SCIENTIFIC AQUATIC SERVICES

FRESHWATER ECOSYSTEM IMPACT VERIFICATION REPORT

FOR THE NON-INVASIVE PROSPECTING RIGHTS APPLICATION AT MAREESBURG, LIMPOPO PROVINCE.

Prepared for:	Environmental Management Assistance (Pty) Ltd (EMA)
Report author:	P. da Cruz (Cert.Sci.Nat)
Report reviewer:	S van Staden (Pr.Sci.Nat)
Report Reference:	SAS 22-1141
Date:	September 2022

Part of the SAS Environmental Group of Companies

Website: http://www.sasenvironmental.co.za

EXECUTIVE SUMMARY

Scientific Aquatic Services (SAS) was appointed by Environmental Management Assistance (Pty) Ltd (the Environmental Assessment Practitioner (EAP) on the project) to ground truth the presence of freshwater ecosystems within the area in which Nomamix (Pty) Ltd (the applicant) is applying for the right to prospect Platinum Group Metals. As part of this scope of works SAS were appointed to prepare a freshwater ecosystem impact and compliance statement as part of the Environmental Authorisation (EA) process for the proposed prospecting rights application. The application area (hereafter referred to as the 'study area') falls within the Farm Mareesburg 8 JT, in the magisterial district of Fetagoma Tubatse, Limpopo. The area covered by the application is 2133 ha in extent and encompasses mining-related activities in the northern and western part of the study area (e.g. ground excavation, a tailings storage facility (TSF) and other infrastructure, with the remainder of the study area being largely vacant, consisting of mountainous terrain.

The Department of Forestry, Fisheries and Environment (DFFE) National Web-based Environmental Screening Tool (2020), provides the criteria for the assessment and reporting of impacts on aquatic/freshwater biodiversity for activities requiring EA. The screening tool indicates that the study area is located within an area of very high aquatic/ freshwater biodiversity significance.

Following on from desk-based delineation of freshwater features in the study area and investigation area (defined as a 500 m radius around the study area, in line with GN 509 as it relates to the National Water Act, 1998 (Act No. 36 of 1998) as amended), a rapid field assessment was undertaken on the 29th to the 31st August 2022 to ground truth the presence of freshwater ecosystems and augment the accuracy of the desk based delineations.

Various freshwater ecosystems were confirmed to occur in the study and investigation areas, consisting of various fluvial drainage features which largely drain northwards into the Groot Dwars River that forms the western boundary of the study area. The majority of these freshwater ecosystems are non-perennial episodic drainage lines based on their hydrological regime, but certain wetlands, perennial streams and the Groot Dwars River are located within the study area.

The designation of very high sensitivity to freshwater ecosystems in the study area by the DFFE Screening Tool has been supported through the findings of the freshwater verification assessment.

The prospecting right, as being applied for would entail non-invasive prospecting activities in the study area, thus no significant physical activities are proposed to be undertaken. Accordingly no impacts to the freshwater environment or freshwater ecosystems in the study area are envisioned and the risk profile to the freshwater environment is considered low to negligible. As such it is the professional opinion of the freshwater specialist that the prospecting right application be granted Environmental Authorisation, subject to prospecting remaining non-invasive with no associated physical activities in the study area. Due to the very high sensitivity associated with the freshwater ecosystems in the study area, it is recommended that a future Aquatic Biodiversity Specialist Assessment must be undertaken should the prospecting rights application be altered or approved to allow any activities other than non-invasive activities as currently proposed by the applicant that would result in the potential for impacts on freshwater ecosystems to result from such prospecting activities. Such an Aquatic Biodiversity Specialist Assessment must also be undertaken for any future mining-right or mining activities-related application for Environmental and/or Water Use Authorisation

GLOSSARY OF TERMS

Alien vegetation:	Plants that do not occur naturally within the area but have been introduced either intentionally or unintentionally. Vegetation species that originate from outside of the borders of the biome -usually international in origin.
Alluvial Material / deposits	Sedimentary deposits resulting from the action of rivers, including those deposited within river channels, floodplains, etc.
Anaerobic	The absence of molecular oxygen.
Apedal	A term indicating the degree of aggregation of soil particles within a soil horizon, where the material is well aggregated, but without well-formed peds (individual soil aggregates); in the context of the South African Soil Classification System, apedal soils also include structureless soils (e.g. sands) and somewhat more structured soils than the above description.
Catchment:	The area where water is collected by the natural landscape, where all rain and run-off water ultimately flow into a river, wetland, lake, and ocean or contributes to the groundwater system.
Cumulative Impact	The impact of an activity that in itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.
Delineation (of a wetland):	To determine the boundary of a wetland based on soil, vegetation, and/or hydrological indicators.
Dystrophic Soil	A soil that suffered marked leaching that has resulted in the sum of exchangeable (as opposed to soluble) Calcium, Magnesium Potassium and Sodium being very low (<5cmol(+) per kg clay). Dystrophic soils have low base status. Compare with mesotrophic.
Ecoregion:	An ecoregion is a "recurring pattern of ecosystems associated with characteristic combinations of soil and landform that characterise that region".
Ephemeral	A river or watercourse that only flows at the surface periodically, especially those drainage systems that are only fed by overland flow (runoff). According to Rossouw *et al* (2005) ephemeral drainage systems are characterised by no flow at least 26-75% of the time
Episodic	Relating to rivers and drainage lines typically located within arid or semi-arid environments that only carry flow in response to isolated rainfall events. According to Rossouw *et al* (2005) episodic drainage systems are characterised by no flow at least 76% of the time
Facultative species:	Species usually found in wetlands (76%-99% of occurrences) but occasionally found in non-wetland areas
First Order Drainage Line	Refer to 'Stream,Order' below
Gleying	The process by which a material (soil) has been or is becoming subject to intense reduction as a result of prolonged saturation by water. Gleyed soils are characterised by grey, blue and green colours (due to an absence of ferrous compounds).
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 soil).
Hydrological Activation	The degree and period of time of inundation of an area / channel by water, potentially resulting in the development of hydromorphic conditions
Hydrology:	The study of the occurrence, distribution, and movement of water over, on and under the land surface.
Hydromorphy:	A process of gleying and mottling resulting from the intermittent or permanent presence of excess water in the soil profile.
Hydrophyte	A plant that grows in water or in conditions that are at least periodically deficient in oxygen as a result of saturation by water – these are typically wetland plants.
Interflow	The lateral movement of water, usually derived from precipitation, that occurs in the upper part of the unsaturated zone between the ground surface and the water table. This water generally enters directly into a wetland or other aquatic ecosystem, without having occurred first as surface runoff, or it returns to the surface at some point down-slope from its point of infiltration.
Landtype	Distinct areas defined as part of the Land Type Survey of South Africa based on a unique combination of soil pattern, macroclimate and terrain form.

