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# FRESHWATER ECOSYSTEM SCOPING REPORT FOR THE PROPOSED DRIEKUIL DEVELOPMENT AT WONDERSTONE MINE IN OTTOSDAL, NORTH-WEST PROVINCE.

## SCOPING REPORT

## Prepared for

## Envirogistics (Pty) Ltd.

## February 2022

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# MANAGEMENT SUMMARY

**Scientific Aquatic Services (SAS) was appointed to conduct a freshwater ecosystem scoping report for the proposed Driekuil development at Wonderstone mine in Ottosdal, North-West Province. The proposed Driekuil development project components will comprise of a five (5) mining blocks, three stockpiling of overburden areas and two (east and west) access roads.**

**During the desktop analysis, it was established that various freshwater ecosystems are situated within the footprint of the study and investigation area and will be traversed by the mining block areas (2N, 3N and 5N), stockpiling areas and access roads. The planned method of assessment for the EIA phase will include field verification and delineation of the freshwater ecosystems, defining the Present Ecological State (PES), Ecological service provisioning and Ecological Importance and Sensitivity (EIS), as well as defining and assessing the risk significance of the proposed Driekuil development on the freshwater ecosystems.**

**Preliminary management and mitigation measures (provided in Section 5.2 of this report) include utilising the freshwater ecosystem delineation and Zones of Regulation maps provided in this report (Section 4) for planning purposes, to ensure that no project components encroach on the freshwater ecosystems associated with the proposed Driekuil development.**

# DOCUMENT GUIDE

The table below provides the specialist report requirements for the assessment and reporting of impacts on aquatic biodiversity in terms of Government Notice 648 as promulgated in Government Gazette 45421 of 2019 in line with the Department of Environmental Affairs screening tool requirements, as it relates to the National Environmental Management Act, 1998 (Act No. 107 of 1998).

| No. | Requirement | Section in Report | Corresponding Heading |
|---|---|---|---|
| 1 | Introduction | Section 1 | 1. Introduction |
| 2 | Terms of reference | Section 1.2 | 1.2. Scope of Work |
| 3 | Knowledge gaps | Section 1.3 | 1.3 Assumptions and Limitations |
| 4 | Study area | Section 1.1 | 1.1 Background |
| 5 | Expertise of the specialist | Appendix D | Appendix C – Specialist CVs and Declaration |
| 6 | Aims and objectives | Section 1.2 | 1.2 Scope of work |
| 7 | Methodology | Appendix C | Appendix C – Method of Assessment |
| 7.1 | Watercourse identification and mapping | Section 3 and Appendix C | |
| 7.2 | Watercourse delineation | Section 3 and Appendix C | |
| 7.3 | Watercourse functional assessment | N/A | |
| 7.4 | Determining the ecological integrity of the watercourses | N/A | |
| 7.5 | Determining the Present Ecological State of watercourses | N/A | |
| 7.6 | Determining the Ecological Importance and Sensitivity of the watercourses | N/A | |
| 7.7 | Ecological classification and description | Section3 and Appendix C | |
| 8 | Results | Section 3 | 3. Scoping Phase - Results |
| 8.1 | Watercourse delineation | Section 3 | 3 Scoping Phase - Results |
| 8.2 | Watercourse unit identification | Section 3 | 3 Scoping Phase - Results |
| 8.3 | Watercourse unit setting | Section 3 | 3 Scoping Phase - Results |
| 8.4 | Watercourse soils | N/A | N/A |
| 8.5 | Description of the watercourse type | Section 3 | N/A |
| 8.6 | General functional description of the watercourse | Section 3 | N/A |
| 8.7 | Watercourse ecological functional assessment | N/A | |
| 8.8 | The ecological health assessment of the watercourses | N/A | |
| 8.9 | The PES assessment of the remaining watercourse areas | N/A | |
| 8.10 | The EIS assessment of the remaining watercourse areas | N/A | |
| 9 | Impact assessment discussions | Section 5 | 5. Potential impacts associated with the proposed Driekuil development on the study area |
| 10 | Conclusions and recommendations | Section 6 | 5. Potential impacts associated with the proposed Driekuil development on the study area |
| 11 | References | Section 7 | 7. References |

# TABLE OF CONTENTS

# LIST OF FIGURES



# LIST OF TABLES

# GLOSSARY

| | |
|---|---|
| **Alluvial soil**: | A deposit of sand, mud, etc. formed by flowing water, or the sedimentary matter deposited thus within recent times, especially in the valleys of large rivers. |
| **Biodiversity:** | The number and variety of living organisms on earth, the millions of plants, animans and micro-organisms, the genes they contain, the evolutionary history and potential they encompass and the ecosystems, ecological processes and landscape of which they are integral parts. |
| **Buffer:** | A strip of land surrounding a wetland or riparian area in which activities are controlled or restricted, in order to reduce the impact of adjacent land uses on the wetland or riparian area. |
| **Catchment:** | The area where water is collected by the natural landscape, where all rain and run-off water ultimately flows into a river, wetland, lake, ocean or contributes to the groundwater system. |
| **Chroma:** | The relative purity of the spectral colour which decreases with increasing greyness. |
| **Delineation (of a wetland):** | To determine the boundary of a wetland based on soil, vegetation and/or hydrological indicators. |
| **Ecoregion**: | An ecoregion is a "recurring pattern of ecosystems associated with characteristic combinations of soil and landform that characterise that region". |
| **Facultative species:** | Species usually found in wetlands (76%-99% of occurrences) but occasionally found in non-wetland areas |
| **Groundwater:** | Subsurface water in the saturated zone below the water table. |
| **Hydromorphic soil:** | A soil that in its undrained condition is saturated or flooded long enough to develop anaerobic conditions favouring the growth and regeneration of hydrophytic vegetation (vegetation adapted to living in anaerobic soils). |
| **Obligate species:** | Species almost always found in wetlands (>99% of occurences). |
| **Watercourse:** | In terms of the definition contained within the National Water Act, a watercourse means:<br>• A river or spring;<br>• A natural channel which water flows regularly or intermittently;<br>• A wetland, dam or lake into which, or from which, water flows; and<br>• Any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse;<br>• and a reference to a watercourse includes, where relevant, its bed and banks |
| **Wetland Vegetation (WetVeg) type:** | Broad groupings of wetland vegetation, reflecting differences in regional context, such as geology, climate, and soils, which may in turn have an influence on the ecological characteristics and functioning of wetlands. |

# ACRONYMS

| | |
|---|---|
| **°C** | Degrees Celsius. |
| **AIP** | Alien Invasive Plant |
| **BGIS** | Biodiversity Geographic Information Systems |
| **CBA** | Critical Biodiversity Area |
| **CSIR** | Council of Scientific and Industrial Research |
| **DWA** | Department of Water Affairs |
| **DWAF** | Department of Water Affairs and Forestry |
| **DWS** | Department of Water and Sanitation (formerly known as DWA, DWAF, see above) |
| **EAP** | Environmental Assessment Practitioner |
| **EA** | Environmental Authorisation |
| **EIA** | Environmental Impact Assessment |
| **EIS** | Ecological Importance and Sensitivity |
| **EMC** | Ecological Management Class |
| **EMP** | Environmental Management Program |
| **ESA** | Ecological Support Area |
| **EWR** | Ecological Water Requirements |
| **FEPA** | Freshwater Ecosystem Priority Areas |
| **GIS** | Geographic Information System |
| **GN** | Government Notice |
| **GPS** | Global Positioning System |
| **HGM** | Hydrogeomorphic |
| **m** | Meter |
| **MAP** | Mean Annual Precipitation |
| **NA** | Not Applicable |
| **NBA** | National Biodiversity Assessment |
| **NEMA** | National Environmental Management Act |
| **NFEPA** | National Freshwater Ecosystem Priority Areas |
| **NWA** | National Water Act |
| **PES** | Present Ecological State |
| **REC** | Recommended Ecological Category |
| **RHP** | River Health Program |
| **RMO** | Recommended Management Objective |
| **SAIIAE** | South African Inventory of Inland Aquatic Ecosystems |
| **SA RHP** | South African River Health Programme |
| **SACNASP** | South African Council for Natural Scientific Professions |
| **SANBI** | South African National Biodiversity Institute |
| **SAS** | Scientific Aquatic Services |
| **subWMA** | Sub-Water Management Area |
| **VEGRAI** | Riparian Vegetation Response Assessment Index |
| **WetVeg Groups** | Wetland Vegetation Groups |
| **WMA** | Water Management Areas |
| **WRC** | Water Research Commission |

# 1 INTRODUCTION

## *1.1 Background*

Scientific Aquatic Services (SAS) was appointed to conduct a freshwater[1] ecosystem scoping assessment for the proposed Driekuil development at Wonderstone Limited in Ottosdal, North-West province. For ease of reference, the area demarcated for the various components that form part of the proposed Driekuil development (mining blocks, stockpiling areas and roads) will henceforth be referred to as the "study area". This report includes a freshwater desktop screening assessment as part of the Scoping Phase of the EIA and WULA processes.

### 1.1.1 Background context of existing status and operations

Wonderstone Limited (WST) is a mining operation that is wholly owned by Assore Ltd. ("Assore") and has been mining a uniquely pure Pyrophyllite deposit since 1935. The site is situated ±300 kilometers west of Johannesburg and approximately 10 km outside Ottosdal in the North-West Province. Up until recently, the mine has been operating under the legal entitlement, Mining License: ML1-97, converted to Mining Right: NW 30/1/2/2/398 MR (Registered Right dated 23 December 2014). The issued mining right authorises the extraction of Pyrophyllite for a period of 30 years over the farm Gestoptefontein 349 IO:

- Portion 44; and
- Area measuring 135.916 ha.

Mining takes place by means of open cast mining, comprising of hydraulic hammering and excavator loading with no drilling and blasting required. In addition, Wonderstone also holds an approved New Order Mining Right (NOMR) NW30/5/1/2/2/397MR (signed 20 March 2019) over various portions of the farms Gestoptefontein and Driekuil 280IP:

- Portion 5, 7, 9, 10, 11, 24 (portion of portion 5), remainder of portion 15 (a portion of portion 1), portion 20 and portion 40 (a portion of portion 41 now known as portion 44) of the farm Gestoptefontein 349 IO;
- Portions 2, 4, remainder of portion 1, portion 7 (a portion of portion A) and the remainder of farm Driekuil 280 IP; and
- Area measuring: 4595.4239 ha.

[1]For the purposes of this investigation, the definition of a freshwater ecosystem is considered to be synonymous with the definition of a watercourse as per the National Water Act, 1998 (Act No. 36 of 1998) and the terms may be used interchangeably in this report.

The Mining Right Area (MRA) combined covers an area of approximately 140 ha of which just under 30 ha has been disturbed by mining activities to date depicted in Figure 1, below. A large portion of the northern section of the Wonderstone MRA on Gestoptefontein has been rehabilitated. Wonderstone would like to combine its existing MRA into one consolidated right, in an attempt to ease the administrative duties and compliance requirements associated with multiple mining authorisations per site. Simultaneously, the operation would like to abandon some of the areas currently included and authorised as part of the approved NOMR area. After an extensive study, Wonderstone forecasts only using a select portion of the already approved NOMR area in its future mining endeavours. Abandonment of the remainder of the approved NOMR areas will ensure future mining in these areas and prevent the sterilisation of said areas for future mining.

During a pre-application meeting with the Department of Mineral Resources and Energy (DMRE) on 15 November 2021, the Department indicated that Wonderstone will be expected to submit a Section 102 Amendment Application. The application will include the areas of one approved mining right into the existing area of the other approved right. Wonderstone decided to apply for the extension of the CMR (398MR) area by adding portions of the approved NOMR (397) areas to the CMR area. At the same time the additional proposed areas of the NOMR, portions of the approved portions will be abandoned to allow for future mining.

### 1.1.2 New project activities

Mining activities will continue within the existing Wonderstone Opencast Pit and will include the additional five (5) mining blocks (Figure 3) that form part of the proposed Driekuil development. The mineral to be mined is Pyrophyllite, an aluminium silicate of the phyllosilicate family, with the chemical formula $Al_2Si_4O_{10}(OH)_2$.

The pyrophyllite is opencast mined with a hydraulic hammer mounted on an excavator that loosens the stone. The loose stone is then loaded onto dump trucks that transport useable stone to the plant for further processing whilst un-useable stone is discarded to the low-grade stockpile for possible use in future. In areas where there is topsoil present, the topsoil (if any) will first be stripped to open the pyrophyllite. This topsoil will on completion of mining process, be used during the rehabilitation process. Historically, there was little to no topsoil on Wonderstone deposits. Mining will be done using the bench method with benches not higher than 5 m. It should be noted that the two areas demarcated for the temporary storage of overburden will be used for backfilling of the opencast pits in the future. The following information and proposed activities are also applicable to the proposed Driekuil development:

- Existing haul roads will be used but will have to be extended to the new mining area;
- No electricity is required in new areas; and
- Dust control on haul roads will be done with the mine's own water bowser and water will be extracted from Driekuilspruit dam that is included in the mine's existing Water Use License. There are, however, existing boreholes that can be developed should the need arise.

The project will involve:

- Mining of existing area (Block 1N – about 15 ha);
  - Five (5) mining blocks (2.5 ha, 2.1 ha, 2.1 ha, 2 ha, 2.9 (amounts to an approximate 14 ha);
- Stockpiles:
  - Two areas (3.4 ha and 3.2 ha) have been identified for the temporary stockpiling of overburden – the mine will commit to ongoing rollover mining – but due to the time sequence, material will be stockpiled in these areas. The existing Waste Rock Dump will remain operational at 13.4 ha;
- Provision in the two new areas must be for topsoil and overburden/waste rock (volumes is still to be finalised).
- A new WRD of about 4 ha is currently planned, which will likely comprise of a Pollution Control Dam (PCD);
- Other: Two roads (eastern and western roads);
  - Eastern Road at 1.9 km at 6 m width;
  - Western Road at 1.8 km at 6 m width;
- Roads will be gravel/sand – not tarred;
- Current mining operations planned up until 2027; and
- New plan allows for mining up until 2045 (additional 18 years);
- The operation would like to abandon some portions of the areas currently included and authorised as part of the approved NOMR area in order to minimise its legal responsibility footprint to that of only the areas to be mined as far as practically possible. The new mining area will be in the order of 2050 ha, resulting in about 2 545 ha to be abandonment. This will result in a reduction of the approved MRA (both) of about 55%. No mining activities have previously been undertaken on the areas being abandoned.

In order to identify all potential freshwater ecosystems that may potentially be impacted by the proposed Driekuil development in the study area, a 500 m “zone of investigation” around the study area, in accordance with Government Notice (GN) 509 of 2016 as it relates to the

National Water Act, 1998 (Act No. 36 of 1998) (NWA), was used as a guide in which to assess possible sensitivities of the receiving freshwater ecosystem environment. This area – i.e. the 500 m zone of investigation around the study area - will henceforth be referred to as the "investigation area" (please refer to Figures 2 to 4 for locality, topographical and layout maps).

This specialist desktop freshwater ecological report was compiled as part of the scoping phase for the project. Included in the scoping report is the preliminary freshwater ecosystem delineations identified within the study area and associated investigation area which were mapped using desktop methods. Additionally, the method of assessment that will be utilised for the development of the Environmental Impact Assessment (EIA) phase of the study, a preliminary literature review, and the results of the analyses of various spatial databases are included in this freshwater ecosystem scoping report.

