounted for in the EIA process. They are not highlighted as the MINSET highlights the 'choice' areas from a biodiversity point of view only. Should one or more of the CBA2 and CBA3 sites be utilised for development, it is obvious that the target for whatever feature(s) where located within that PU will no longer be met.

4.7 Important Bird Areas (IBA)

The subject property falls within the Grasslands IBA (IBA SA125) (Figure 10) which extends across three provinces, namely KwaZulu-Natal, Mpumalanga and the Freestate. This large IBA covers several catchments, containing many perennial rivers and wetlands. These habitat units combined with the grasslands within the IBA provide suitable habitat to many Crane and grassland specialist species. Grasslands throughout southern Africa are under severe pressure as a result of habitat transformation from agriculture and mining. As a result, many habitat specialist species are currently being displaced and as a result are being compressed into increasingly diminishing suitable habitat. The result of this is an increase in competition for resources and breeding habitat, leading to intra-specific species competition, with a net loss of overall species numbers. As such, mining developments and placement of mining infrastructure needs to be increasingly scrutinized, ensuring that sensitive habitats are being conserved whilst suitably managing the increasing demand for natural resources.

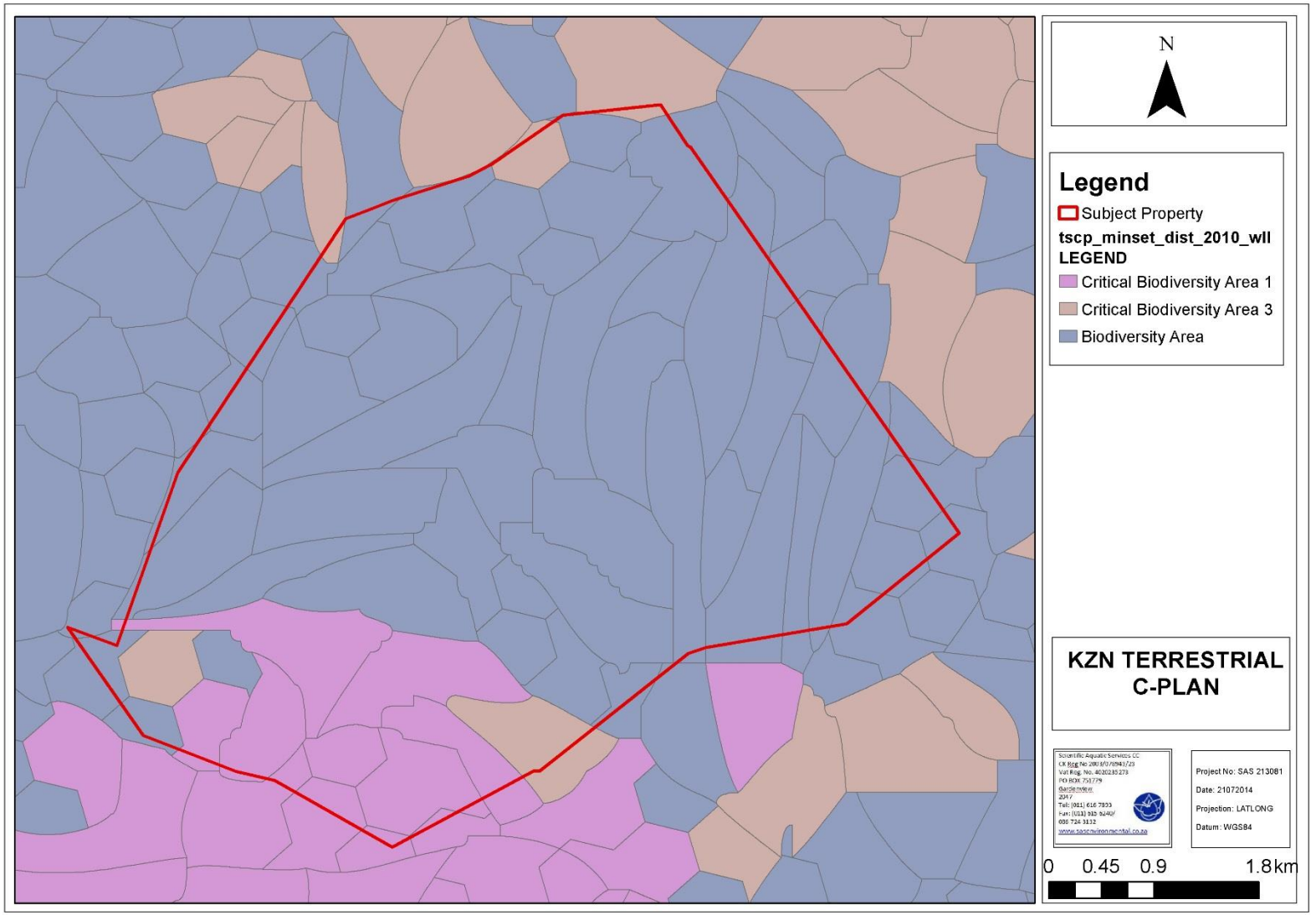

Figure 9: KZN Terrestrial Biodiversity Priority Areas associated with the subject property.