Lithocutanic B horizon	A subsoil horizon underlying a topsoil or other subsoil (E) horizon, and that overlies and merges into weathering bedrock; is comprised of heterogeneous material consisting of a mixture of soil material, and saprolite (bedrock fragments), displaying cutanic properties.
Macro channel (Bank)	The (overall) compound channel of a watercourse that is situated between the two outermost and highest-lying banks.
Marginal	Plants and habitat on the edge of waterbodies; the marginal zone with riparian corridors is the zone that is most often subjected to flows / inundation.
Melanic	A type of topsoil horizon that is dark-coloured and usually well-structured.
Mesotrophic Soil	A soil that suffered leaching that has resulted in the sum of exchangeable (as opposed to soluble) Calcium, Magnesium Potassium and Sodium being low (5-15cmol(+) per kg clay). Mesotrophic soils have medium base status. Compare with dystrophic.
Neocutanic B Horizon	A Neocutanic B soil horizon is defined as unconsolidated material which has undergone pedogenesis to an extent to allow aggregation of soil particles to the degree that the material is no longer loose, but is not sufficient to characterise it as other cutanic B horizons
Obligate species:	Species almost always found in wetlands (>99% of occurrences).
Pedocutanic B Horizon	A subsoil (B) horizon that has become enriched in clay by illuviation (the downward movement of fine materials by, and deposition from water), and that has as a result developed blocky structure
Perched water table / aquifer	A water table caused by the presence of water above an isolated relatively impermeable underlying layer, some height above the normal aquifer level.
Redoximorphic	Features within soil that are a result of the reduction, translocation and oxidation (precipitation) of Fe (iron) and Mn (manganese) oxides that occur when soils are saturated for sufficiently long periods of time to become anaerobic.
Seasonal zone of wetness:	The zone of a wetland that lies between the Temporary and Permanent zones and is characterised by saturation from three to ten months of the year, within 50 cm of the surface
Stream Order	A morphometric classification of a drainage system according to a hierarchy or orders of the channel segments. Within a drainage network the un-branched channel segments which terminate at the stream head are termed as “first order streams”
Reach	A longitudinal stretch of a river, wetland or watercourse
Riparian Area /Zone	The physical structure and associated vegetation of the areas associated with a watercourse which are commonly characterised 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 land areas
Temporary zone of wetness:	The outer zone of a wetland characterised by saturation within 50 cm of the surface for less than three months of the year.
Vertic Soils	Soils characterised by the presence of swelling and shrinking clays, typically formed where there is a distinct wet and dry period that affects the soils. These soils swell when they become saturated, and shrink again when they dry out, leading to characteristic ‘cracking’ on the surface of the ground
Wetland Vegetation (WetVeg) type:	Broad groupings of wetland vegetation, reflecting differences in regional context, such as geology, climate, and soil, which may, in turn, influence the ecological characteristics and functioning of wetlands.

ACRONYMS

°C	Degrees Celsius.
BGIS	Biodiversity Geographic Information Systems
CBA	Critical Biodiversity Area
CSIR	Council of Scientific and Industrial Research
DFFE	Department of Forestry, Fisheries and Environment
DWA	Department of Water Affairs
DWAF	Department of Water Affairs and Forestry
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EC	Ecological Class
EIA	Environmental Impact Assessment
EIS	Ecological Importance and Sensitivity
EMC	Ecological Management Class
EMPr	Environmental Management Program
ESA	Ecological Support Area
FEPA	Freshwater Ecosystem Priority Areas
GIS	Geographic Information System
GN	Government Notice
GPS	Global Positioning System
HGM	Hydrogeomorphic
m	Meter
MAP	Mean Annual Precipitation
NEMA	National Environmental Management Act
NFEPA	National Freshwater Ecosystem Priority Areas
NBA	National Biodiversity Assessment
NWA	National Water Act
PES	Present Ecological State
REC	Recommended Ecological Category
RMO	Resource Management Objective
RQIS	Research Quality Information Services
SACNASP	South African Council for Natural Scientific Professions
SANBI	South African National Biodiversity Institute
SAS	Scientific Aquatic Services
SQR	Sub-quaternary catchment reach
subWMA	Sub-Water Management Area
SWSA	Strategic Water Source Area
WetVeg Groups	Wetland Vegetation Groups
WMA	Water Management Areas

DOCUMENT GUIDE

Table 1 below provides the specialist report requirements for the assessment and reporting of impacts to the aquatic biodiversity in terms of Government Notice 320 as promulgated in Government Gazette 43110 of 20 March 2020 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) as amended (NEMA). It is important to note that the aquatic biodiversity theme replaces Appendix 6 of NEMA.

Table A: Specialist report requirements for the assessment and reporting of impacts to the aquatic biodiversity

No.	Requirements	Section in Report
3.1	The compliance statement must be prepared by a suitably qualified specialist registered with the SACNASP, with expertise in the field of aquatic sciences.	Appendix C
3.2	The compliance statement must:	-
3.2.1	be applicable to the preferred site and the proposed development footprint;	Section 1, 2, 6
3.2.2	confirm that the site is of “low” sensitivity for aquatic biodiversity; and	Section 6.1
3.2.3	indicate whether or not the proposed development will have an impact on the aquatic features.	Section 8.2
3.3	The compliance statement must contain, as a minimum, the following information:	-
3.3.1	contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;	Appendix B, C
3.3.2	a signed statement of independence by the specialist;	Appendix B
3.3.3	a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	Section 6,
3.3.4	a baseline profile description of biodiversity and ecosystems of the site;	Section 6
3.3.5	the methodology used to verify the sensitivities of the aquatic biodiversity features on the site including the equipment and modelling used where relevant;	Section 1.1, 6.1
3.3.6	in the case of a linear activity, confirmation from the aquatic biodiversity specialist that, in their opinion, based on the mitigation and remedial measures proposed, the land can be returned to the current state within two years of completion of the construction phase;	N/A
3.3.7	where required, proposed impact management outcomes or any monitoring requirements for inclusion in the EMPr;	N/A
3.3.8	a description of the assumptions made as well as any uncertainties or gaps in knowledge or data; and	Section 1.1
3.3.9	any conditions to which this statement is subjected.	Section 6.1; 8.2, 8.3
3.4	A signed copy of the compliance statement must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.	EAP to ensure this requirement is met.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1. INTRODUCTION AND BACKGROUND SETTING

Scientific Aquatic Services (SAS) was appointed by Environmental Management Assistance (Pty) Ltd (the Environmental Assessment Practitioner (EAP) on the project) to ground truth the presence of freshwater ecosystems within the area in which Nomamix (Pty) Ltd (the applicant) is applying for the right to prospect Platinum Group Metals. As part of this scope of works SAS were appointed to prepare a freshwater ecosystem impact and compliance statement as part of the Environmental Authorisation (EA) process for the proposed prospecting rights application. The application area (hereafter referred to as the 'study area') falls within the Farm Mareesburg 8 JT, in the magisterial district of Fetagoma Tubatse, Limpopo. The area covered by the application is 2133 ha in extent and encompasses mining-related activities in the northern and western part of the study area (e.g. ground excavation, a tailings storage facility (TSF), with the remainder of the study area being largely vacant, consisting of mountainous terrain. Apart from the mining related activities, vacant parts of the study area are utilised for limited livestock grazing, and the natural parts of the site have been stocked with certain game species.