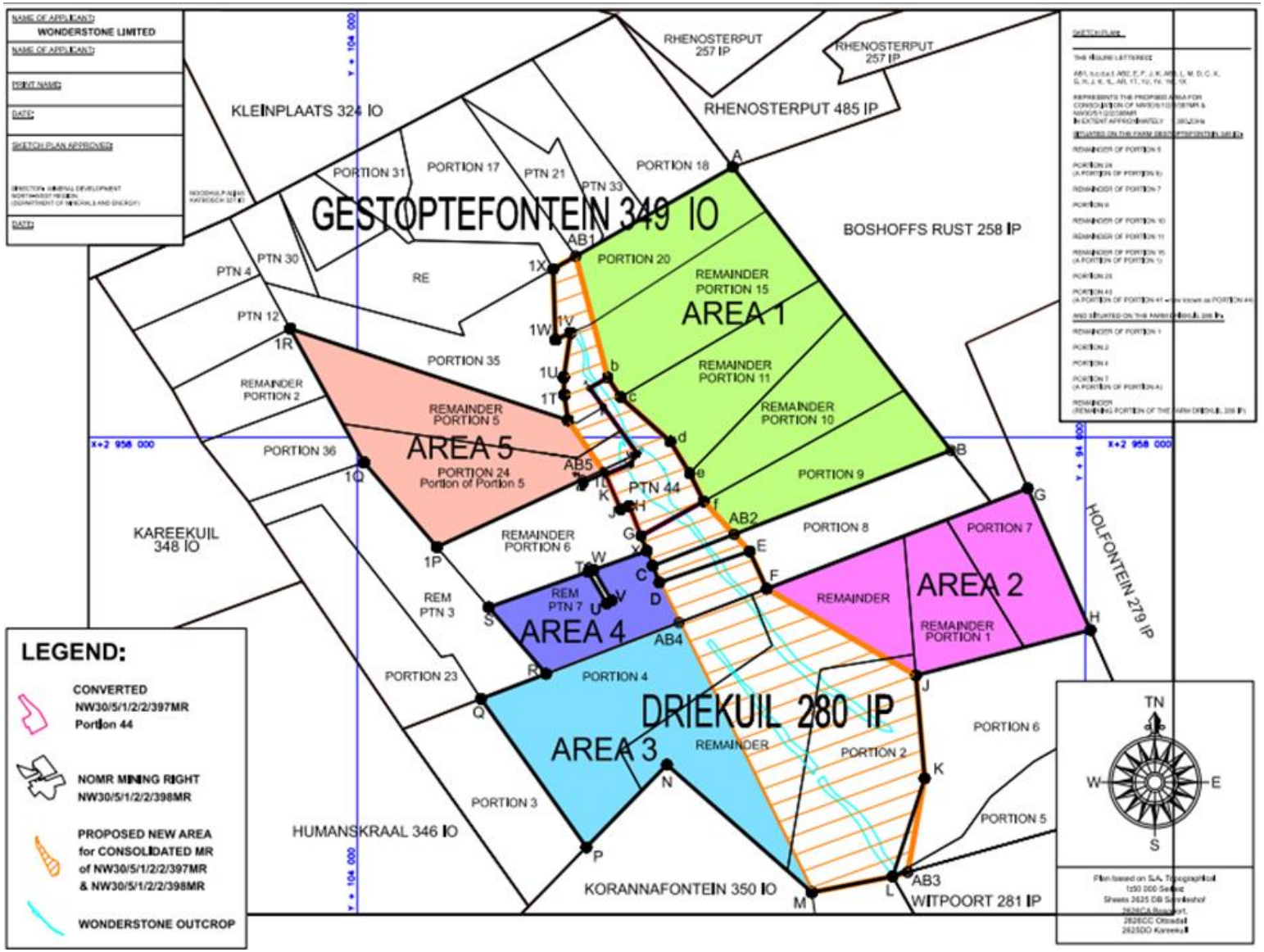


**Figure 1: Overview of the MRA, NOMR and Wonderstone outcrop as provided by the EAP, Envirogistics (2022).**

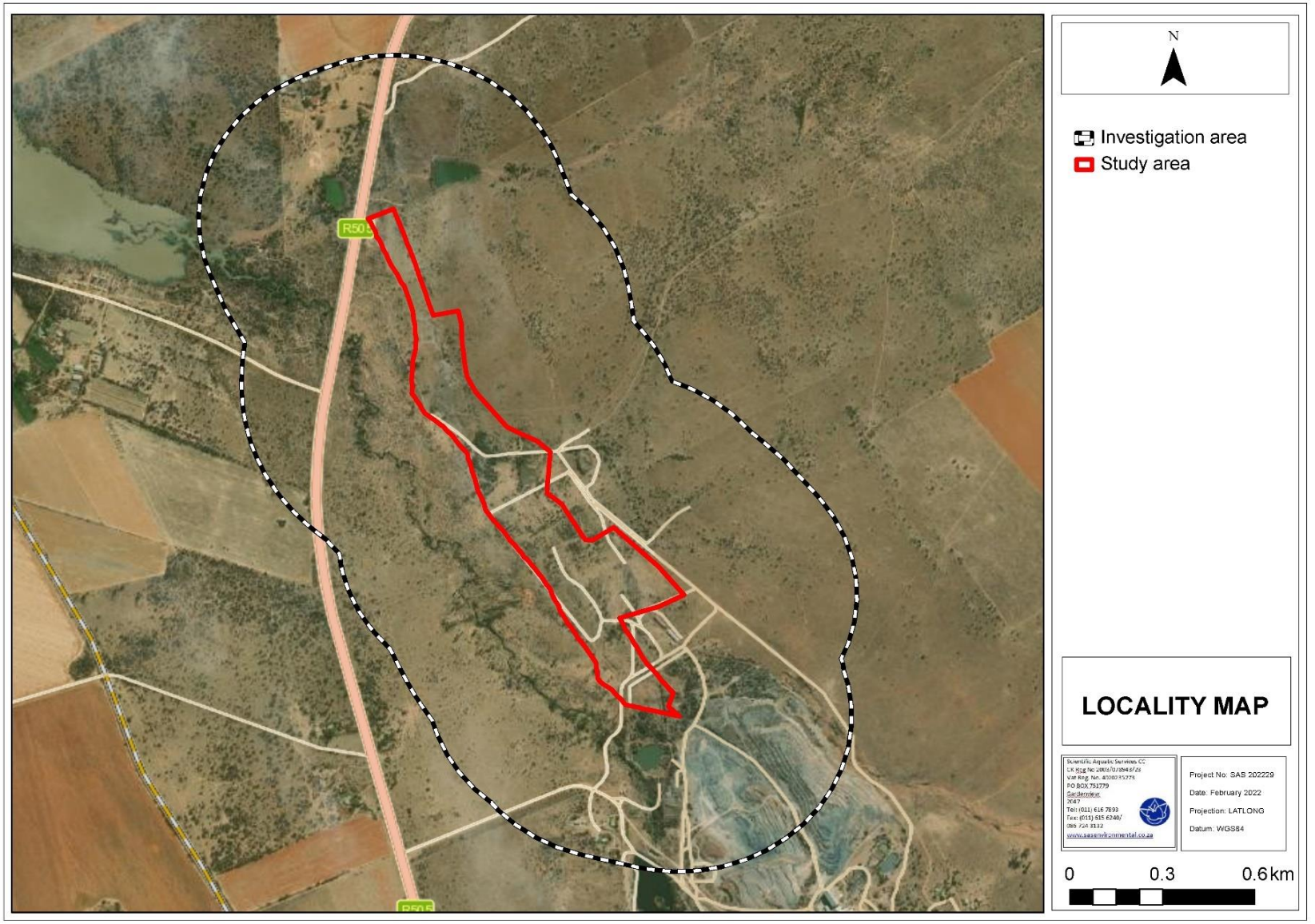


**Figure 2: Digital satellite image depicting the study area and investigation area in relation to the surrounding areas.**

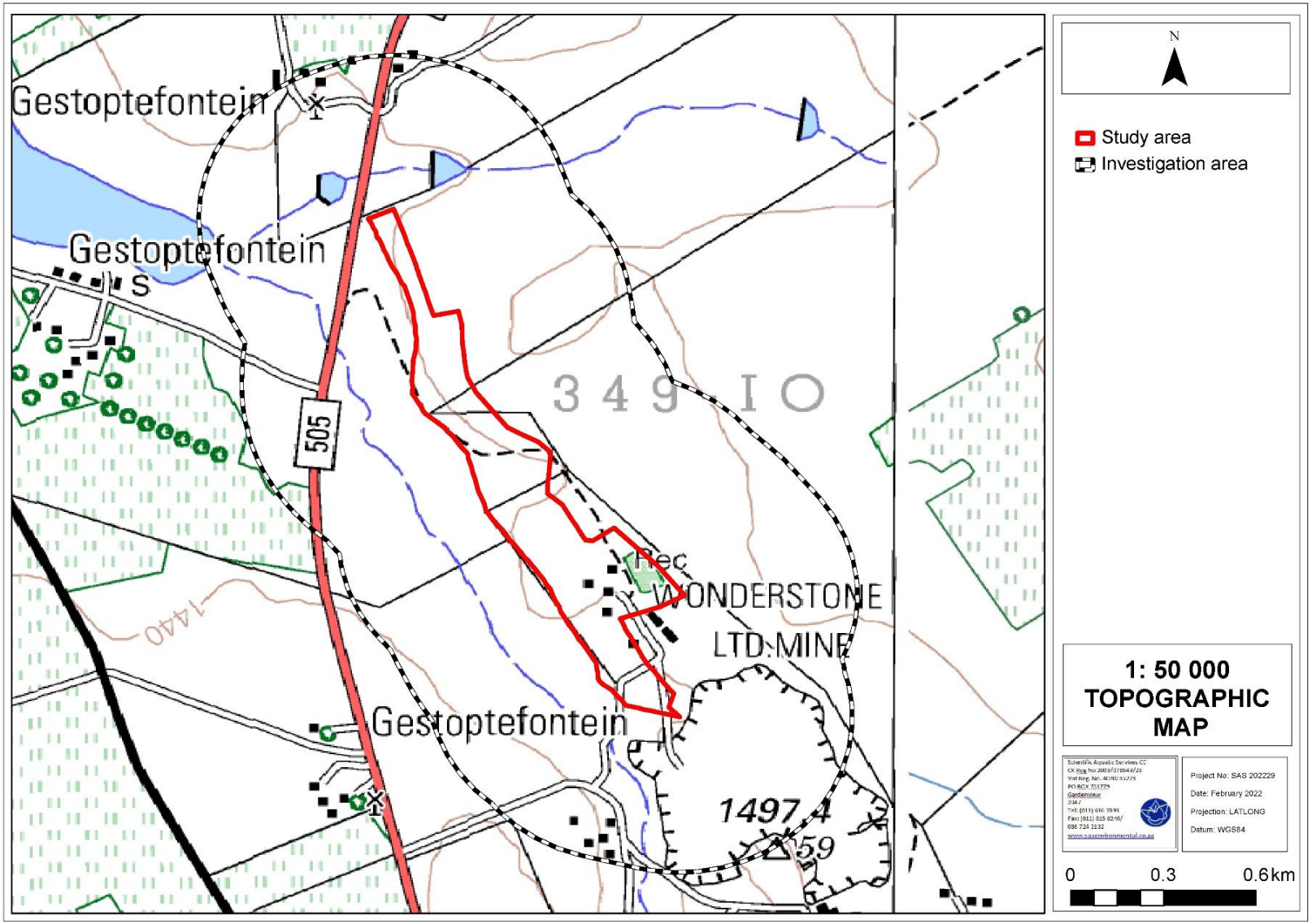


**Figure 3: Location of study and investigation area depicted on a 1:50 000 topographical map in relation to the surrounding area.**

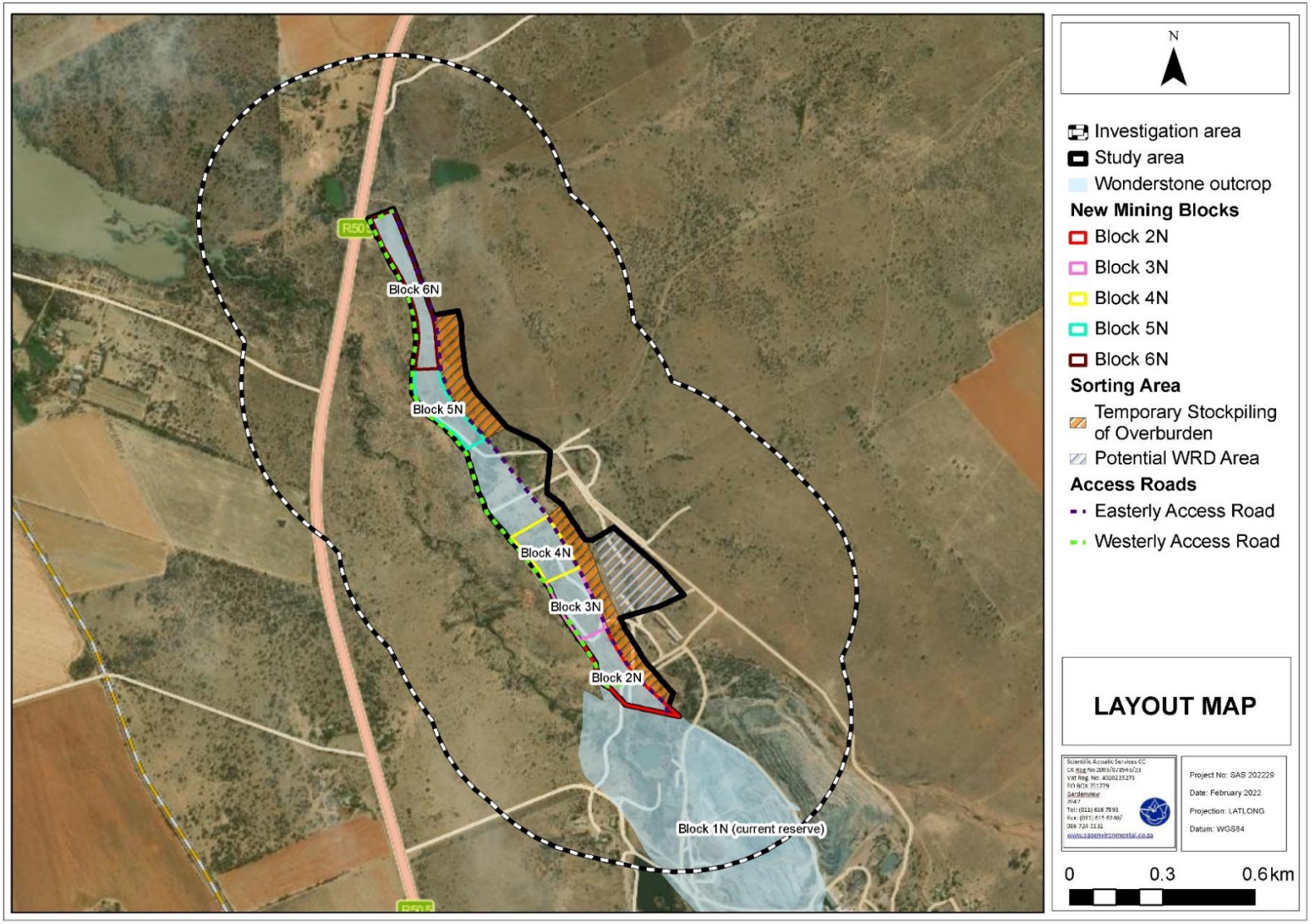


**Figure 4: Layout map of the various components that form part of the proposed Driekuil development in relation to the study and investigation area.**

## 1.2 Scope of work

Specific outcomes in terms of the scoping phase report are as follows:

- Compile a desktop study with all relevant information as presented by the South African National Biodiversity Institute (SANBI) Biodiversity Geographic Information System (GIS) website (http://bgis.sanbi.org) as well as the location of any freshwater ecosystems according to the National Freshwater Ecosystem Priority Areas (NFEPA, 2011), National Biodiversity Assessment (NBA, 2018) and North-West Biodiversity Sector Plan (NWBSP, 2015) databases, in relation to the study and investigation areas;
- Compile a report presenting the results of the freshwater scoping assessment and findings, including a desktop delineation and identification of potential freshwater ecosystems within the study and investigation areas in line with Regulation GN 509 of 2016 as it relates to the National Water Act of 1998, (Act No. 36 of 1998), and highlight key potential impacts associated with the proposed Driekuil development, and
- Present the plan of study for the EIA phase of the proposed Driekuil development including the methods of assessment to be used.