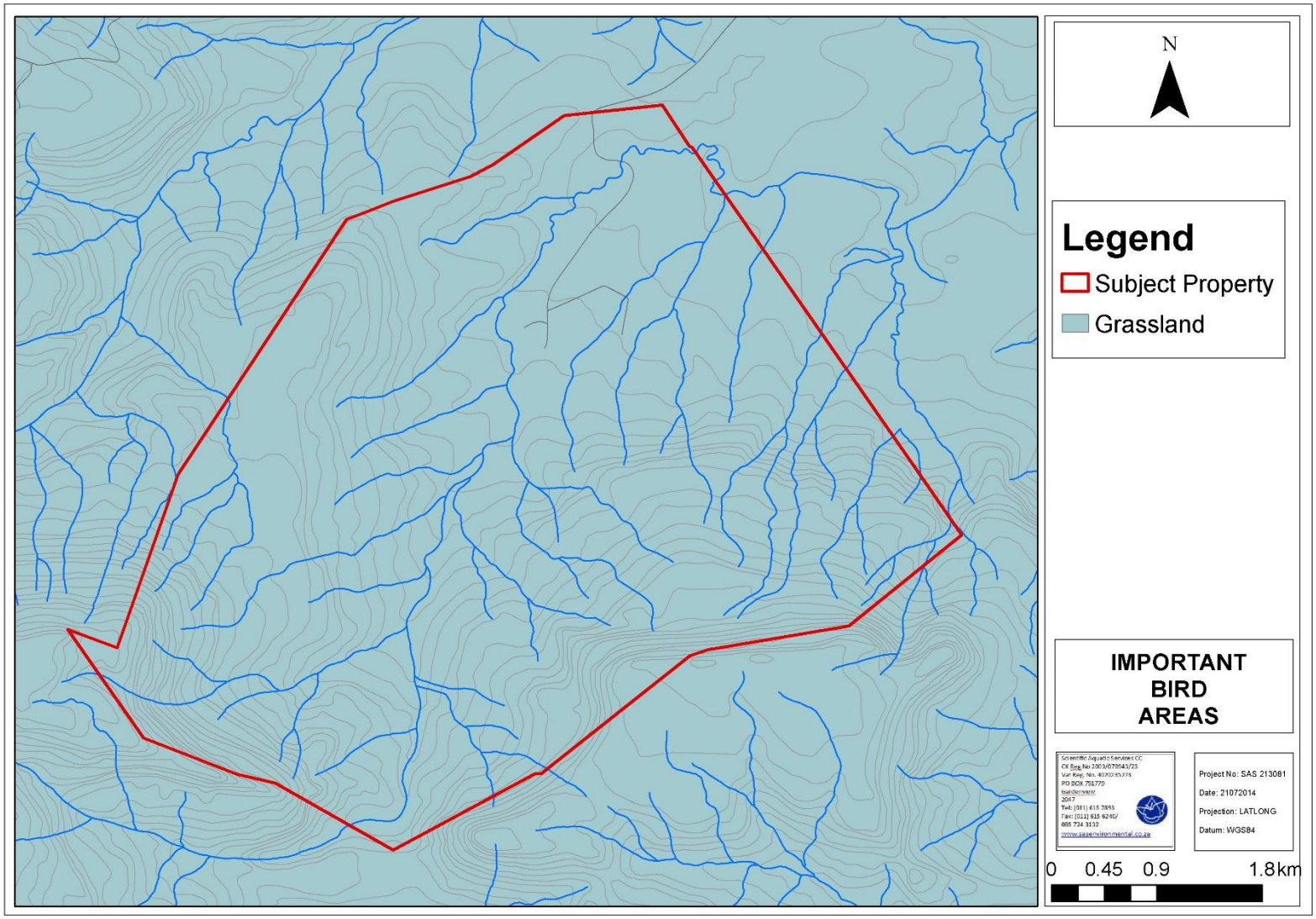

Figure 10: Important Bird Areas associated with the subject property.

5 STRUCTURE OF THE REPORT

Section A of this report served to provide an introduction to the subject property, the general approach to the study as well as the method of impact assessment. Section A also presents the results of general desktop information reviewed as part of the study including the information generated by the relevant authorities as well as the context of the site in relation to the surrounding anthropogenic activities and ecological character.

Section B addresses all the aspects pertaining to the assessment of the floral ecology of the subject property.

Section C addresses all the aspects pertaining to the assessment of the faunal ecology of the subject property.

Section D addresses all the aspects pertaining to the assessment of the wetland ecology of the subject property.

Section E addresses all the aspects pertaining to the assessment of the aquatic ecology of the subject property with focus on the Pandana and Sibabe Rivers.

Section F presents the results of the impact assessment and the mitigation measure development as well as the impact statement for the project.

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The South African National Biodiversity Institute (SANBI) is thanked for the use of data from the National Herbarium, Pretoria (PRE) **Computerised Information System (PRECIS)**

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