A 500 m "zone of investigation" around the study area, (in accordance with General Notice (GN) 509 of 2016 (as it relates to the National Water Act (Act No. 36 of 1998) as amended), was generated to determine potential risks to possible freshwater ecosystems associated with the study area. This will henceforth be referred to as the "investigation area" (Figures 1 and 2).

SAS was required to ground truth freshwater ecosystem occurrence in the study area, whilst also considering any potential the risk that the proposed prospecting rights application may pose to the receiving freshwater environment. In addition, SAS was required to provide input into any development constraints or enviro-legal constraints that may arise for the proposed prospecting rights application within the study area in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) as amended (NEMA) and the National Water Act, 1998 (Act No. 36 of 1998) as amended (NWA).

1.1 Assumptions and limitations

The following assumptions and limitations are applicable to this report:

- The ground-truthing and delineation of potential freshwater ecosystems and the assessment thereof, were confined to a single rapid site visit within the study area undertaken on the 29th to the 31st September 2022. All freshwater ecosystems identified within the investigation area were delineated in fulfilment of GN 509 of the NWA using various desktop methods including use of topographic maps, current digital satellite imagery and aerial photographs with limited site verification;
- The delineation of the freshwater ecosystems as provided in this report is considered the best estimate taking into consideration the limitations and conditions at the time of assessment (the site visit was conducted in winter outside of the rainfall and growing season);
- Global Positioning System (GPS) technology is inherently inaccurate to a certain extent, and some inaccuracies due to the use of handheld GPS instrumentation may occur; however, the delineations as provided in this report are deemed appropriately accurate to fulfil the authorisation requirements;
- Wetlands and/or riparian zones and terrestrial zones create transitional areas where an ecotone is formed as vegetation species change from terrestrial to obligate/facultative wetland or riparian species. Within this transition zone, some variation of opinion on the freshwater feature boundaries may occur. However, if the Department of Water Affairs and Forestry (DWAF)[1] (2008)[2] method is followed, all assessors should get largely similar results;
- With ecology being dynamic and complex, certain aspects (some of which may be important) may have been overlooked. The watercourse delineation as presented in this report is, however, regarded as the best estimate of the boundaries based on the site conditions present at the time of the site visit and are deemed appropriately accurate to guide any future development plans.
- As per the project description (Section 2) it has been assumed that no significant physical ('invasive') prospecting activities will be undertaken in the study area, and the assessment of risks and impacts to the freshwater environment in the investigation area has been based on this premise. Should this change, with the introduction of physical prospecting activities in the study area, the assessment of risks and impacts

[1] The Department of Water Affairs and Forestry (DWAF) was formerly known as the Department of Water Affairs (DWA). At present, the Department is known as the Department of Water and Sanitation (DWS). For the purposes of referencing in this report, the name under which the Department was known during the time of publication of reference material, will be used.

[2] Although an updated manual is available since 2008 (Updated Manual for the Identification and Delineation of Wetlands and Riparian Areas). This is still considered a draft document currently under review.

as undertaken in this report would need to be revised due to a change in the risk profile, as well as necessitating the undertaking of an Aquatic Biodiversity Assessment (as stipulated by the Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Aquatic Biodiversity (GN320 of March 2020)).

- The assessment of Present Ecological State (PES), Ecological Importance and Sensitivity (EIS) and assessment of freshwater ecosystem functionality (freshwater ecoservices provided) does not form part of the scope of this freshwater / aquatic biodiversity compliance assessment. Accordingly, freshwater / aquatic biodiversity sensitivity as assessed through the site investigation has been assigned through the application of the precautionary principle and has been based upon the confirmed presence of freshwater ecosystems in the study area.

2. PROJECT DESCRIPTION

Nomamix (Pty) Ltd (the applicant) is applying for the right to prospect Platinum Group Metals on the Farm Mareesburg 8 JT, in the magisterial district of Fetagoma Tubatse, Limpopo.
The proposed non-invasive prospecting activities will include the following main techniques:

- Data search, field mapping and desk-based studies;
- Logging and sampling historical core; and
- Scoping and (pre) feasibility studies.

For the purposed of the Basic Assessment (BA) process, the EAP and appointed specialists will perform a baseline and/or desktop assessment identifying potential sensitivities in the general area of the properties.

Should additional sampling be required using any invasive prospecting methods, the areas where these activities will take place will require the necessary assessments as per the various protocols published for identified themes and approval from the Department of Minerals, Resources and Energy (DMRE), prior to commencement of any such activities.

3. ASSESSMENT APPROACH

- The desktop assessment, as presented in Section 5, reports on the findings from the relevant national, provincial and municipal datasets (such as the National Freshwater Ecosystem Priority Areas [NFEPA], 2011 database; The National Wetland Map 5 (2018) and the Limpopo Conservation Plan (2018)) which was undertaken to aid in identifying freshwater features;
- The National Web-based Environmental Screening Tool (DEA, 2020) was utilised to screen the study area for any environmental sensitivity, with specific focus on aquatic sensitivities. The results are presented in Section 4.
- Section 6 reports the following:
    - A description and mapped extent of all freshwater ecosystems associated with the study area;
    - Delineation of all freshwater ecosystems (using desk-based methods) located with the study area, and within 500 m of the study area in accordance with GN 509 as published in the Government Gazette 40229 of 2016 as it relates to activities as stipulated in Section 21(c) and (i) of the National Water Act, 1998 (Act No. 36 of 1998) as amended; and

- The classification of the freshwater ecosystems according to the Classification System for Wetlands and other Aquatic Ecosystems in South Africa. User Manual: Inland systems (Ollis *et al*., 2013).

- Section 7 provides a summary of the applicable legislative conditions that may be applicable.

3.1 Freshwater Ecosystem Definition

The NWA 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 NWA 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.