## 1.3 Assumptions and Limitations

The following assumptions and limitations are applicable to this report:

- The desktop delineation and identification of the freshwater ecosystems is confined to the 500 m investigation area surrounding the study area associated with the proposed Driekuil development as depicted in Figures 1, 2 and 3, above;
- This freshwater ecosystem scoping assessment was undertaken as a desktop assessment only. As such, the information gathered must be considered with caution, as inaccuracies and data capturing errors are often present within these databases. Since this information forms part of the scoping phase, this desktop assessment is considered to provide adequate information for informed decision making to take place and in order to inform the plan of study for the EIA processes;
- A field verified delineation of the identified freshwater ecosystems will be presented during the EIA phase of the proposed development. During the field verification, the freshwater ecosystems identified as part of this scoping assessment will be verified and boundaries of the freshwater ecosystems will be confirmed and refined. It must be noted that there still exists the possibility that additional freshwater ecosystems will be identified during the field assessment and as such, this could have a further impact on the layout of the proposed Driekuil development components and associated ancillary infrastructure within the study area.

## 1.4 Legislative Requirements and Provincial Guidelines

The following legislative requirements were considered during the assessment:

- The Constitution of the Republic of South Africa, 1996[1] (Act No.108 of 1996);
- The National Environmental Management Act, 1998 (Act No.107 of 1998) (NEMA);
- National Environmental Management: Biodiversity Act, 2004 (Act No.10 of 2004) (NEMBA);
- The National Water Act, 1998 (Act No. 36 of 1998) (NWA);
- Government Notice 509 as published in the Government Gazette 40229 of 2016 as it relates to the National Water Act, 1998 (Act No. 36 of 1998);
- Government Notice 704 as published in the Government Gazette 20119 of 1999 as it relates to the National Water Act, 1998 (Act No. 36 of 1998);
- The Minerals and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA); and
- The North-West Biodiversity Management Act, 2016 (Act No. 4 of 2016).

The details of each of the above, as they pertain to this study, are provided in **Appendix B** of this report.

[1] Since 1996, the Constitution has been amended by seventeen amendments acts. The Constitution is formally entitled the 'Constitution of the Republic of South Africa, 1996". It was previously also numbered as if it were an Act of Parliament – Act No. 108 of 1996 – but since the passage of the Citation of Constitutional Laws Act, neither it nor the acts amending it are allocated act numbers.

# 2 SCOPING PHASE - METHOD OF ASSESSMENT

## *2.1 Desktop Study*

A desktop study was compiled with all relevant information as presented by SANBI's Biodiversity GIS website (http://bgis.sanbi.org) as well as relevant national and provincial databases and supporting documentation that were considered during the assessment of the proposed Driekuil development and which include the following:

- National Freshwater Ecosystem Protected Areas (NFEPA, 2011) database;
- National Biodiversity Assessment (NBA, 2018);
- Department of Water and Sanitation Research Quality Information Services [DWS RQIS PES/EIS], 2014 database; and
- North-West Biodiversity Sector Plan (NWBSP, 2015).

# 3 SCOPING PHASE – RESULTS

## *3.1 Analyses of relevant databases*

The following section contains data accessed as part of the desktop assessment which is presented as a "dashboard-style" report below (Table 1). The dashboard report aims to present concise summaries of the data on as few pages as possible, to allow for the reader to understand how this information has been integrated into the findings of this report.

It is important to note that although all data sources used provide useful and often verifiable, high-quality data, the various databases used do not always provide an entirely accurate indication of the actual field characteristics associated with the study area at the scale required to inform the EIA and/or WULA processes. Given these limitations, this information is considered useful as background information to the study, is important in legislative contextualisation of the risks and impacts and was thus, used as a guideline to inform the assessment and to focus on areas and aspects of increased conservation importance during the field verification. It must, however, be noted that field verification of key areas may potentially contradict the information contained in the relevant databases, in which case the field verified information must carry more weight in the decision-making process.

**Table 1: Desktop data relating to the characteristics of the freshwater ecosystems associated with the study and investigation area as identified by the relevant databases.**

| Aquatic ecoregion and sub-regions in which the study and investigation area is located | |
|---|---|
| Ecoregion | Highveld |
| Catchment | Vaal |
| Quaternary Catchment | C31C |
| WMA | Lower Vaal |
| subWMA | Harts |

| Detail of the study and investigation area terms of the (NFEPA) (2011) database. | |
|---|---|
| FEPACODE | The study and investigation areas fall within a sub-quaternary catchment classified as an Upstream Management Area (FEPA code 4). These are sub-quaternary catchments in which human activities need to be managed to prevent degradation of downstream river "Freshwater Ecosystem Protected Area's" (FEPA's) and Fish Support Areas (FSA). Upstream Management Areas do not include management areas for wetland FEPA's which need to be determined at a finer scale. |
| NFEPA Wetlands (Figure 5) | According to the NFEPA (2011) database, there are no wetlands situated within the study area however, three natural channelled valley bottom (CVB) wetlands are situated north of the study area, within the investigation area. The wetlands range from moderately modified to seriously modified (WETCON C to Z3). |
| Wetland Vegetation Type (Wetveg) | The study area is situated within the Dry Highveld Grassland Group 5 Wetland vegetation type, classified as Least Threatened according to Mbona *et al.* (2015). |
| NFEPA Rivers (Figure 5) | According to the NFEPA (2011) database there are no NFEPA Rivers associated with the study and investigation area. The closest river is the Klein -Harts River which is situated approximately ±8 km north-west and downgradient of the study area. |

| Detail of the prospecting area in terms of the North-West Biodiversity Spatial Plan (2015). | |
|---|---|
| Aquatic Critical Biodiversity Areas (CBAs) and Ecological Support Area (ESAs) (Figure 6) | Critical Biodiversity Areas (CBA's) include natural and near-natural terrestrial and aquatic features that are required to meet targets for biodiversity patterns and ecological processes. Furthermore, CBAs are area's considered important for the survival of threatened species and include valuable ecosystems such as wetlands, untransformed vegetation and ridges. Ecological Support Areas (ESAs) are natural, near natural, degraded or heavily modified areas required to be maintained in an ecologically functional state to support CBAs and/or Protected Areas. According to the North-West Biodiversity Sector Plan (2015) portions along the north-western and south-eastern extents of the study and investigation area falls within areas identified as an ESA 1 whilst a small portion towards the south-east of the investigation area is situated within an area identified as ESA 2. |
| Landcover category (Figure 7) | According to the North-West Biodiversity Sector Plan (2015), the large majority of the study and investigation area is classified as natural areas whilst a small portion towards the southern extent of the investigation area is classified as a settlement/ mine areas. |

| Dominant characteristics of the Bushveld Ecoregion Level 2 (8.06) (Kleynhans *et al.*, 2007). | |
|---|---|
| Dominant primary terrain morphology | Plains, moderate relief |
| Dominant primary vegetation types | Moist Cold Highveld Grassland |
| Altitude (m.a.m.s.l.) | 1300 to 1700 |
| MAP (mm) | 400 to 500 |
| Coefficient of Variation (% of MAP) | 25 to 34 |
| Rainfall concentration index | 45 to 60 |
| Rainfall seasonality | Mid to late summer |
| Mean annual temp. (°C) | 14 to 18 |
| Winter temperature (July) | -2 to 18 |
| Summer temperature (Feb) | 12 to 28 |
| Median annual simulated runoff (mm) | 5 to 10 (limited); 10 to 80 |

| Ecological Status of the most proximal sub-quaternary reach (DWS, 2014) | |
|---|---|
| Sub-quaternary reach | C31C- 01486 (Klein Harts) |
| SQR Point Proximity to prospecting area | ±8 km north-west of the study area |
| Assessed by expert? | Yes |
| PES Category Median | Moderately Modified (Class C) |
| Mean Ecological Importance (EI) Class | Moderate |
| Mean Ecological Sensitivity (ES) Class | Moderate |
| Stream Order | 1 |
| Default Ecological Class (based on median PES and highest EI or ES mean) | Class C |

| National Biodiversity Assessment (2018): South African Inventory of Inland Aquatic Ecosystems (SAIIAE) (National Wetland Map 5 is included in the NBA) (Figure 8). | National web based Environmental Screening Tool (2021) | |
|---|---|---|
| The NBA 2018: SAIIAE database indicates the presence of a seep wetland that traverses the study and investigation area. The seep wetland is classified to be critically endangered (ETS) and not protected (EPL). There are no rivers situated within the study and investigation area according to the NBA (2018) database and the closest river is the Klein-Harts river which corresponds with the NFEPA (2011) database. According to the NBA (2018) database, the Klein-Harts river is identified to have a ETS of critically endangered and EPL of poorly protected. | The Screening Tool is intended to allow for pre-screening of sensitivities in the landscape to be assessed within the EA process. This assists with implementing the mitigation hierarchy by allowing developers to adjust their proposed development footprint to avoid sensitive areas. | The aquatic sensitivity of the study and investigation area is considered to have a high and very high aquatic sensitivity due to being associated with aquatic CBA's, wetlands and estuaries. |
| Mining and Biodiversity Guidelines (2012) (Figure 9). | | |
| According to the Mining and Biodiversity Guidelines database (2012), the north-western portion of the study an investigation area is considered of "Highest biodiversity" importance whilst the large majority of the remaining portions of the study area is considered of "High biodiversity" importance and a small portion towards the south of the study and investigation area is considered of "Moderate biodiversity" importance. | | |

**CBA = Critical Biodiversity Area; DWS = Department of Water and Sanitation; EI = Ecological Importance; ES = Ecological Sensitivity; ESA = Ecological Support Area; m.a.m.s.l = Metres Above Mean Sea Level; MAP = Mean Annual Precipitation; NBA = National Biodiversity Assessment; NFEPA = National Freshwater Ecosystem Priority Areas; PA = Protected Area PES = Present Ecological State; SAIIAE = South African Inventory of Inland Aquatic Ecosystems; WMA = Water Management Area.**

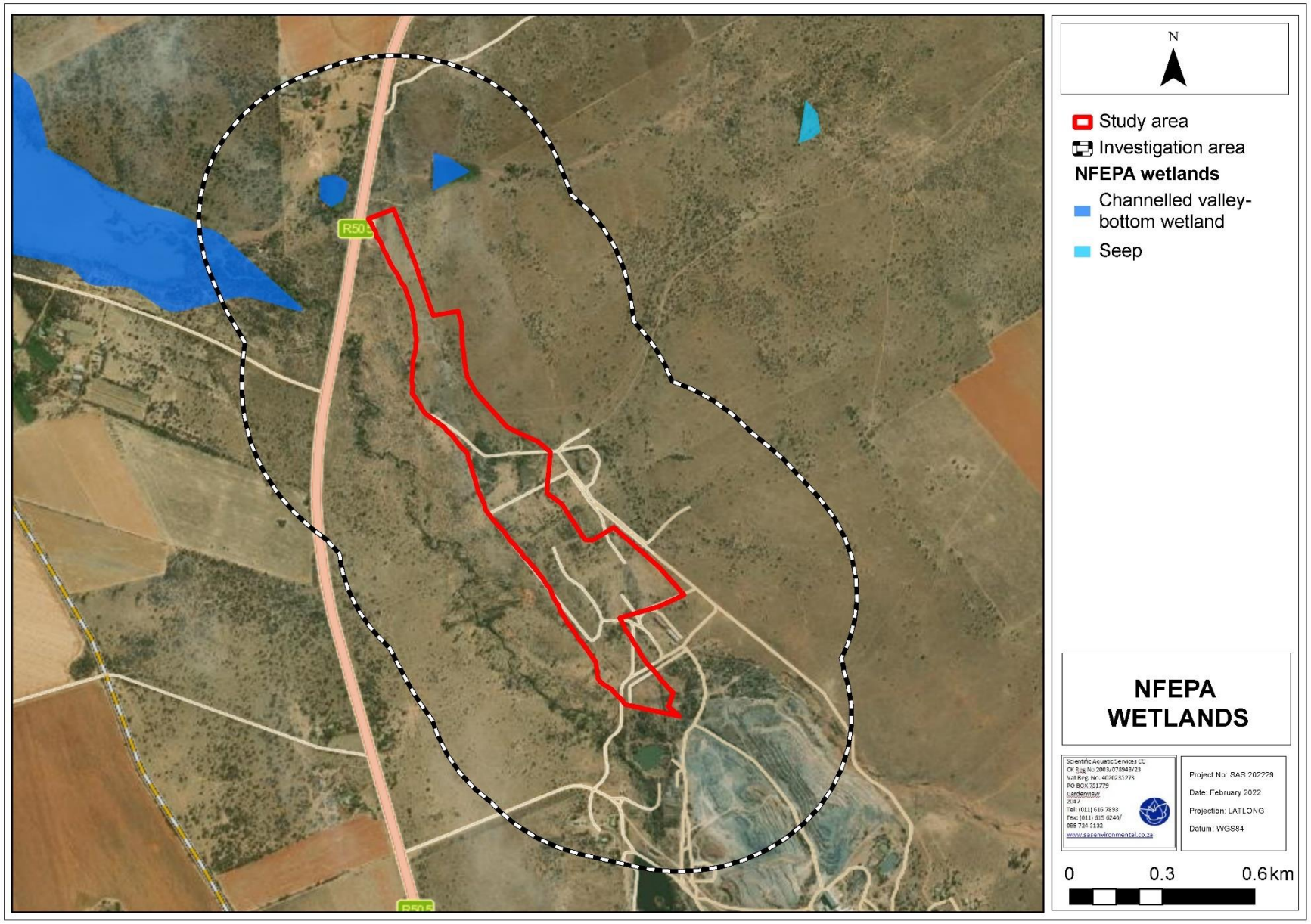


**Figure 5: The wetlands associated with the study and investigation area according to the NFEPA database (2011).**

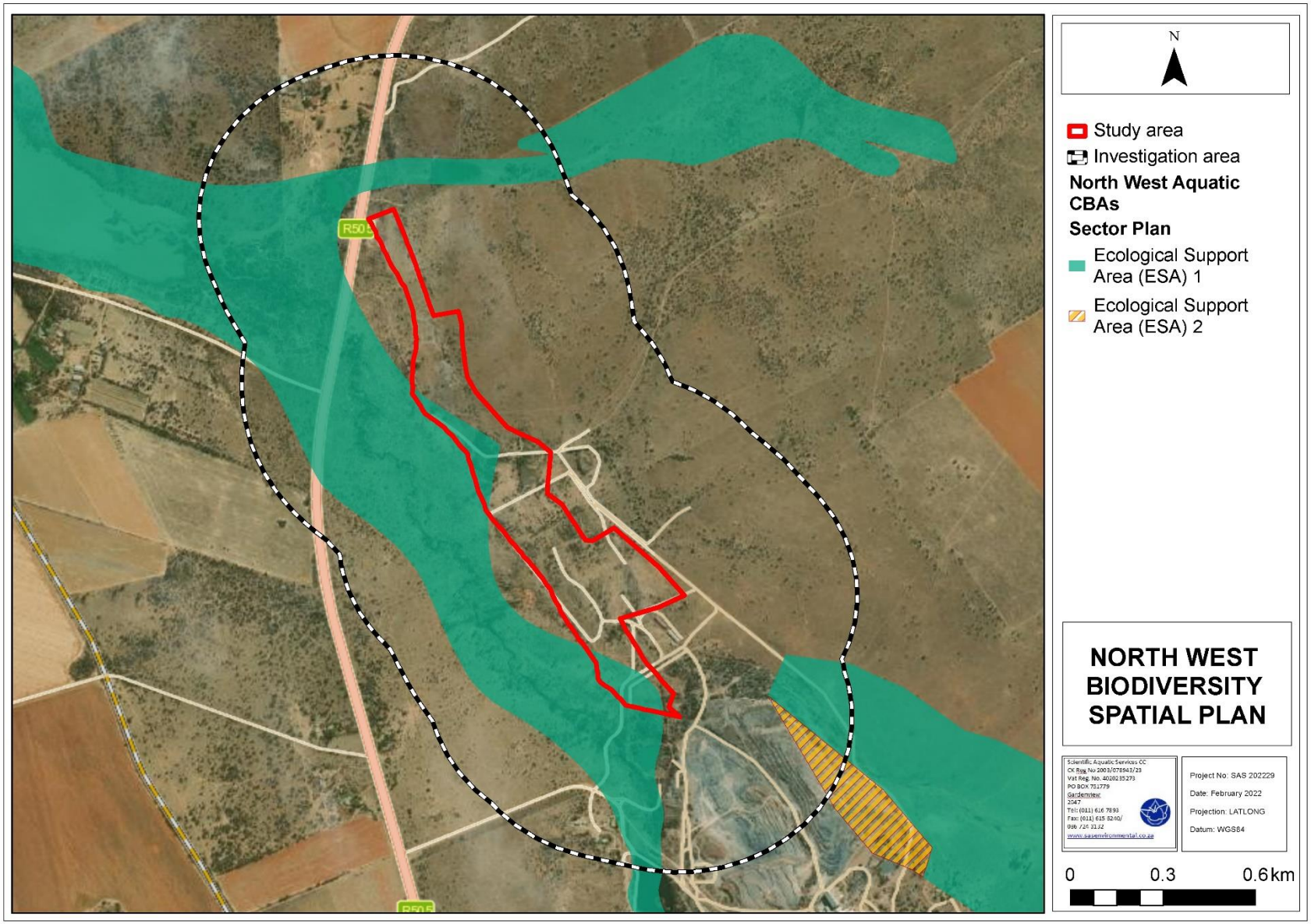


**Figure 6: The Aquatic ESAs associated with the study and investigation area according to the North-West Biodiversity Spatial Plan (2015).**

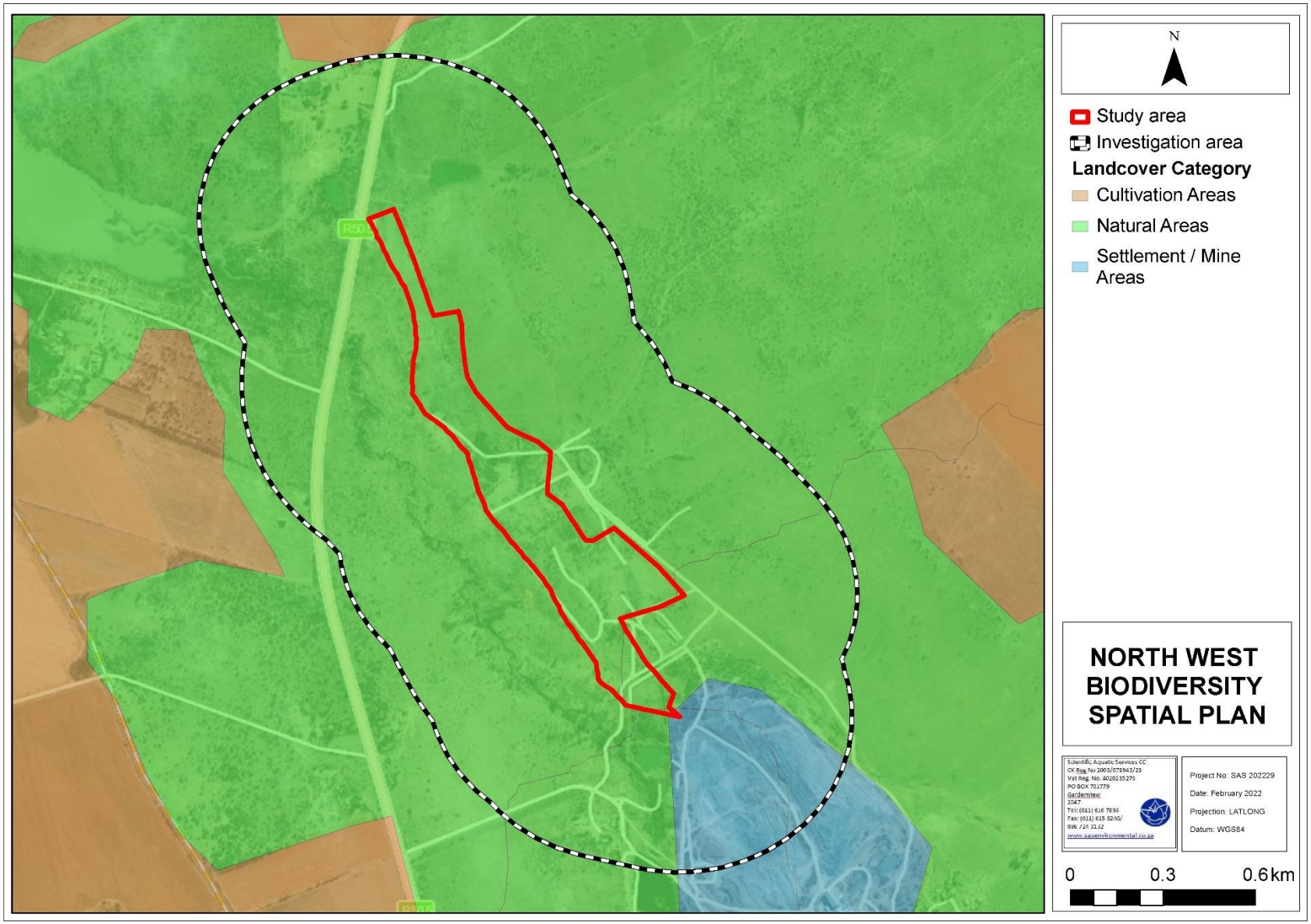


**Figure 7: The landcover associated with the study and investigation area according to the North-West Biodiversity Spatial Plan (2015).**

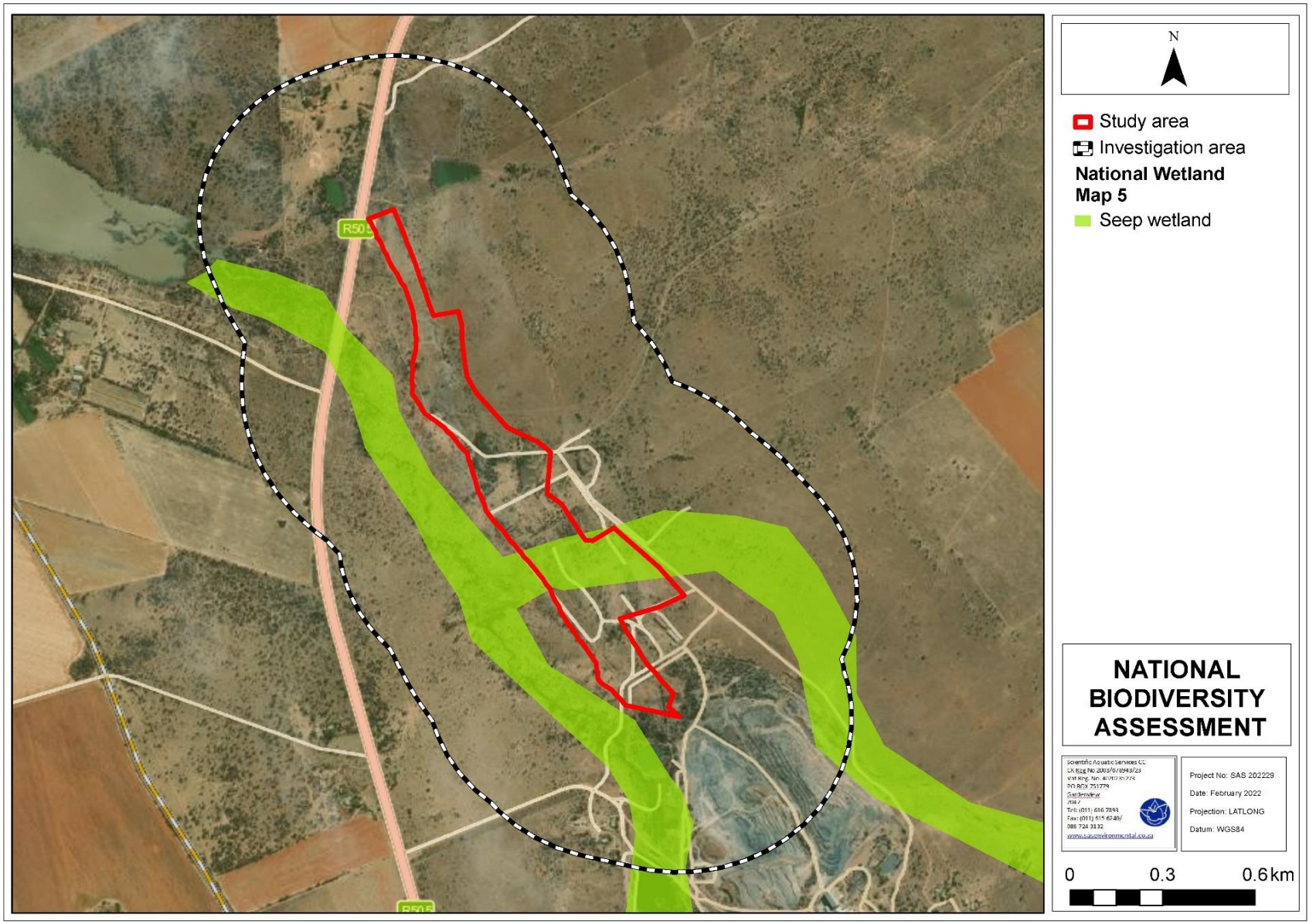


**Figure 8: The wetlands associated with the study and investigation area according to the NBA (2018) database.**

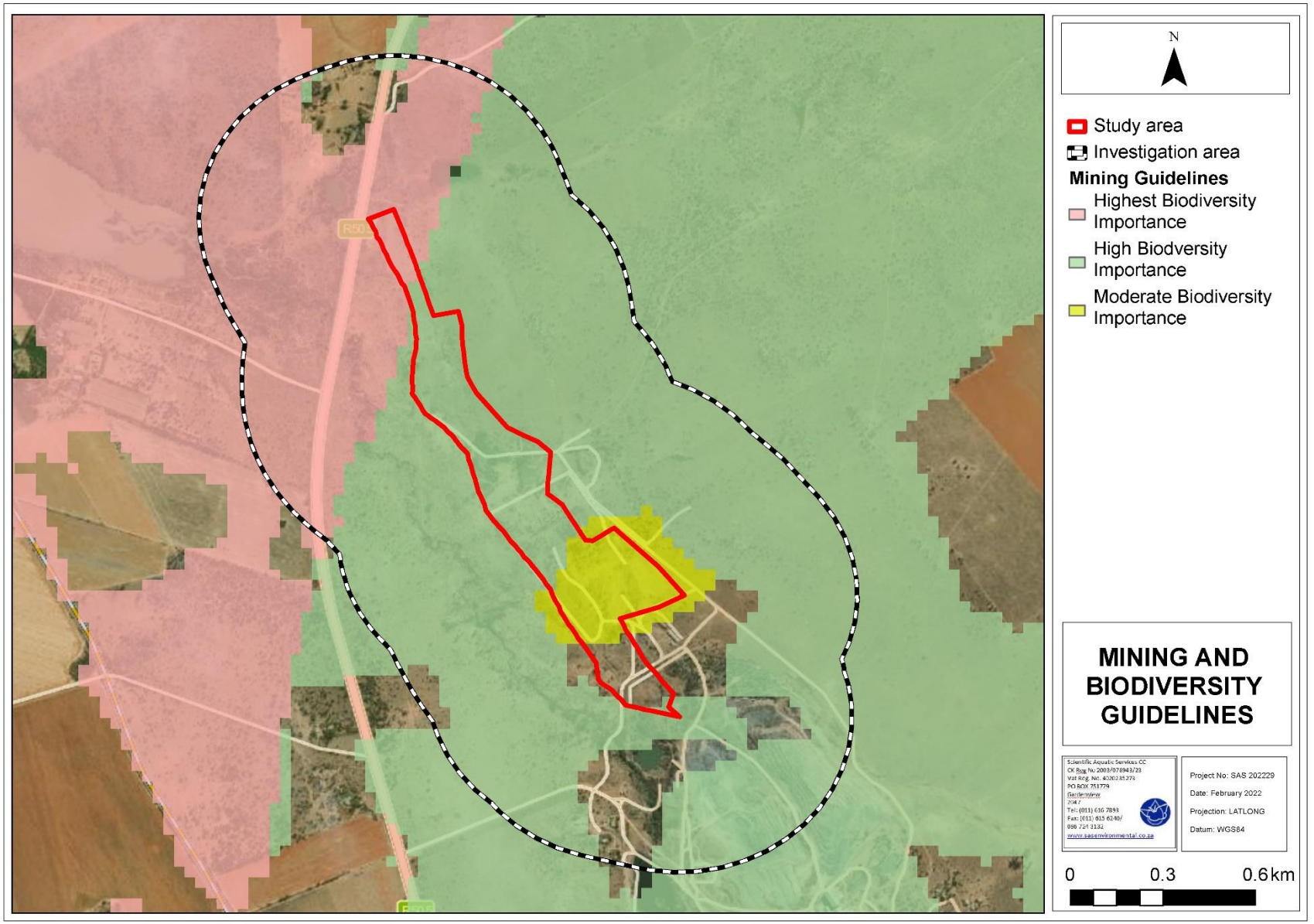


**Figure 9: The biodiversity importance associated with the study and investigation area as per the Mining and Biodiversity Guidelines (2012).**

## 3.2 Freshwater Ecosystem Definition

The National Water Act, 1998 (Act No. 36 of 1998) is aimed at the protection of the country's water resources, defined in the Act as "a watercourse, surface water, estuary or aquifer". According to the National Water Act, 1998 (Act No. 36 of 1998), a watercourse means:

(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 a watercourse.

The National Water Act, 1998 (Act No. 36 of 1998) further provides definitions of wetland and riparian habitats as follows:

**Wetland habitat** is "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."

**Riparian habitat** includes the physical structure and associated vegetation of the areas associated with a watercourse which are commonly characterized by alluvial soils, and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with a composition and physical structure distinct from those of adjacent areas.

Thus, for the purposes of this investigation, the definition of a freshwater ecosystem is synonymous with the definition of a watercourse as per the National Water Act, 1998 (Act No. 36 of 1998) and the terms may be used interchangeably in this report.

## 3.3 Preliminary delineation and classification of the freshwater ecosystems associated with the study and investigation area using desktop analysis

The delineation of the freshwater ecosystems was undertaken using desktop methods and takes into consideration the desktop database information as per Section 3.1 above. Thus, the delineations using desktop methods make use of the latest Google Earth digital satellite imagery, to identify features displaying a diversity of digital signatures. In this regard, specific mention is made of the following:

- Linear features: since water flows/moves through the landscape, watercourses often have a distinct linear element to their signature which makes them discernible on aerial photography or digital satellite imagery;

- Vegetation associated with watercourses: a distinct increase in density as well as shrub size near flow paths;
- Hue: with water flow paths often show as white/grey or black and outcrops or bare soils displaying varying chroma created by varying vegetation cover, geology and soil conditions. Changes in the hue of vegetation with watercourse vegetation often indicated on black and white images as areas of darker hue (dark grey and black). In colour imagery these areas mostly show up as darker green and olive colours or brighter green colours in relation to adjacent areas where there is less soil moisture or surface water present; and
- Texture: with areas displaying various textures, created by varying vegetation cover and soil conditions.

Based on the abovementioned characteristics and the professional experience of the freshwater ecologist in delineating and assessing freshwater ecosystems, a preliminary delineation of the freshwater ecosystems situated within the study and associated investigation area is presented in Figure 10, below.