It should be noted that in the context of this report, 'a watercourse' as per the definition of the NWA is referred to in this report as a "freshwater ecosystem"

The NWA 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."

Another widely used definition of wetlands is the one used under the **Ramsar Convention**; wetlands are defined as:

"areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres"

In addition the above, the presence / absence of hydric (hydromorphic) soils is a determining factor used to define a freshwater ecosystem as a wetland.

Wetland soils can be termed hydric or hydromorphic soils. **Hydric soils** are defined by the United States Department of Agriculture's Natural Resources Conservation Service as being:

"soils that formed under conditions of saturation, flooding or ponding long enough during the growing season to develop anaerobic conditions in the upper part".

These anaerobic conditions would typically support the growth of hydrophytic vegetation (vegetation adapted to grow in soils that are saturated and starved of oxygen) and are typified by the presence of redoximorphic features.

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 area.

3.2 Freshwater Ecosystem Site Verification

Verification of potential freshwater ecosystems took place according to the method presented in the "Updated manual for the identification and delineation of wetland and riparian resources" (DWAF, 2008). The foundation of the method is based on the fact that freshwater ecosystems have several distinguishing factors including the following:

- Landscape position;
- 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.

A field assessment was undertaken from the 29th to the 31st September 2022 (late winter) during which the presence of any riparian or wetland characteristics as defined by DWAF (2008) and by the NWA, was investigated (please refer to Section 6 of this report).

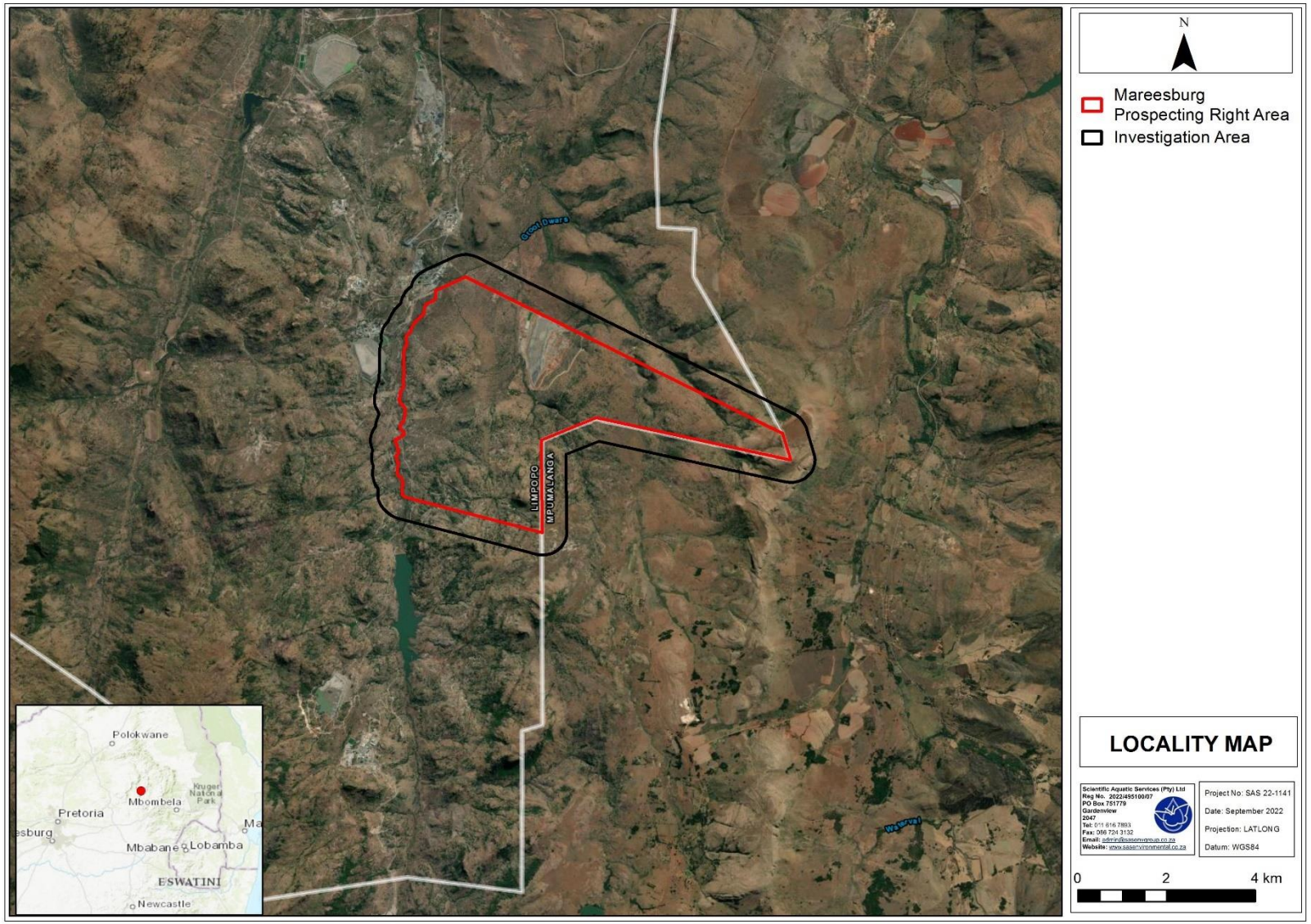


Figure 1: Digital satellite image depicting the study and investigation areas in relation to the surrounding area.

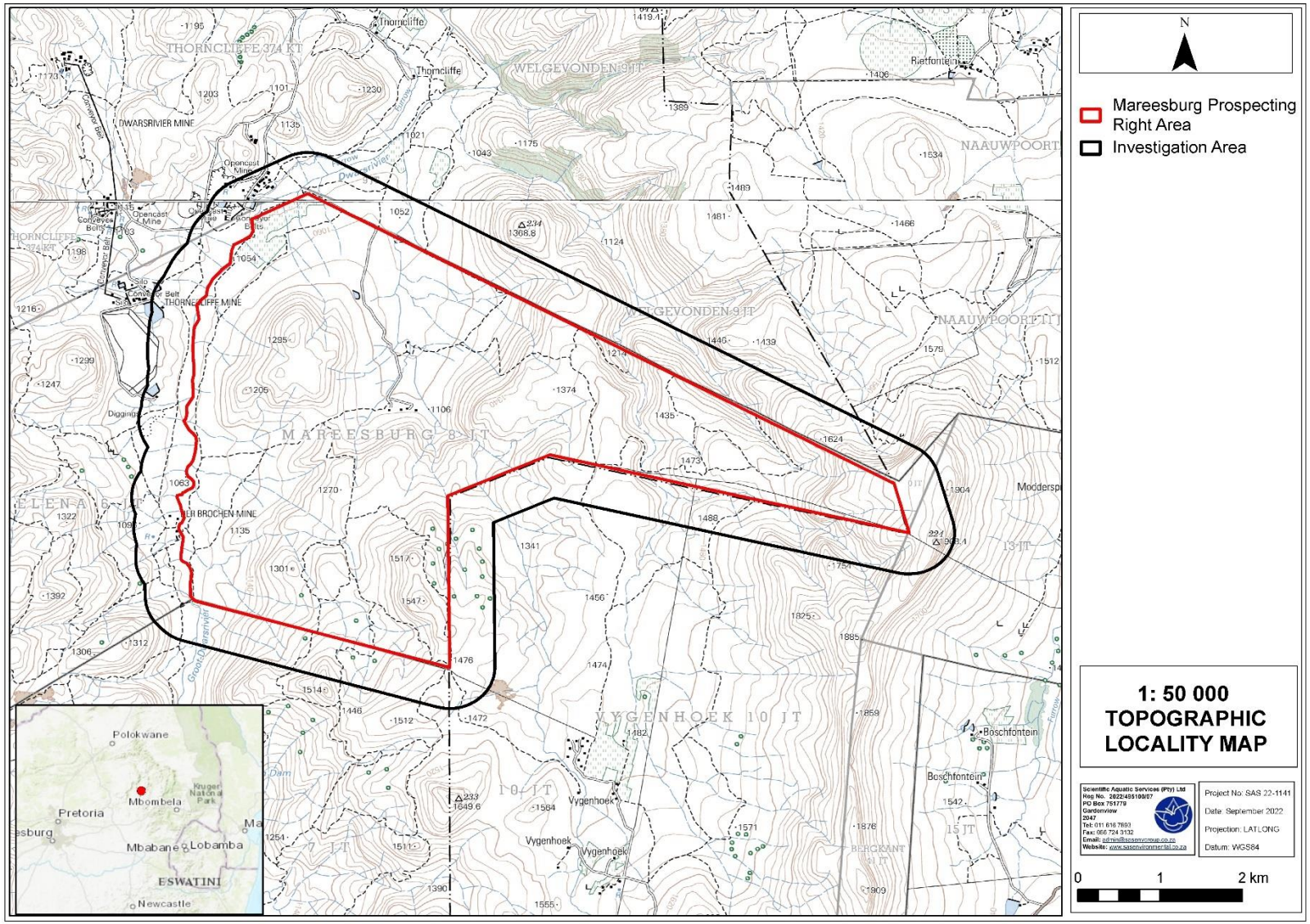


Figure 2: Location of the study and investigation areas depicted on a 1:50 000 topographical map, in relation to surrounding area

4. APPLICATION OF THE DEPARTMENT OF FORESTRY, FISHERIES AND ENVIRONMENT (DFFE) WEB-BASED ENVIRONMENTAL SCREENING TOOL

The protocol for the assessment of freshwater and aquatic biodiversity prepared in support of the Department of Forestry, Fisheries and Environment (DFFE) (previously the Department of Environmental Affairs (DEA)) National Web-based Environmental Screening Tool (2020), provides the criteria for the assessment and reporting of impacts on aquatic/freshwater biodiversity for activities requiring Environmental Authorisation (EA). For the aquatic / freshwater biodiversity theme, the requirements are for sites which support various levels of biodiversity. The relevant aquatic / freshwater biodiversity theme in the national web based environmental screening tool (2020) has been provided by the South African National Biodiversity Institute (SANBI). Based on the sensitivity rating, a suitably qualified specialist must prepare the relevant report or opinion memorandum which is to be submitted as part of the EA application.

As part of the process of the background information gathering, the EAP applied the DFFE screening tool to the study area. According to the guidelines, an applicant intending to undertake an activity on a site identified as being of “very high sensitivity” for an aquatic biodiversity theme must submit an Aquatic Biodiversity Impact Assessment, or if the area is identified as being of “low sensitivity” then an Aquatic Biodiversity Compliance Statement must be compiled and submitted to the competent authority. It is noted, however, that during a site survey undertaken by a suitably qualified freshwater ecologist should the sensitivity be determined different from that assigned by the screening tool (i.e. that a high risk to the regional aquatic biodiversity or freshwater ecosystems in the area is likely even though it is assigned as a “low” sensitivity, or if it is assigned a high sensitivity, however, the proposed development risks are deemed low) then the relevant assessment approach must be followed based on the site survey results and not the DFFE screening tool allocation.

According to the national web based environmental screening tool, the entirety of the study area and most of the investigation area is located within an area of **very high aquatic/ freshwater biodiversity significance**, (Figure 3).