The freshwater delineation undertaken using desktop methods indicated that various areas indicative of freshwater ecosystem habitat, including areas indicated by the NFEPA (2011) NBA (2018) and NWBSP (2015) databases are situated within the confines of the study and investigation area. At present, freshwater ecosystem habitat will be encroached by the mining block areas (specifically blocks 2N, 3N and 5N), stockpiling areas and both east and west access roads which is likely to directly impact these systems. In addition, it is considered plausible that areas identified to be freshwater habitat that are not directly encroached by the proposed Driekuil development components may also be affected by indirect impacts and edge effects. The presented desktop delineations can thus be used to guide the future layout and planning for the proposed Driekuil development.

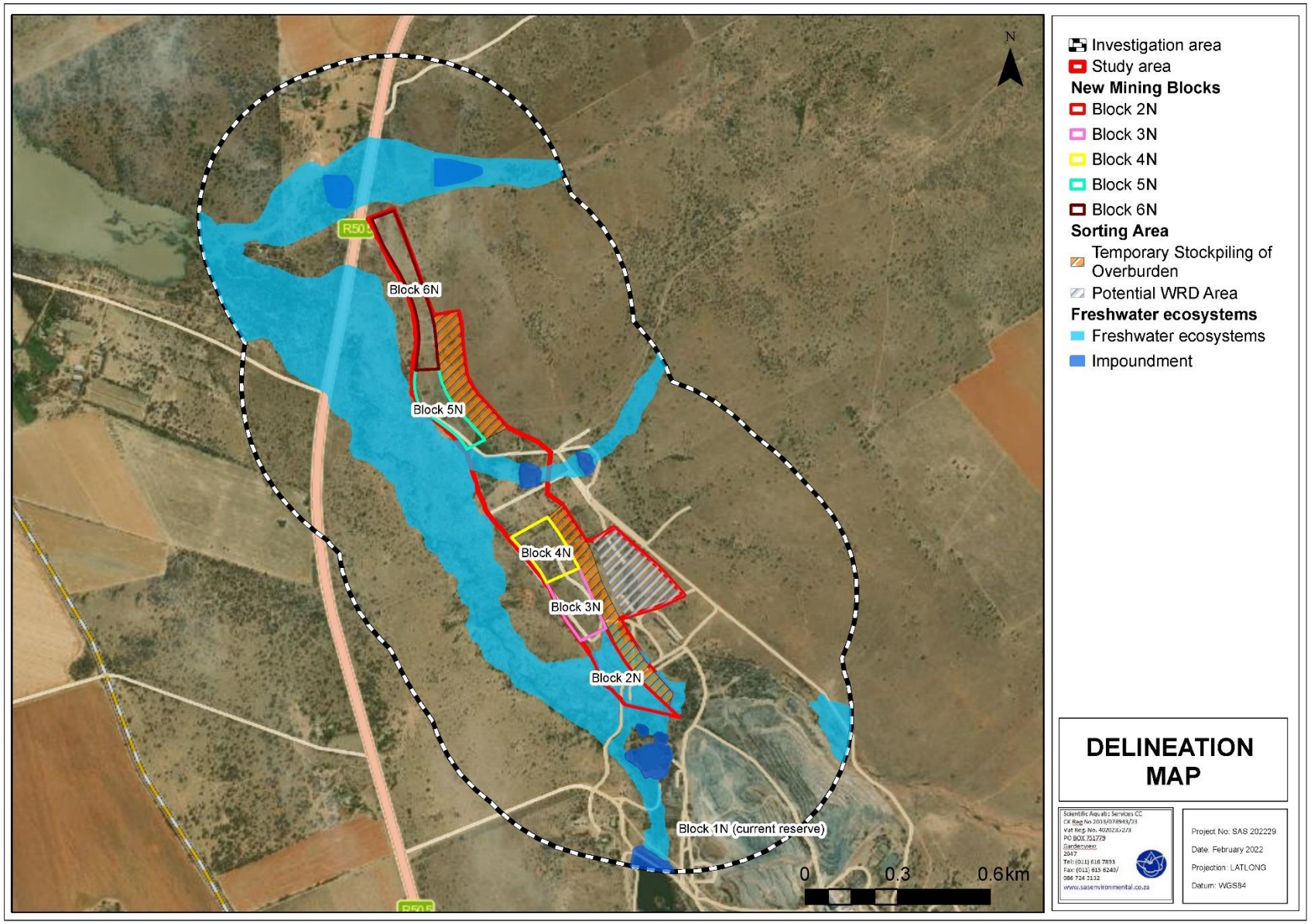


**Figure 10: Freshwater ecosystem delineations (desktop methods) associated with the proposed Driekuil development on the study and investigation area.**

# 4 LEGISLATIVE REQUIREMENTS AND NATIONAL AND PROVINCIAL GUIDELINES PERTAINING TO THE FRESHWATER ECOSYSTEMS

As part of the freshwater ecosystem scoping phase assessment, a preliminary sensitivity map was developed incorporating all relevant legislative requirements applicable to the freshwater ecosystem delineations associated with the study and investigation area, as undertaken using desktop methods.

A regulated zone is a legally stipulated area around the delineated freshwater ecosystems that:

a) May be considered a 'high sensitivity' area, as deemed necessary by the specialist; and/or
b) Would require authorisation by the relevant authorities for any activities (both construction and operation of any development) within the identified regulatory zone as applicable to a specific type of freshwater ecosystem (eg. wetland or riparian).

The definition and motivation for a regulated zone of activity for the protection of the freshwater ecosystems can be summarised in Table 2, as follows:

**Table 2: Articles of legislation and the relevant regulated areas applicable to each article.**

| Regulatory authorisation required | Zone of applicability |
|---|---|
| Water Use License Application in terms of the National Water Act, 1998 (Act 36 of 1998). | **General Notice 509 as published in the Government Gazette 40229 of 2016 as it relates to the National Water Act, 1998 (Act 36 of 1998)**<br>In accordance with GN509 of 2016 as it relates to the National Water Act, 1998 (Act No. 36 of 1998), a regulated area of a watercourse in terms of water uses as listed in Section 21(c) and 21(i) is defined as:<br>• the outer edge of the 1 in 100 year flood line and/or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of a river, spring, natural channel, lake or dam;<br>• in the absence of a determined 1 in 100 year flood line or riparian area the area within 100 m from the edge of a watercourse where the edge of the watercourse is the first identifiable annual bank fill flood bench; or<br>• a 500 m radius from the delineated boundary (extent) of any wetland or pan. |
| | **Government Notice 704 Regulations as published in the Government Gazette 20119 of 1999 as it relates to the National Water Act, 1998 (Act No. 36 of 1998) regarding the use of water for mining and related activities aimed at the protection of water resources.**<br>These Regulations were put in place in order to prevent the pollution of water resources and protect water resources in areas where mining activity is taking place from impacts generally associated with mining. It is recommended that the proposed project complies with GN704 of the National Water Act, 1998 (Act No. 36 of 1998) which contains regulations on use of water for mining and related activities aimed at the protection of water resources. GN704 states that:<br>*No person in control of a mine or activity may:*<br>*(a) locate or place any residue deposit, dam, reservoir, together with any associated structure or any other facility within the 1:100 year floodline or within a horizontal distance of 100 metres from any watercourse or estuary, borehole or well, excluding boreholes or wells drilled specifically to monitor the pollution of groundwater, or on waterlogged ground, or on ground likely to become waterlogged, undermined, unstable or cracked;*<br>According to the above, the activity footprint must fall outside of the 1:100 year floodline of the aquatic resource or 100m from the edge of the resource, whichever distance is the greatest. |
| Listed activities in terms of the National Environmental Management Act, 1998 (Act 107 of 1998) EIA Regulations (2014), as amended must be taken into consideration if any activities (for example, access roads) are to take place within the applicable zone of regulation. This must be determined by the EAP in consultation with the relevant authorities. | **Activity 12** of Listing Notice 1 (GN 327) of the National Environmental Management Act, 1998 (Act 107 of 1998) EIA regulations, 2014 (as amended) states that:<br>*The development of:*<br>*(xii) Infrastructure or structures with a physical footprint of 100 square meters or more;*<br>*Where such development occurs—*<br>*a) Within a watercourse;*<br>*b) In front of a development setback; or*<br>*c) If no development setback has been adopted, within **32 meters of a watercourse**, measured from the edge of a watercourse.*<br>Activity 19 of Listing Notice 1 (GN 327) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) EIA regulations, 2014 (as amended) states *"The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse.* |

In accordance with the National Environmental Management Act, 1998 (Act No. 107 of 1998), a 32 m Zone of Regulation was generated around the freshwater ecosystems whilst a 500 m Zone of Regulation was depicted in accordance with GN509 of the National Water Act, 1998 (Act No. 36 of 1998) as it was considered likely that the freshwater ecosystems would likely be classified as wetlands. In addition, a 100 m Zone of Regulation was also applied in line with GN 704 as it relates to the National Water Act, 1998 (Act No. 36 of 1998).

As noted in Section 3.3, the freshwater delineations provided in this report are intended as a guide for high-level planning and decision-making. Thus, the various Zones of Regulation depicted in Figure 11, below are also provided for information purposes and may potentially change dependent on the outcome of the field verification assessment. In addition, a site-specific buffer zone will be calculated and applied surrounding the wetlands using the "Preliminary guideline for the determination of buffer zones for rivers, wetlands and estuaries" as developed by Macfarlane *et al*. (2015). The implementation of a buffer zone surrounding the freshwater ecosystems will aim to mitigate against direct, indirect impacts and potential edge effects that may occur.

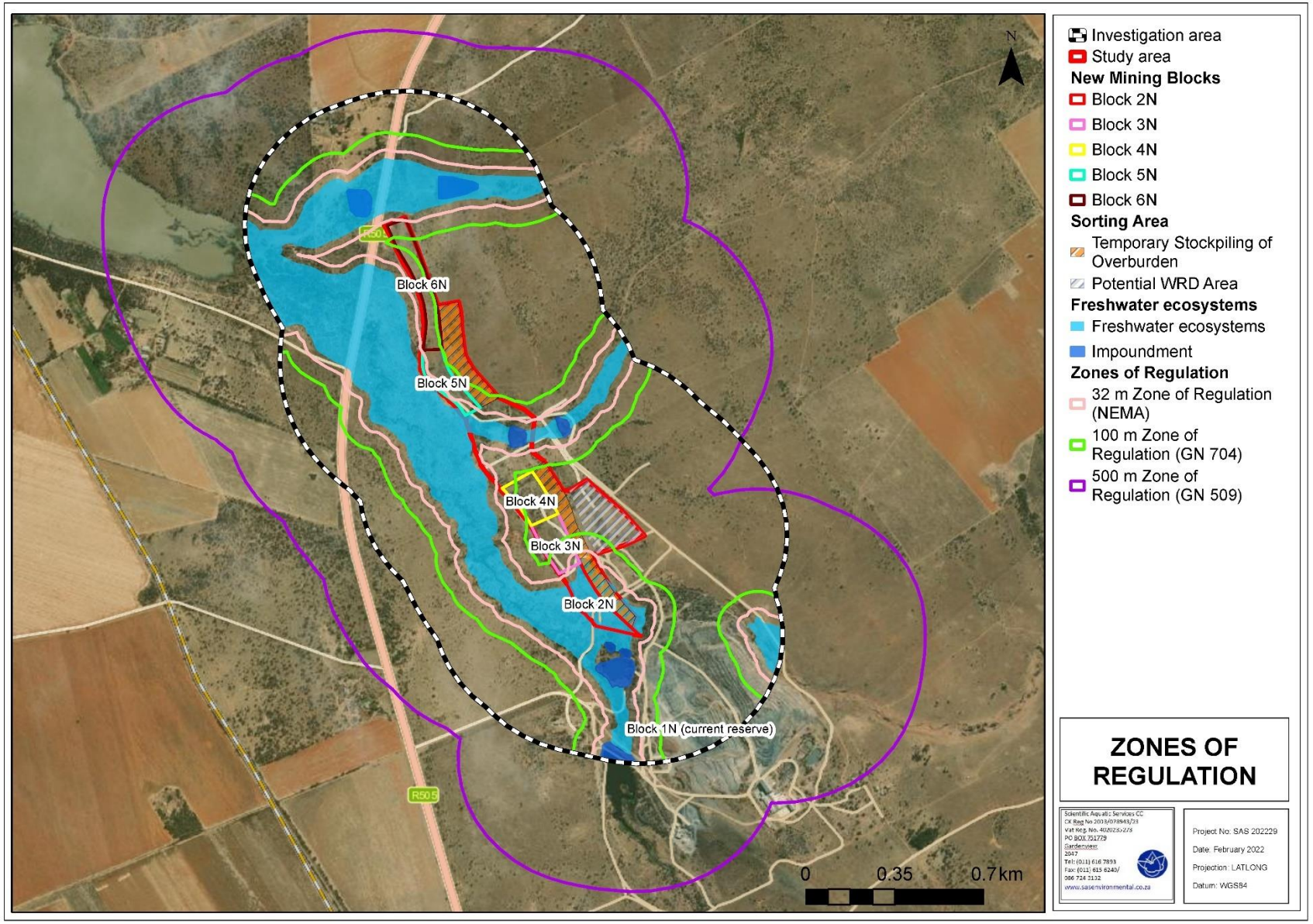


**Figure 11: Conceptual illustration of the potentially applicable Zones of Regulation according to the GN 509, GN 704 and the NEMA.**

# 5 PRELIMINARY IMPACT ANALYSIS

This section of the scoping report aims to provide a brief summary of the anticipated impacts that the proposed Driekuil development may have on the freshwater ecosystems situated within the study and associated investigation area as well as the nature and extent of the impact that may occur. There are five key ecological impacts on freshwater ecosystems that may potentially occur in relation to the proposed Driekuil development, specifically:

- Altered freshwater habitat and ecological structure;
- Potential changes to the sociocultural and ecological service provisioning of the freshwater ecosystems;
- Altered biotic integrity and disturbance to ecosystem functioning;
- Impacts on the hydrology and sediment balance of the freshwater ecosystems; and
- Altered water quality.

Some direct impacts as well as the potential for indirect impacts and cumulative impacts on the freshwater environment are anticipated to occur as a result of the new mining blocks, temporary stockpiling of overburden and both easterly and westerly access roads. In order to assess these risks and the significance thereof, it is firstly necessary to confirm whether the potential freshwater ecosystems identified within the study and investigation area are freshwater ecosystems according to the definitions contained in the National Water Act, 1998 (Act No. 36 of 1998). Thereafter, the potential risk to the receiving freshwater environment can be appropriately assessed using a pre-defined impact assessment method and subsequently, a quantum of impact significance defined.

Desktop data (as presented in this report) was utilised to determine the preliminary impact significance on the various freshwater ecosystems associated with the proposed Driekuil development in the study and associated investigation area which will be further refined and assessed during the EIA phase of this project. Below is a high-level identification of the potential impacts that are anticipated to occur, followed by a recommendation of proposed mitigation measures that can be employed to reduce these impacts from occurring.