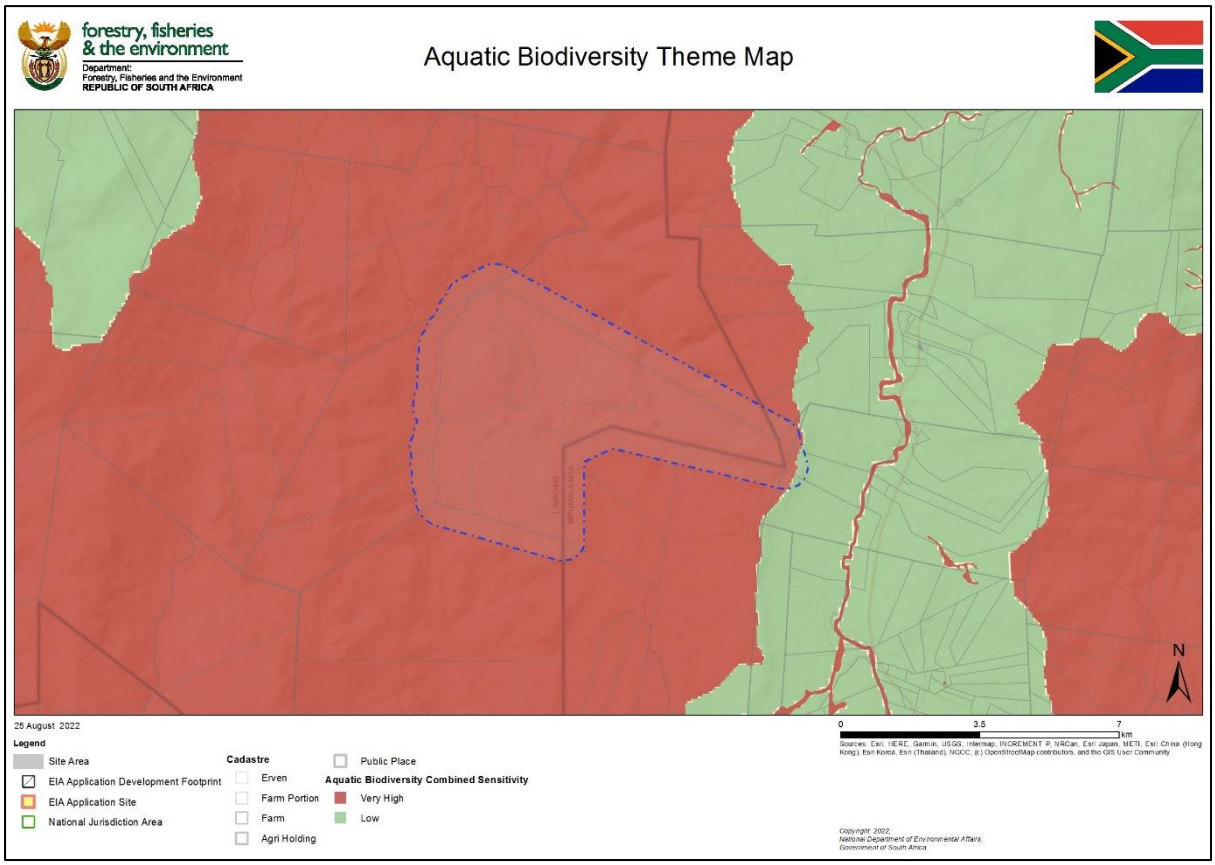


Figure 3 - Map of relative aquatic biodiversity according to the Web-based DFFE Screening Tool, indicating 'very high' sensitivity for the study area and most of the investigation area

The National Web based Environmental Screening tool report has assigned the areas of very high aquatic biodiversity sensitivity as being associated with the presence of the following features:

- Aquatic Critical Biodiversity Areas (CBAs)
- Freshwater ecosystem priority area quinary catchments

Despite the majority of the study area being assigned a very high aquatic biodiversity sensitivity, due to the low risk profile of the proposed non-invasive prospecting activities as part of the application for EA, the assessment approach of undertaking an Aquatic Biodiversity Compliance Statement has been undertaken.

5. DESKTOP INVESTIGATION FINDINGS

A background study of relevant national, provincial and municipal datasets (such as the National Freshwater Ecosystem Priority Areas [NFEPA] 2011 database; The National Wetland Map 5 (2018), the Limpopo Province Map of Critical Biodiversity Area and Ecological Support Areas – i.e. the Sekhukhune District Bioregional Plan[3] – was undertaken to aid in defining presence of any freshwater ecosystems prior to the site survey of the study area (see Appendix A, Table 1) as well as the associated 500 m investigation area.

The results are summarised in the dashboard and relevant maps below.

[3] This is the Map of Critical Biodiversity Areas and Ecological Support Areas (CBA Map) produced by the Limpopo Conservation Plan V2 (LCPv2, 2013), and updated consecutively and individually for the Waterberg (2015), Mopani (2016), Vhembe (2017), Sekhukhune (2018) and Capricorn (2018) district municipalities as part the compilation of bioregional plans for these municipalities. Each bioregional plan produced an updated CBA map for the district.

Table 1: Desktop data (from available databases only) relating to the character of the freshwater ecosystems associated with the Mareesburg prospecting right area and surrounding region [Quarter Degree Squares (QDS) 2430CC; 2530AA]

Aquatic ecoregion and sub-regions in which the Mareesburg prospecting right area is located			
Ecoregion	Eastern Bankenveld		
Catchment	Olifants North		
Quaternary Catchment	B41G		
WMA	Olifants		
Sub-Water Management Area (SubWMA)	Steelpoort		
Dominant characteristics of the Eastern Bankenveld Level II (Kleynhans *et al.*, 2007a)			
Ecoregion Level II (Figure 4)	9.02	9.03	
Dominant primary terrain morphology	Closed hills, Mountains; Moderate and high relief, low mountains		
Dominant primary vegetation types	Mixed Bushveld, Patches of Afromontane Forest and North Eastern Mountain Grassland	Mixed Bushveld	
Altitude (m a.m.s.l)	700 to 1700	500 to 2300	
MAP (mm)	400 to 1000	400 to 700	
Coefficient of Variation (% of MAP)	<20 to 34	20 to 34	
Rainfall concentration index	55 to >65	55 to 64	
Rainfall seasonality	Early to mid-summer	Early summer	
Mean annual temp. (°C)	10 to 22	14 to 22	
Winter temperature (July)	0 to 22	2 to 20 °C	
Summer temperature (Feb)	8 to 30	12 – 30 °C	
Median annual simulated runoff (mm)	20 to 150; 200 to >250	20 to 150	
Ecological Status of the most proximal sub-quaternary reach (DWS, 2014) (Figure 10)			
Sub-quaternary reach	B41G – 00674 (Groot Dwars River)	B41G – 00721 (Groot Dwars River)	B41G – 00726 (Mareesburg Spruit)
Assessed by expert?	Yes	Yes	Yes
PES Category Median	**Class D (Largely Modified)**	**Class C (Moderately Modified)**	**Class B (Largely Natural)**
Stream Order	2	1	1
Mean Ecological	**High**	**High**	**High**

Detail of the Mareesburg prospecting right area in terms of the National Freshwater Ecosystem Priority Area (NFEPA) (2011) database (Figure 5)	
FEPACODE: Freshwater Ecosystem Priority Area (FEPA)	The Mareesburg prospecting right area falls within an area defined as a **CODE 1 FEPA catchment.** FEPA catchments achieve biodiversity targets for river ecosystems and threatened fish species and were identified in rivers that are currently in a good condition (A or B ecological category). Their FEPA status indicates that they should remain in a good condition in order to contribute to national biodiversity goals and support sustainable use of water resources. Although the FEPA status applies to the actual river reach, the surrounding land and smaller stream network needs to be managed in a way that maintains the good condition of the river reach.
NFEPA Wetlands and Rivers (Figure 6)	No wetlands are indicated by the NFEPA database within the Mareesburg prospecting right area, nor within the investigation area. The Groot-Dwars River and the Mareesburg Spruit traverse the Mareesburg prospecting right area and investigation area. The Groot-Dwars River is considered natural (Class A/B). The Mareesburg Spruit is considered largely natural (Class B). Both rivers are designated FEPA Rivers and therefore, in terms of the NFEPA Implementation Manual (2011), mining (and/or prospecting) is not considered a compatible land use within 1km (1000 m) of a riverine buffer around a river FEPA.
Wetland vegetation Type (Figure 7)	The majority of the Mareesburg prospecting right area falls within the **Central Bushveld Group 1** Wetland Vegetation Type considered **critically endangered** (Mbona *et al*, 2015), while the remaining south-eastern portion of the Mareesburg prospecting right area falls within the **Mesic Highveld Grassland Group 7 and Group 6** Wetland Vegetation Type considered **endangered** and **least threatened** respectively.
Detail of the Mareesburg prospecting right area in terms of the Limpopo Conservation Plan Version 2 (2018) (Figure 7)	
Critical Biodiversity Area (CBA) 2	The Mareesburg prospecting right area falls within an area defined as a **Category 2 CBA.** These are **Best Design Selected Sites** that are selected to meet biodiversity pattern and / or ecological processes targets. Alternative sites may be available to meet targets. Land Management Recommendations: Implement appropriate zoning and land management guidelines to avoid impacting on ecological processes. Avoid intensification of land use and fragmentation of natural landscapes. Incompatible Land-Use: Urban land-uses including Residential (including golf estates, rural residential, resorts), Business, Mining & Industrial; Infrastructure (roads, power lines, pipelines). **Note**: *Certain elements of these activities could be allowed subject to detailed impact assessment to ensure that developments were designed to maintain the overall ecological functioning of ESAs*.
National Biodiversity Assessment (2018): South African Inventory of Inland Aquatic Ecosystems (SAIIAE) (Figure 6)	