## *5.1 Preliminary impacts associated with the Driekuil development on the freshwater ecosystems within the receiving environment.*

The chain of mining blocks (blocks 2N, 3N and 5N) is likely to occur in potential freshwater ecosystems situated within the study area. In addition, the temporary stockpiling of overburden material and the easterly and westerly access roads are located in areas identified as freshwater ecosystems. As a result, this may pose several potential risks to the receiving freshwater environment which have been taken into consideration. The potential risks are briefly presented below:

- Site clearing and preparation prior to commencement of any construction related activities for the proposed Driekuil development in the study area will result the potential for increased disturbance of freshwater habitat including increased runoff and erosion, disturbance and compaction of soil as well as removal of wetland vegetation. In addition, any disturbance from site clearing will result in removal of breeding and feeding habitat for faunal species. Frequent anthropogenic and noise during site clearing is also likely to disturb biota that occupy the affected and adjacent freshwater habitat. Site clearing activities will also contribute to smothering of freshwater soil and vegetation due to increased sedimentation. Should site clearing be undertaken without the implementation of the relevant mitigation measures, the intensity of impacts pre-mitigation is likely to be of “moderate to high” risk significance. The impacts of site clearing are anticipated to be relatively localised however, any impacts on any of the single freshwater ecosystems will likely affect neighbouring areas further downstream as the systems are relatively well connected. Impacts on the freshwater ecosystems are considered likely to occur on a medium to long term basis. The implementation of appropriate mitigation measures during the construction and operational phase of the development are considered likely to reduce the impact significance on the affected freshwater ecosystems.
    - Recommended mitigation measures include ensuring that all project components including mining blocks, stockpile areas and access roads as well as ancillary infrastructure should be located outside of the boundaries of the freshwater ecosystems and associated zones of regulation in line with the requirements of GN 704 and GN 509 of the National Water Act, 1998 (Act No. 36 of 1998). As such, it is recommended that the layout of the proposed Driekuil development be optimised to avoid and/or minimise impacts on the freshwater ecosystems and associated buffer zones (when calculated), wherever possible. It must also be ensured that all construction phase activities must be

undertaken in the dry winter season when surface flow is reduced to decrease the severity of any potential impacts expected on the freshwater ecosystems in the receiving environment;

- The potential for construction activities associated with the creation and operation of mining block areas will permanently alter the freshwater ecosystems that fall within the footprint area of mining blocks 2N, 3N and 5N. As such, mining these blocks will involve removing the wetland soil, vegetation and most importantly altering the hydrological drivers, flow and connectivity of these freshwater ecosystems as a result of deep excavations (upto 25 m in depth) within these systems. The intensity of impacts pre-mitigation is thus considered to be of “high” risk significance;
- The freshwater ecosystems situated outside of the confines of these mining blocks, stockpiling areas and access roads whilst not anticipated to be directly affected are subject to indirect impacts such as desiccation, alteration of wetland vegetation, and smothering by dust and soil from mining and stockpile areas adjacent. The intensity of impacts is likely to be of “moderate” risk significance, pre-mitigation;
- In addition, the creation of stockpile areas and access roads through a freshwater ecosystem considered likely to result in smothering of hydromorphic soils, contribute to soil compaction and largely alter infiltration rates and flow of water within the landscape and subsequently within the freshwater ecosystems. The creation of the stockpile areas and access roads will also contribute increased likelihood of dust generation, altered drainage patterns due to increased impermeable surfaces and associated runoff. The intensity of impact pre-mitigation is considered to be “moderate to high”. Whilst impacts are likely to be of a localised nature, any potential impacts are considered likely to affect neighbouring freshwater ecosystems downgradient due to the connectivity of the freshwater ecosystems in the region. Optimisation of the proposed Driekuil development layout to move the components, specifically the stockpiling areas outside of the freshwater ecosystems and associated buffer zones are considered the best form of mitigation to be employed;
- The freshwater ecosystems that are not recommended to be directly affected by the stockpile areas and access roads are considered likely to be affected by indirect impacts which include smothering of vegetation by increased dust and soil and increased runoff from impermeable surfaces within the catchment of these freshwater ecosystems. Impact significance is anticipated to be of “low to moderate” significance pre-mitigation;
- It is considered likely that the development of additional clean and dirty water separation systems and associated stormwater infrastructure will occur as part of the proposed Driekuil development and may lead to loss of catchment yield from

stormwater containment, altered vegetation community structure and diversity due to moisture stress and reduction in volume of water entering the freshwater environment, leading to reduced recharge. Impacts are considered likely to be of a “moderate” impact significance and may affect neighbouring areas downgradient, before the implementation of mitigation measures;

- The operation and maintenance of the proposed Driekuil development as well as the operation of clean and dirty water separation systems may result in increased risk of pollution of surface water, increased risk of sediment transport in surface runoff from impermeable surfaces, altered vegetation community composition, increased risk of erosion and altered runoff patterns within the landscape. These impacts are considered likely to pose a “moderate” impact significance with impacts considered to occur on a localised scale, pre-mitigation. Mitigation measures recommended to be undertaken to reduce the impact significance include pollution prevention through infrastructure design in order to prevent, eliminate and/or control potential pollution of soil, groundwater and surface water as well as the implementation of a monitoring programme to detect and prevent the pollution of soil, surface and groundwater.

## *5.2 Preliminary Management Measures*

The following “high-level” mitigation measures are provided to assist in minimising impacts to the receiving freshwater environment and which can be considered in the pre-development phase of the proposed Driekuil development. These measures may be refined following the field verification of the freshwater ecosystems, but are provided herein for high-level planning purposes:

- The layout and footprint of the proposed Driekuil development needs to take cognisance of the delineated freshwater ecosystems and calculated buffers and impacts must be mitigated in line with the requirements of the mitigation hierarchy (DEA *et al.,* 2013). As such, it is advised that the Driekuil development layout be reassessed to avoid the delineated boundaries of the freshwater ecosystems with specific mention of mining block 2N and the southern stockpiling area which will directly encroach on the freshwater ecosystems. Should this not be considered feasible, following the mitigation hierarchy a suitable wetland offset might be required if the freshwater ecosystems are confirmed during the EIA phase of the proposed Driekuil development in which impacts cannot be effectively reduced by employing mitigation measures;

- It is also advised that the access roads be reassessed or alternatively maintain the footprint of the existing gravel access road to reduce impacts on freshwater ecosystems;
- The construction and operational footprints must be kept as small as possible to minimise impact on the surrounding environment and loss of catchment yield;
- Care must be taken to ensure no restriction of flow which leads to increased velocity and turbulence of flow during runoff events within the freshwater ecosystems;
- Appropriate sanitary facilities must be provided during the construction phase and all waste must be removed to an appropriate waste facility;
- All soil compacted as a result of construction activities should be ripped and reprofiled to natural levels and revegetated with indigenous vegetation. Special attention should be paid to alien and invasive plant control within these areas;
- No indiscriminate disposal of waste should take place. If any spills occur, they should be immediately cleaned up, and be disposed of at a registered waste facility; and
- Upon completion of construction activities, it must be ensured that no areas remain bare and that indigenous floral species are reintroduced.

**Vehicle access**

- Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the proposed Driekuil development and other proposed infrastructure activities within the study area; and
- In the event of a breakdown, maintenance of vehicles must take place with care and the recollection of spillage should be practiced near the surface area to prevent ingress of hydrocarbons into topsoil.

**Soil**

- Limit the footprint area of the construction activity to what is essential to minimise environmental damage;
- Edge-effects of activities, including erosion and alien and invasive plant control, need to be strictly managed in the disturbed areas;
- It must be ensured that all hazardous storage containers and storage areas comply with the relevant South African Bureau of Standards (SABS) to prevent leakage. All vehicles must be regularly inspected for leaks. Re-fuelling must take place on a sealed surface area to prevent ingress of hydrocarbons into topsoil; and
- To prevent the erosion of topsoil, management measures may include berms, soil traps, hessian curtains and storm water diversion away from areas susceptible to erosion. Stockpiles should be placed away from areas known to contain hazardous

substances such as fuel and if any soils are contaminated, they should be stripped and disposed of at a registered hazardous waste disposal site.

**Rehabilitation**

- All areas affected by mining activities and ancillary infrastructure should be rehabilitated upon closure of the mining and associated infrastructure areas. Areas should be reseeded with indigenous grasses as required;
- Vegetation growth should be promoted as much as possible within the proposed development areas following construction activities to protect the soil;
- Strategies to minimise the spread of alien vegetation must be put in place;
- All areas of disturbed and compacted soils should be ripped and reprofiled; and
- All rehabilitated areas should be rehabilitated to a point where natural processes will allow the pre-development ecological functioning and biodiversity of the area to be re-instated to a relatively functional state. It is highly recommended that a nursery be developed where indigenous tree species are cultivated for use during revegetation of the area and to reintroduce biodiversity elements to the affected areas.

## *5.3 Plan of study for EIA phase*

The following points highlight the envisaged activities during the EIA phase of the proposed Driekuil development:

- Field verification and delineation of the potential freshwater ecosystems must be undertaken, and the field verification assessment must ensure no other freshwater ecosystems are located within the study and investigation area that may have been missed on the desktop assessment using digital satellite imagery;
- During the field verification, the classification of the freshwater ecosystems must be undertaken according to the Classification System for Wetlands and other Aquatic Ecosystems in South Africa. User Manual: Inland systems (Ollis *et al*., 2013);
- The Ecological Importance and Sensitivity (EIS) of the freshwater ecosystems must be determined according to the method described by Rountree and Kotze, (2013);
- The ecological service provisioning provided by the freshwater ecosystems associated with the proposed Driekuil development in the study area and associated investigation area must be assessed according to the method of Kotze *et al* (2020);
- The Present Ecological State (PES) of the freshwater ecosystems must be assessed according to the resource directed measures guideline as advocated by Macfarlane *et al*., (2008) or DWAF (2007) as applicable;

- The freshwater ecosystems within the study and associated investigation area of the Driekuil development should be mapped according to the ecological sensitivity of each hydrogeomorphic unit. In addition to the freshwater ecosystem boundaries, construction and operational phase buffers should be appropriately calculated according to the method of Macfarlane *et al*. (2015) and the applicable Zones of Regulation will be refined and depicted, (where applicable) dependent on the classification of the freshwater ecosystems after the field verification;
- The PES, EIS, and ecological service provision of the freshwater ecosystems should be highlighted and expected impacts on the systems must be assessed according to a pre-defined impact assessment methodology.

# 6 CONCLUSION

Scientific Aquatic Services (SAS) was appointed to conduct a freshwater ecosystem scoping report for the proposed Driekuil development at Wonderstone mine in Ottosdal, North-West Province. The proposed Driekuil development project components will comprise of a five (5) mining blocks, three stockpiling of overburden areas and two (east and west) access roads.

During the desktop analysis, it was established that various freshwater ecosystems are situated within the footprint of the study and investigation area and will be traversed by the mining block areas (2N, 3N and 5N), stockpiling areas and access roads. The planned method of assessment for the EIA phase will include field verification and delineation of the freshwater ecosystems, defining the Present Ecological State (PES), Ecological service provisioning and Ecological Importance and Sensitivity (EIS), as well as defining and assessing the risk significance of the proposed Driekuil development on the freshwater ecosystems.

Preliminary management and mitigation measures (provided in Section 5.2 of this report) include utilising the freshwater ecosystem delineation and Zones of Regulation maps provided in this report (Section 4) for planning purposes, to ensure that no project components encroach on the freshwater ecosystems associated with the proposed Driekuil development.

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# APPENDIX A - TERMS OF USE AND INDEMNITY

The findings, results, observations, conclusions and recommendations given in this report are based on the author's best scientific and professional knowledge as well as available information. The report is based on survey and assessment techniques which are limited by time and budgetary constraints relevant to the type and level of investigation undertaken and SAS CC and its staff reserve the right, at their sole discretion, modify aspects of the report including the recommendations if and when new information may become available from ongoing research or further work in this field or pertaining to this investigation.

Although SAS CC exercises due care and diligence in rendering services and preparing documents, SAS CC accepts no liability and the client, by receiving this document, indemnifies SAS CC and its directors, managers, agents and employees against all actions, claims, demands, losses, liabilities, costs, damages and expenses arising from or in connection with services rendered, directly or indirectly by SAS CC and by the use of the information contained in this document.

This report must not be altered or added to or used for any other purpose other than that for which it was produced without the prior written consent of the author(s). This also refers to electronic copies of this report which are supplied for the purposes of inclusion as part of other reports, including main reports. Similarly, any recommendations, statements or conclusions drawn from or based on this report must make reference to this report. If these form part of a main report relating to this investigation or report, this report must be included in its entirety as an appendix or separate section to the main report.

# APPENDIX B - LEGISLATIVE REQUIREMENTS

| | |
|---|---|
| **The Constitution of the Republic of South Africa, 1996** | The environment and the health and well-being of people are safeguarded under the Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996) by way of section 24. Section 24(a) guarantees a right to an environment that is not harmful to human health or well-being and to environmental protection for the benefit of present and future generations. Section 24(b) directs the state to take reasonable legislative and other measures to prevent pollution, promote conservation, and secure the ecologically sustainable development and use of natural resources (including water and mineral resources) while promoting justifiable economic and social development. Section 27 guarantees every person the right of access to sufficient water, and the state is obliged to take reasonable legislative and other measures within its available resources to achieve the progressive realisation of this right. Section 27 is defined as a socio-economic right and not an environmental right. However, read with section 24 it requires of the state to ensure that water is conserved and protected and that sufficient access to the resource is provided. Water regulation in South Africa places a great emphasis on protecting the resource and on providing access to water for everyone. |
| **National Environmental Management Act, 1998 (Act No. 107 of 1998)** | The National Environmental Management Act, 1998 (NEMA) (Act 107 of 1998) and the associated Regulations as amended in 2017, states that prior to any development taking place within a wetland or riparian area, an environmental authorisation process needs to be followed. This could follow either the Basic Assessment Report (BAR) process or the Environmental Impact Assessment (EIA) process depending on the scale of the impact. Provincial regulations must also be considered. |
| **The National Water Act, 1998 (Act No. 36 of 1998)** | The National Water Act (NWA) (Act 36 of 1998) recognises that the entire ecosystem and not just the water itself in any given water resource constitutes the resource and as such needs to be conserved. No activity may therefore take place within a watercourse unless it is authorised by the Department of Water and Sanitation (DWS). Any area within a wetland or riparian zone is therefore excluded from development unless authorisation is obtained from the DWS in terms of Section 21 (c) and (i). |
| **National Environmental Management: Biodiversity Act (2004) (Act No. 10 of 2004) (NEMBA)** | **Ecosystems that are threatened or in need of protection**<br>(1) (a) The Minister may, by notice in the Gazette, publish a national list of ecosystems that are threatened and in need of protection.<br>*(b)* An MEC for environmental affairs in a province may, by notice in *the Gazette,* publish a provincial list of ecosystems in the province that are threatened and in need of protection.<br>(2) The following categories of ecosystems may be listed in terms of subsection (1):<br>*(a)* critically endangered ecosystems, being ecosystems that 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;<br>*(b)* endangered ecosystems, being ecosystems that have undergone degradation of ecological structure, function or composition as a result of human intervention, although they are not critically endangered ecosystems;<br>(c) vulnerable ecosystems, being ecosystems that 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; and<br>*(d)* protected ecosystems, being ecosystems that are of high conservation value or of high national or provincial importance, although they are not listed in terms of paragraphs *(a), (b)* or (c). |
| **Government Notice 598 Alien and Invasive Species Regulations (2014), including the Government Notice 864 Alien Invasive Species List as published in the Government Gazette 40166 of 2016, as it relates to the National Environmental** | NEMBA is administered by the Department of Environmental Affairs and aims to provide for the management and conservation of South Africa's biodiversity within the framework of the NEMA. This act in terms of alien and invasive species aims to:<br>➢ Prevent the unauthorized introduction and spread of alien and invasive species to ecosystems and habitats where they do not naturally occur,<br>➢ Manage and control alien and invasive species, to prevent or minimize harm to the environment and biodiversity; and<br>➢ Eradicate alien species and invasive species from ecosystems and habitats where they may harm such ecosystems or habitats.<br><br>Alien species are defined, in terms of the NEMBA as: |

| | |
|---|---|
| **Management Biodiversity Act, 2004 (Act No 10 of 2004).** | (a) A species that is not an indigenous species; or<br>(b) An indigenous species translocated or intended to be translocated to a place outside its natural distribution range in nature, but not an indigenous species that has extended its natural distribution range by natural means of migration or dispersal without human intervention.<br><br>Categories according to NEMBA (Alien and Invasive Species Regulations, 2017):<br>➢ **Category 1a:** Invasive species that require compulsory control;<br>➢ **Category 1b:** Invasive species that require control by means of an invasive species management programme;<br>➢ **Category 2:** Commercially used plants that may be grown in demarcated areas, provided that there is a permit and that steps are taken to prevent their spread; and<br>➢ **Category 3:** Ornamentally used plants that may no longer be planted. |
| **Government Notice 509 as published in the Government Gazette 40229 of 2016 as it relates to the National Water Act, 1998 (Act No. 36 of 1998)** | In accordance with Regulation GN509 of 2016, a regulated area of a watercourse for section 21 (c) and 21 (i) of the National Water Act, 1998 (Act No. 36 of 1998) is defined as:<br>a) The outer edge of the 1 in 100 year flood line and/or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of a river, spring, natural channel, lake or dam;<br>b) In the absence of a determined 1 in 100 year flood line or riparian area the area within 100 m from the edge of a watercourse where the edge of the watercourse is the first identifiable annual bank fill flood bench; or<br>c) A 500 m radius from the delineated boundary (extent) of any wetland or pan.<br><br>This notice **replaces GN1199** and may be exercised as follows:<br>i) Exercise the water use activities in terms of Section 21(c) and (i) of the Act as set out in the table below, subject to the conditions of this authorisation;<br>ii) Use water in terms of section 21(c) or (i) of the Act if it has a low risk class as determines through the Risk Matrix;<br>iii) Do maintenance with their existing lawful water use in terms of section 21(c) or (i) of the Act that has a LOW risk class as determined through the Risk Matrix;<br>iv) Conduct river and stormwater management activities as contained in a river management plan;<br>v) Conduct rehabilitation of wetlands or rivers where such rehabilitation activities has a LOW risk class as determined through the Risk Matrix; and<br>vi) Conduct emergency work arising from an emergency situation or incident associated with the persons' existing lawful water use, provided that all work is executed and reported in the manner prescribed in the Emergency protocol.<br><br>A General Authorisation (GA) issued as per this notice will require the proponent to adhere with specific conditions, rehabilitation criteria and monitoring and reporting programme. Furthermore, the water user must ensure that there is a sufficient budget to complete, rehabilitate and maintain the water use as set out in this GA.<br><br>Upon completion of the registration, the responsible authority will provide a certificate of registration to the water user within 30 working days of the submission. On written receipt of a registration certificate from the Department, the person will be regarded as a registered water user and can commence within the water use as contemplated in the GA. |
| **National Environmental Management: Waste Act, No 59 of 2008 (NEMWA)** | NEMWA, which reforms the law regulating waste management in order to protect the health and the environment by providing reasonable measures for the prevention of pollution; provides for national norms and standards for regulating the management of waste by all spheres of government and provides for the licensing and control of waste management activities. |

# APPENDIX C – WATERCOURSE METHOD OF ASSESSMENT

## 1. Desktop Study

Prior to the commencement of the field assessment, a background study, including a literature review, was conducted in order to determine the ecoregion and ecostatus of the larger aquatic system within which the freshwater features present or in close proximity to the study area are located. Aspects considered as part of the literature review are discussed in the sections that follow.

### *1.1 National Freshwater Ecosystem Priority Areas (NFEPA, 2011)*

The NFEPA project is a multi-partner project between the Council of Scientific and Industrial Research (CSIR), Water Research Commission (WRC), South African National Biodiversity Institute (SANBI), Department of Water Affairs (DWA), South African Institute of Aquatic Biodiversity (SAIAB) and South African National Parks (SANParks). The project responds to the reported degradation of freshwater ecosystem condition and associated biodiversity, both globally and in South Africa. It uses systematic conservation planning to provide strategic spatial priorities of conserving South Africa's freshwater biodiversity, within the context of equitable social and economic development.

The NFEPA project aims to identify a national network of freshwater conservation areas and to explore institutional mechanisms for their implementation. Freshwater ecosystems provide a valuable natural resource with economic, aesthetic, spiritual, cultural and recreational value. However, the integrity of freshwater ecosystems in South Africa is declining at an alarming rate, largely as a consequence of a variety of challenges that are practical (managing vast areas of land to maintain connectivity between freshwater ecosystems), socio-economic (competition between stakeholders for utilisation) and institutional (building appropriate governance and co-management mechanisms).

The NFEPA database was searched for information in terms of conservation status of rivers, wetland habitat and wetland features present in the study area or the vicinity thereof.

## 2. Classification System for Wetlands and other Aquatic Ecosystems in South Africa

The freshwater features encountered within the proposed study area were assessed using the Classification System for Wetlands and other Aquatic Ecosystems in South Africa. User Manual: Inland Systems (Ollis *et al*., 2013), hereafter referred to as the "Classification System". A summary of Levels 1 to 4 of the classification system are presented in Table C1 and C2, below.

**Table C1: Proposed classification structure for Inland Systems, up to Level 3.**

| WETLAND / AQUATIC ECOSYSTEM CONTEXT | | |
|---|---|---|
| LEVEL 1:<br>SYSTEM | LEVEL 2:<br>REGIONAL SETTING | LEVEL 3:<br>LANDSCAPE UNIT |
| Inland Systems | DWA Level 1 Ecoregions<br>OR<br>NFEPA WetVeg Groups<br>OR<br>Other special framework | Valley Floor |
| | | Slope |
| | | Plain |
| | | Bench<br>(Hilltop / Saddle / Shelf) |

**Table C2: Hydrogeomorphic (HGM) Unit for the Inland System, showing the primary HGM Types at Level 4A and the subcategories at Level 4B to 4C.**

| FUNCTIONAL UNIT | | |
|---|---|---|
| LEVEL 4: HYDROGEOMORPHIC (HGM) UNIT | | |
| HGM type | Longitudinal zonation/ Landform / Outflow drainage | Landform / Inflow drainage |
| **A** | **B** | **C** |
| River | Mountain headwater stream | Active channel |
| | | Riparian zone |
| | Mountain stream | Active channel |
| | | Riparian zone |
| | Transitional | Active channel |
| | | Riparian zone |
| | Upper foothills | Active channel |
| | | Riparian zone |
| | Lower foothills | Active channel |
| | | Riparian zone |
| | Lowland river | Active channel |
| | | Riparian zone |
| | Rejuvenated bedrock fall | Active channel |
| | | Riparian zone |
| | Rejuvenated foothills | Active channel |
| | | Riparian zone |
| | Upland floodplain | Active channel |
| | | Riparian zone |
| Channelled valley-bottom wetland | (not applicable) | (not applicable) |
| Unchannelled valley-bottom wetland | (not applicable) | (not applicable) |
| Floodplain wetland | Floodplain depression | (not applicable) |
| | Floodplain flat | (not applicable) |
| Depression | Exorheic | With channelled inflow |
| | | Without channelled inflow |
| | Endorheic | With channelled inflow |
| | | Without channelled inflow |
| | Dammed | With channelled inflow |
| | | Without channelled inflow |
| Seep | With channelled outflow | (not applicable) |
| | Without channelled outflow | (not applicable) |
| Wetland flat | (not applicable) | (not applicable) |

## *Level 1: Inland systems*

From the Classification System, Inland Systems are defined as aquatic ecosystems that have no existing connection to the ocean[2] (i.e. characterised by the complete absence of marine exchange and/or tidal influence) but which are inundated or saturated with water, either permanently or periodically. It is important to bear in mind, however, that certain Inland Systems may have had a historical connection to the ocean, which in some cases may have been relatively recent.

## *Level 2: Ecoregions & NFEPA Wetland Vegetation Groups*

For Inland Systems, the regional spatial framework that has been included at Level 2 of the classification system is that of DWA's Level 1 Ecoregions for aquatic ecosystems (Kleynhans *et al.,* 2005). There is a total of 31 Ecoregions across South Africa, including Lesotho and Swaziland. DWA Ecoregions have

[2] Most rivers are indirectly connected to the ocean via an estuary at the downstream end, but where marine exchange (i.e. the presence of seawater) or tidal fluctuations are detectable in a river channel that is permanently or periodically connected to the ocean, it is defined as part of the estuary.

most commonly been used to categorise the regional setting for national and regional water resource management applications, especially in relation to rivers.

The Vegetation Map of South Africa, Swaziland and Lesotho (Mucina & Rutherford, 2006) group's vegetation types across the country according to Biomes, which are then divided into Bioregions. To categorise the regional setting for the wetland component of the National Freshwater Ecosystem Priority Areas (NFEPA) project, wetland vegetation groups (referred to as WetVeg Groups) were derived by further splitting bioregions into smaller groups through expert input (Nel *et al*., 2011). There are currently 133 NFEPA WetVeg Groups. It is envisaged that these groups could be used as a special framework for the classification of wetlands in national- and regional-scale conservation planning and wetland management initiatives.

### *Level 3: Landscape Setting*

At Level 3 of the Classification System, for Inland Systems, a distinction is made between four Landscape Units (Table C1) on the basis of the landscape setting (i.e. topographical position) within which an HGM Unit is situated, as follows (Ollis *et al.,* 2013):

- **Slope:** an included stretch of ground that is not part of a valley floor, which is typically located on the side of a mountain, hill or valley;
- **Valley floor:** The base of a valley, situated between two distinct valley side-slopes;
- **Plain:** an extensive area of low relief characterised by relatively level, gently undulating or uniformly sloping land; and
- **Bench (hilltop/saddle/shelf):** an area of mostly level or nearly level high ground (relative to the broad surroundings), including hilltops/crests (areas at the top of a mountain or hill flanked by down-slopes in all directions), saddles (relatively high-lying areas flanked by down-slopes on two sides in one direction and up-slopes on two sides in an approximately perpendicular direction), and shelves/terraces/ledges (relatively high-lying, localised flat areas along a slope, representing a break in slope with an up-slope one side and a down-slope on the other side in the same direction).

### *Level 4: Hydrogeomorphic Units*

Seven primary HGM Types are recognised for Inland Systems at Level 4A of the Classification System (Table C2), on the basis of hydrology and geomorphology (Ollis *et al*., 2013), namely:

- **River:** a linear landform with clearly discernible bed and banks, which permanently or periodically carries a concentrated flow of water;
- **Channelled valley-bottom wetland:** a valley-bottom wetland with a river channel running through it;
- **Unchannelled valley-bottom wetland:** a valley-bottom wetland without a river channel running through it;
- **Floodplain wetland:** the mostly flat or gently sloping land adjacent to and formed by an alluvial river channel, under its present climate and sediment load, which is subject to periodic inundation by over-topping of the channel bank;
- **Depression:** a landform with closed elevation contours that increases in depth from the perimeter to a central area of greatest depth, and within which water typically accumulates.
- **Wetland Flat:** a level or near-level wetland area that is not fed by water from a river channel, and which is typically situated on a plain or a bench. Closed elevation contours are not evident around the edge of a wetland flat; and
- **Seep:** a wetland area located on (gently to steeply) sloping land, which is dominated by the colluvial (i.e. gravity-driven), unidirectional movement of material down-slope. Seeps are often located on the side-slopes of a valley but they do not, typically, extend into a valley floor.

The above terms have been used for the primary HGM Units in the classification system to try and ensure consistency with the wetland classification terms currently in common usage in South Africa. Similar terminology (but excluding categories for "channel", "flat" and "valleyhead seep") is used, for example, in the recently developed tools produced as part of the Wetland Management Series including WET-Health (Macfarlane *et al*., 2008), WET-IHI (DWAF, 2007) and WET-EcoServices (Kotze *et al*., 2009).

## 3. WET-Health

Healthy wetlands are known to provide important habitats for wildlife and to deliver a range of important goods and services to society. Management of these systems is therefore essential if these attributes are to be retained within an ever-changing landscape. The primary purpose of this assessment is to evaluate the eco-physical health of wetlands, and in so doing to promote their conservation and wise management.

**Level of Evaluation**

Two levels of assessment are provided by WET-Health:

- Level 1: Desktop evaluation, with limited field verification. This is generally applicable to situations where a large number of wetlands need to be assessed at a very low resolution; or
- Level 2: On-site evaluation. This involves structured sampling and data collection in a single wetland and its surrounding catchment.

**Framework for the Assessment**

A set of three modules has been synthesised from the set of processes, interactions and interventions that take place in wetland systems and their catchments: hydrology (water inputs, distribution and retention, and outputs), geomorphology (sediment inputs, retention and outputs) and vegetation (transformation and presence of introduced alien species).

**Units of Assessment**

Central to WET-Health is the characterisation of HGM Units, which have been defined based on geomorphic setting (e.g. hillslope or valley-bottom; whether drainage is open or closed), water source (surface water dominated or sub-surface water dominated) and pattern of water flow through the wetland unit (diffusely or channelled) as described under the Classification System for Wetlands and other Aquatic Ecosystems above.

**Quantification of Present State of a wetland**

The overall approach is to quantify the impacts of human activity or clearly visible impacts on wetland health, and then to convert the impact scores to a Present State score. This takes the form of assessing the spatial extent of the impact of individual activities and then separately assessing the intensity of the impact of each activity in the affected area. The extent and intensity are then combined to determine an overall magnitude of impact. The impact scores, and Present State categories are provided in the table below.

**Table C3: Impact scores and categories of Present State used by WET-Health for describing the integrity of wetlands.**

| Impact category | Description | Impact score range | Present State category |
|---|---|---|---|
| None | Unmodified, natural | 0-0.9 | A |
| Small | Largely natural with few modifications. A slight change in ecosystem processes is discernible and a small loss of natural habitats and biota may have taken place. | 1-1.9 | B |
| Moderate | Moderately modified. A moderate change in ecosystem processes and loss of natural habitats has taken place, but the natural habitat remains predominantly intact. | 2-3.9 | C |
| Large | Largely modified. A large change in ecosystem processes and loss of natural habitat and biota and has occurred. | 4-5.9 | D |
| Serious | The change in ecosystem processes and loss of natural habitat and biota is great, but some remaining natural habitat features are still recognisable. | 6-7.9 | E |
| Critical | Modifications have reached a critical level and the ecosystem processes have been completely modified with an almost complete loss of natural habitat and biota. | 8-10 | F |

**Assessing the Anticipated Trajectory of Change**

As is the case with the Present State, future threats to the state of the wetland may arise from activities in the catchment upstream of the unit or within the wetland itself or from processes downstream of the wetland. In each of the individual sections for hydrology, geomorphology and vegetation, five potential situations exist depending upon the direction and likely extent of change (table below).

**Table C4: Trajectory of Change classes and scores used to evaluate likely future changes to the present state of the wetland.**

| Change Class | Description | HGM change score | Symbol |
|---|---|---|---|
| Substantial improvement | State is likely to improve substantially over the next 5 years | 2 | ↑↑ |
| Slight improvement | State is likely to improve slightly over the next 5 years | 1 | ↑ |
| Remain stable | State is likely to remain stable over the next 5 years | 0 | → |
| Slight deterioration | State is likely to deteriorate slightly over the next 5 years | -1 | ↓ |
| Substantial deterioration | State is expected to deteriorate substantially over the next 5 years | -2 | ↓↓ |

**Overall health of the wetland**

Once all HGM Units have been assessed, a summary of health for the wetland as a whole needs to be calculated. This is achieved by calculating a combined score for each component by area-weighting the scores calculated for each HGM Unit. Recording the health assessments for the hydrology, geomorphology and vegetation components provide a summary of impacts, Present State, Trajectory of Change and Health for individual HGM Units and for the entire wetland.

## 4. Wetland Function Assessment

"The importance of a water resource, in ecological social or economic terms, acts as a modifying or motivating determinant in the selection of the management class".[3] The assessment of the ecosystem services supplied by the identified freshwater features was conducted according to the guidelines as described by Kotze *et al.* (2009). An assessment was undertaken that examines and rates the following services according to their degree of importance and the degree to which the service is provided:

- Flood attenuation;
- Stream flow regulation;
- Sediment trapping;
- Phosphate trapping;
- Nitrate removal;
- Toxicant removal;
- Erosion control;
- Carbon storage;
- Maintenance of biodiversity;
- Water supply for human use;
- Natural resources;
- Cultivated foods;
- Cultural significance;
- Tourism and recreation; and
- Education and research.

[3] Department of Water Affairs and Forestry, South Africa Version 1.0 of Resource Directed Measures for Protection of Water Resources, 1999

The characteristics were used to quantitatively determine the value, and by extension sensitivity, of the freshwater features. Each characteristic was scored to give the likelihood that the service is being provided. The scores for each service were then averaged to give an overall score to the freshwater features.