Importance (EI) Class				
Mean Ecological Sensitivity (ES) Class	**Very High**	**Very High**	**Very High**	Several dams were identified within the investigation area and one dam is located within the Mareesburg prospecting right area according to the NBA (2018): SAIIAE artificial features Database. The Groot Dwars River is classed as Class D largely modified, and Mareesburg Spruit as largely natural (Class C) according to the NBA 2018 Dataset. The Ecosystem Protection Level (EPL) of both rivers are poorly protected and therefore the rivers are critically endangered (Ecosystem Threat Status (ETS)). There are no natural wetland features identified by the NBA Dataset to be in the Mareesburg prospecting right area or the investigation area.
Default Ecological Class (based on median PES and highest EI or ES mean)	Class A (Very High)	Class A (Very High)	Class A (Very High)	
National Web-based Screening Tool (Figure 3)				Importance of the Mareesburg prospecting right area according to the Mining and Biodiversity Guidelines (2013)
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 Mareesburg prospecting right area falls within an area considered of **Highest Biodiversity Importance**. Highest Biodiversity Importance areas include areas where mining is not legally prohibited, but where there is a very high risk that due to their potential biodiversity significance and importance to ecosystem services (e.g., water flow regulation and water provisioning) that mining projects will be significantly constrained or may not receive the necessary authorisations.
For the aquatic biodiversity theme, the Mareesburg prospecting right area is considered to have an overall **aquatic sensitivity of very high,** due to the area being classified as a FEPA catchment (NFEPA, 2011).				Strategic Water Source Areas for Surface Water (SWSA) (2017)
				Surface water SWSAs are defined as areas of land that supply a disproportionate (i.e., relatively large) quantity of mean annual surface water runoff in relation to their size. They include transboundary areas that extend into Lesotho and Swaziland. The sub-national Water Source Areas (WSAs) are not nationally strategic as defined in the report but were included to provide a complete coverage.
				Name and Criteria: The Mareesburg prospecting right area does not fall within a SWSA.

Landtype Data (Figure 9)

A number of landtypes are located across the study area; the centra and south-western parts of the study area are characterised by the **Ib31** landtype. A small part of the south-eastern part of the study area is underlain by the **Ib147** landtype. Ib landtype groupings are areas where 60-80% of the surface is occupied by exposed rock and stones/boulders and the slopes are usually steep. The rest of the area comprises mostly shallow soils, directly underlain by hard or weathered rock.

The Dwars River that forms the western boundary of the study area, and the river's valley is comprised of the **Dc31** landtype. Dc Landtypes are characterised by soils with strong structural properties such as prismacutanic, pedocutanic, vertic, melanic and red structured soils. This is true of the Groot Dwars valley floor which is predominated by vertic topsoils and subsoils and soil forms with a pedocutanic characteristics in the subsoil, with no hydromorphic characteristics.

Parts of the eastern component of the study area are occupied by the **Ab29** landtype. Ab landtypes are characterised by the presence of red-yellow apedal, freely drained soils. These soils are normally associated with high rainfall areas, where soils are subjected to moderate (i.e. mesotrophic) to intense (i.e. dystrophic) leaching of nutrients from the soil profile. The Ab29 landtype is characterised by a mix of the Hutton soil form (characterised by red apedal sub-soils). Where Hutton soil forms do not occur, the remainder (including all valley floors in this landtype) are comprised of highly structured clay soils including melanic and vertic topsoils and pedocutanic sub-soils.

The far eastern part of the study area is comprised of the **Fa 327** and **Fa343** landtypes. Fa landtype groupings are characterised by generally shallow soils consisting of a topsoil directly underlain by weathered rock (the Glenrosa Soil Form) or hard rock (the Mispah form), sometimes with surface rock and steep slopes. Soils in the Fa landtypes in the study area are generally characterised by structured clay soils displaying pedocutanic and Neocutanic sub-soils, especially within the lowest-lying parts of the terrain in this part of the study area.

The landtype data indicates very little soil forms / families which are characterised by hydromorphic characteristics, thus limited wetland occurrence is expected based on a landtype analysis for the study area.