**Table C5: Classes for determining the likely extent to which a benefit is being supplied.**

| Score | Rating of the likely extent to which the benefit is being supplied |
|---|---|
| <0.5 | Low |
| 0.6-1.2 | Moderately low |
| 1.3-2 | Intermediate |
| 2.1-3 | Moderately high |
| >3 | High |

## 5. Ecological Importance and Sensitivity (EIS) (Rountree & Kotze, 2013)

The purposed of assessing importance and sensitivity of water resources is to be able to identify those systems that provide higher than average ecosystem services, biodiversity support functions or are especially sensitive to impacts. Water resources with higher ecological importance may require managing such water resources in a better condition than the present to ensure the continued provision of ecosystem benefits in the long term (Rountree & Kotze, 2013).

In order to align the outputs of the Ecoservices assessment (i.e. ecological and socio-cultural service provision) with methods used by the DWA (now the DWS) used to assess the EIS of other watercourse types, a tool was developed using criteria from both WET-Ecoservices (Kotze, *et, al,* 2009) and earlier DWA EIA assessment tools. Thus, three proposed suites of important criteria for assessing the Importance and Sensitivity for wetlands were proposed, namely:

- Ecological Importance and Sensitivity, incorporating the traditionally examined criteria used in EIS assessments of other water resources by DWA and thus enabling consistent assessment approaches across water resource types;
- Hydro-functional importance, taking into consideration water quality, flood attenuation and sediment trapping ecosystem services that the wetland may provide; and
- Importance in terms of socio-cultural benefits, including the subsistence and cultural benefits provided by the wetland system.

The highest of these three suites of scores is then used to determine the overall Importance and Sensitivity category (Table C6) of the wetland system being assessed.

**Table C6: Ecological Importance and Sensitivity Categories and the interpretation of median scores for biota and habitat determinants (adapted from Kleynhans, 1999).**

| EIS Category | Range of Mean | Recommended Ecological Management Class |
|---|---|---|
| Very high<br>Wetlands that are considered ecologically important and sensitive on a national or even international level. The biodiversity of these wetlands is usually very sensitive to flow and habitat modifications. | >3 and <=4 | A |
| High<br>Wetlands that are considered to be ecologically important and sensitive. The biodiversity of these wetlands may be sensitive to flow and habitat modifications. | >2 and <=3 | B |
| Moderate<br>Wetlands that are considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of these wetlands is not usually sensitive to flow and habitat modifications. | >1 and <=2 | C |
| Low/marginal | >0 and <=1 | D |

| EIS Category | Range of Mean | Recommended Ecological Management Class |
|---|---|---|
| Wetlands that are not ecologically important and sensitive at any scale. The biodiversity of these wetlands is ubiquitous and not sensitive to flow and habitat modifications. | | |

## 6. Recommended Management Objective (RMO) and Recommended Ecological Category (REC) Determination

"A high management class relates to the flow that will ensure a high degree of sustainability and a low risk of ecosystem failure. A low management class will ensure marginal maintenance of sustainability but carries a higher risk of ecosystem failure" (DWA, 1999).

The RMO (table below) was determined based on the results obtained from the PES, reference conditions and EIS of the freshwater resource (sections above), with the objective of either maintaining, or improving the ecological integrity of the watercourse in order to ensure continued ecological functionality.

**Table C7: Recommended management objectives (RMO) for water resources based on PES & EIS scores.**

| | | | Ecological and Importance Sensitivity (EIS) | | | |
|---|---|---|---|---|---|---|
| | | | Very High | High | Moderate | Low |
| PES | A | Pristine | A Maintain | A Maintain | A Maintain | A Maintain |
| | B | Natural | A Improve | A/B Improve | B Maintain | B Maintain |
| | C | Good | A Improve | B/C Improve | C Maintain | C Maintain |
| | D | Fair | C Improve | C/D Improve | D Maintain | D Maintain |
| | E/F | Poor | D* Improve | E/F* Improve | E/F* Maintain | E/F* Maintain |

***PES Categories E and F are considered ecologically unacceptable (Malan and Day, 2012) and therefore, should a freshwater resource fall into one of these PES categories, an REC class D is allocated by default, as the minimum acceptable PES category.**

A watercourse may receive the same class for the REC as the PES if the watercourse is deemed in good condition, and therefore must stay in good condition. Otherwise, an appropriate REC should be assigned in order to prevent any further degradation as well as enhance the PES of the freshwater resource.

**Table C8: Description of Recommended Ecological Category (REC) classes.**

| Class | Description |
|---|---|
| A | Unmodified, natural |
| B | Largely natural with few modifications |
| C | Moderately modified |
| D | Largely modified |

## 7. Wetland and Riparian Zone Delineation

The watercourse delineation took place according to the method presented in the “Updated manual for the identification and delineation of wetland and riparian resources” published by DWAF in 2008. The foundation of the method is based on the fact that wetlands and riparian zones have several distinguishing factors including the following:

- The presence of water at or near the ground surface;
- Distinctive hydromorphic soils;
- Vegetation adapted to saturated soils; and
- The presence of alluvial soils in stream systems.

According to the DWAF (2005) like wetlands, riparian areas have their own unique set of indicators. It is possible to delineate riparian areas by checking for the presence of these indicators. Some areas may display both wetland and riparian indicators, and can accordingly be classified as both. If you are adjacent to a watercourse, it is important to check for the presence of the riparian indicators described below, in addition to checking for wetland indicators, to detect riparian areas that do not qualify as wetlands. The delineation process requires that the following be taken into account:

- topography associated with the watercourse;
- vegetation; and
- alluvial soils and deposited material.

By observing the evidence of these features in the form of indicators, wetlands and riparian zones can be delineated and identified. If the use of these indicators and the interpretation of the findings are applied correctly, then the resulting delineation can be considered accurate (DWAF, 2005).

# APPENDIX D - DETAILS, EXPERTISE AND CURRICULUM VITAE OF SPECIALISTS

**1. (a) (i) Details of the specialist who prepared the report**

| | |
|---|---|
| Stephen van Staden | MSc (Environmental Management) (University of Johannesburg) |
| Christel du Preez | MSc (Environmental Sciences) (North-West University) |
| Sashin Pillay | BSc Hons (Biological Sciences) (University of KwaZulu-Natal) |

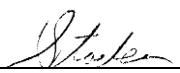
**1. (a). (ii) The expertise of that specialist to compile a specialist report including a curriculum vitae**

| | | | |
|---|---|---|---|
| Company of Specialist: | Scientific Aquatic Services | | |
| Name / Contact person: | Stephen van Staden | | |
| Postal address: | 29 Arterial Road West, Oriel, Bedfordview | | |
| Postal code: | 1401 | Cell: | 083 415 2356 |
| Telephone: | 011 616 7893 | Fax: | 011 615 6240/ 086 724 3132 |
| E-mail: | stephen@sasenvgroup.co.za | | |
| Qualifications | MSc Environmental Management (University of Johannesburg)<br>BSc (Hons) Zoology (Aquatic Ecology) (University of Johannesburg)<br>BSc (Zoology, Geography and Environmental Management) (University of Johannesburg) | | |
| Registration / Associations | Registered Professional Scientist at South African Council for Natural Scientific Professions (SACNASP)<br>Accredited River Health Practitioner by the South African River Health Program (RHP)<br>Member of the South African Soil Surveyors Association (SASSO) Member of the Gauteng Wetland Forum<br>Member of the Gauteng Wetland Forum;<br>Member of International Association of Impact Assessors (IAIA) South Africa;<br>Member of the Land Rehabilitation Society of South Africa (LaRSSA) | | |

**1. (b) a declaration that the specialist is independent in a form as may be specified by the competent authority**

I, Stephen van Staden, 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 relevant legislation and any guidelines that have relevance to the proposed activity;
- I will comply with the applicable legislation;
- I have not, 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



**SAS ENVIRONMENTAL GROUP OF COMPANIES –**
**SPECIALIST CONSULTANT INFORMATION**

# CURRICULUM VITAE OF STEPHEN VAN STADEN

## PERSONAL DETAILS

| | |
|---|---|
| Position in Company | Group CEO, Water Resource Discipline Lead, Managing Member, Ecologist, Aquatic Ecologist |
| Joined SAS Environmental Group of Companies | 2003 (year of establishment) |

## MEMBERSHIP IN PROFESSIONAL SOCIETIES

Registered Professional Scientist at South African Council for Natural Scientific Professions (SACNASP)
Accredited River Health Practitioner by the South African River Health Program (RHP)
Member of the South African Soil Surveyors Association (SASSO) Member of the Gauteng Wetland Forum
Member of the Gauteng Wetland Forum
Member of International Association of Impact Assessors (IAIA) South Africa;
Member of the Land Rehabilitation Society of South Africa (LaRSSA)

## EDUCATION

### Qualifications

| | |
|---|---|
| MSc Environmental Management (University of Johannesburg) | 2003 |
| BSc (Hons) Zoology (Aquatic Ecology) (University of Johannesburg) | 2001 |
| BSc (Zoology, Geography and Environmental Management) (University of Johannesburg) | 2000 |

### Short Courses

| | |
|---|---|
| Integrated Water Resource Management, the National Water Act, and Water Use Authorisations, focusing on WULAs and IWWMPs | 2017 |
| Tools for Wetland Assessment (Rhodes University) | 2017 |
| Legal liability training course (Legricon Pty Ltd) | 2018 |
| Hazard identification and risk assessment training course (Legricon Pty Ltd) | 2018 |
| Wetland Management: Introduction and Delineation (WLID1502S) (University of the Free State) | 2018 |
| Hydropedology and Wetland Functioning (TerraSoil Science and Water Business Academy) | 2018 |

## AREAS OF WORK EXPERIENCE

South Africa – All Provinces
Southern Africa – Lesotho, Botswana, Mozambique, Zimbabwe Zambia
Eastern Africa – Tanzania Mauritius
West Africa – Ghana, Liberia, Angola, Guinea Bissau, Nigeria, Sierra Leona
Central Africa – Democratic Republic of the Congo

## DEVELOPMENT SECTORS OF EXPERIENCE

1. Mining: Coal, chrome, Platinum Group Metals (PGMs), mineral sands, gold, phosphate, river sand, clay, fluorspar
2. Linear developments (energy transmission, telecommunication, pipelines, roads)
3. Minerals beneficiation

4. Renewable energy (Hydro, wind and solar)
5. Commercial development
6. Residential development
7. Agriculture
8. Industrial/chemical

## KEY SPECIALIST DISCIPLINES

**Legislative Requirements, Processes and Assessments**

- Water Use Applications (Water Use License Applications / General Authorisations)
- Environmental and Water Use Audits
- Freshwater Resource Management and Monitoring as part of EMPR and WUL conditions

**Freshwater Assessments**

- Freshwater (wetland / riparian) Delineation and Assessment
- Freshwater Eco Service and Status Determination
- Rehabilitation Assessment / Planning
- Maintenance and Management Plans
- Plant Species and Landscape Plans
- Freshwater Offset Plans
- Hydropedological Assessment
- Pit Closure Analysis

**Aquatic Ecological Assessment and Water Quality Studies**

- Habitat Assessment Indices (IHAS, HRC, IHIA & RHAM)
- Aquatic Macro-Invertebrates (SASS5 & MIRAI)
- Fish Assemblage Integrity Index (FRAI)
- Fish Health Assessments
- Riparian Vegetation Integrity (VEGRAI)
- Toxicological Analysis
- Water quality Monitoring
- Screening Test
- Riverine Rehabilitation Plans

**Biodiversity Assessments**

- Floral Assessments
- Biodiversity Actions Plan (BAP)
- Biodiversity Management Plan (BMP)
- Alien and Invasive Control Plan (AICP)
- Ecological Scan
- Terrestrial Monitoring
- Biodiversity Offset Plan

**Soil and Land Capability Assessment**

- Soil and Land Capability Assessment
- Hydropedological Assessment

**Visual Impact Assessment**

- Visual Baseline and Impact Assessments
- Visual Impact Peer Review Assessments

**SAS ENVIRONMENTAL GROUP OF COMPANIES –**
**SPECIALIST CONSULTANT INFORMATION**

# CURRICULUM VITAE OF CHRISTEL DU PREEZ

## PERSONAL DETAILS

| | |
|---|---|
| Position in Company | Senior Scientist<br>Watercourse ecology |
| Joined SAS Environmental Group of Companies | 2016 |

## MEMBERSHIP IN PROFESSIONAL SOCIETIES

Professional member of the South African Council for Natural Scientific Professions (SACNASP – Reg No. 120240)
Member of the Western Cape Wetland Forum (WCF)
Member of the Gauteng Wetland Forum (GWF)

## EDUCATION

### Qualifications

| | |
|---|---|
| MSc Environmental Sciences (North West University) | 2017 |
| BSc Hons Environmental Sciences (North West University) | 2012 |
| BSc Environmental and Biological Sciences (North West University) | 2011 |

### Short Courses

| | |
|---|---|
| Wetland and Aquatic plant Identification presented by Carin van Ginkel | 2019 |
| Wetland Management: Introduction and Delineation presented by the Centre of Environmental Management University of the Free State | 2018 |
| Tools for Wetland Assessment presented by Prof. F. Ellery and Rhodes University | 2017 |
| Basic Principles of ecological rehabilitation and mine closure presented by the Centre for Environmental Management North West University | 2015 |

## AREAS OF WORK EXPERIENCE

**South Africa** – Gauteng, Mpumalanga, Limpopo, Western Cape, Northern Cape, Eastern Cape

**KEY SPECIALIST DISCIPLINES**

**Freshwater Assessments**

- Desktop Freshwater Delineation
- Freshwater Verification Assessment
- Freshwater (wetland / riparian) Delineation and Assessment
- Freshwater Eco Service and Status Determination
- Rehabilitation Assessment / Planning
- Maintenance and Management Plans
- Plant species and Landscape Plan
- Freshwater Offset Plan

**SAS ENVIRONMENTAL GROUP OF COMPANIES –**
**SPECIALIST CONSULTANT INFORMATION**

# CURRICULUM VITAE OF SASHIN PILLAY

## PERSONAL DETAILS

| | |
|---|---|
| Position in Company | Junior Ecologist |
| Joined SAS Environmental Group of Companies | 2019 |

## MEMBERSHIP IN PROFESSIONAL SOCIETIES

Member of the Gauteng Wetlands Forum
Member of the South African Wetland Society (SAWS)

## EDUCATION

### Qualifications

| | |
|---|---|
| BSc (Hons) Biological Sciences (Aquatic Ecology) (University of KwaZulu-Natal) | 2017 |
| BSc (Environmental and Life Sciences) (University of KwaZulu-Natal) | 2016 |

### Short courses

| | |
|---|---|
| SACNASP Candidate Mentorship Phase (CMP) Program for young practitioners in the wetland sciences | 2021/2022 |
| Grass Identification course (3 day) presented by Frits van Oudtshoorn | 2021 |
| Wetland Legislation course presented by Piet-Louis Grundling | 2021 |
| Hydropedology and Wetlands course presented by WETREST and Digital Soils Africa | 2021 |
| Tools for Wetland Assessments (Version 2) presented by Prof Fred Ellery, GroundTruth and Verdant Environmental | 2020 |
| Back-2-Basics wetland workshop presented by Piet-Loius Grundling | 2020 |
| Environmental management training course by Enaq Environmental Consulting | 2018 |
| Young-Leaders academy, leadership development programme | 2012 |

## AREAS OF WORK EXPERIENCE

South Africa – KwaZulu-Natal, Gauteng, Mpumalanga, Free-State, Limpopo, North-West

## KEY SPECIALIST DISCIPLINES

**Freshwater Assessments**

- Desktop Freshwater Delineation
- Freshwater Verification Assessment
- Freshwater (wetland / riparian) delineation and assessment
- Freshwater Eco Service and Status Determination
- Rehabilitation Assessment / Planning

**Aquatic Ecological Assessment and Water Quality Studies**

- Habitat Assessment Indices (IHAS, IHI)
- Toxicological analysis
- Water quality monitoring