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

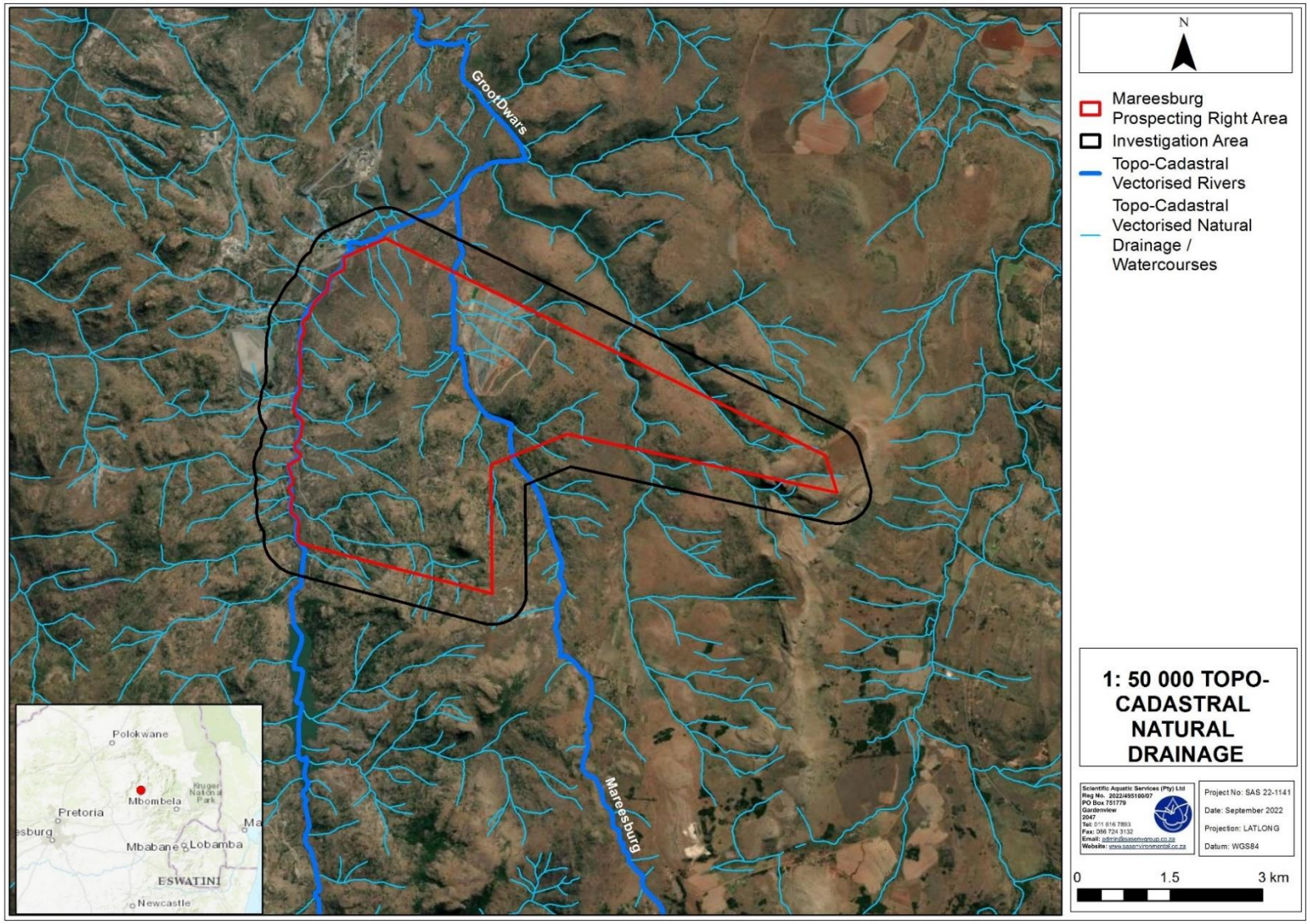


Figure 4: Map of natural surface water drainage in the study and investigation areas, as presented on the 1:50 000-scale topo-cadastral map for the area.

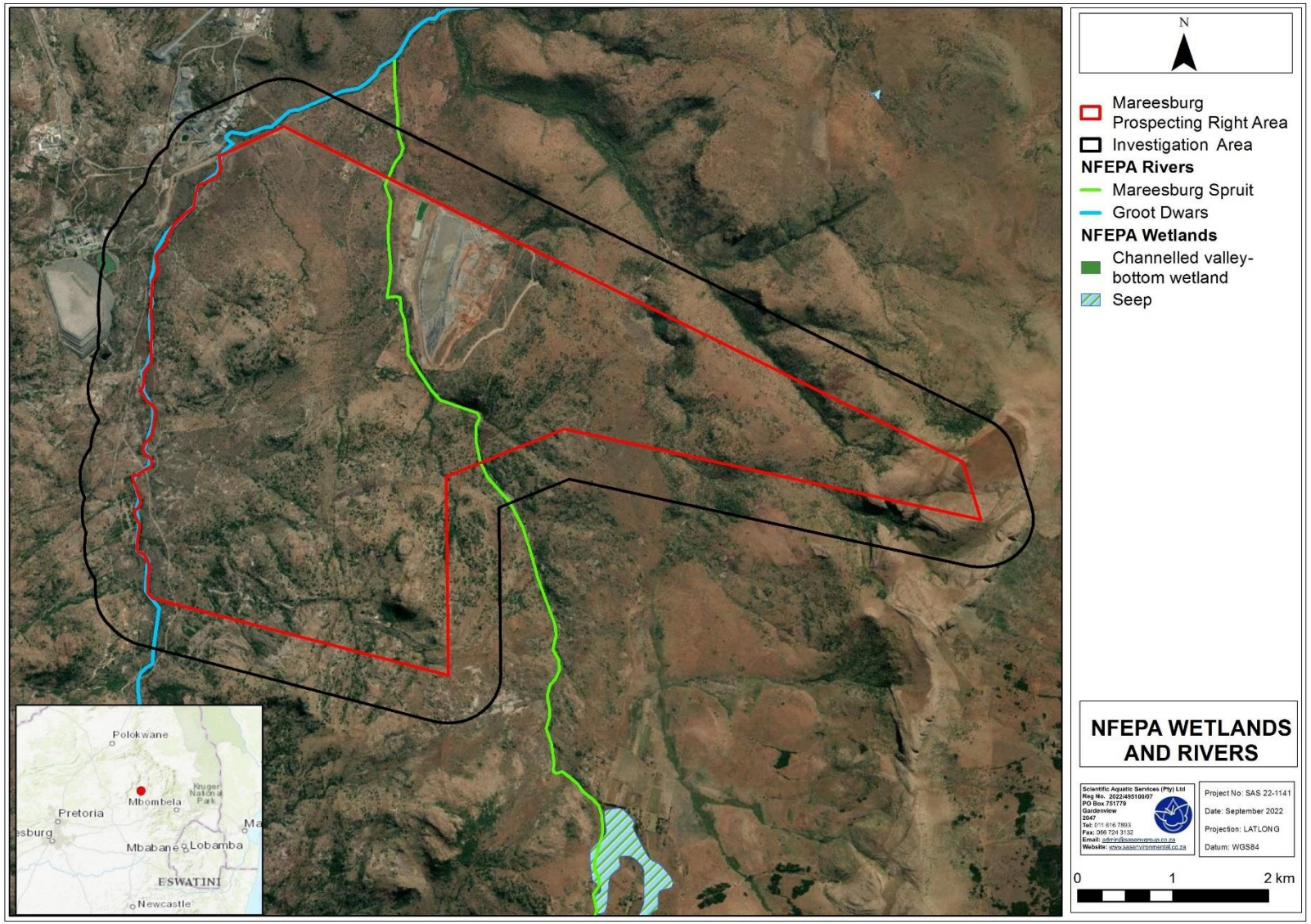


Figure 5: Wetlands and Rivers within the investigation area indicated by the NFEPA database.

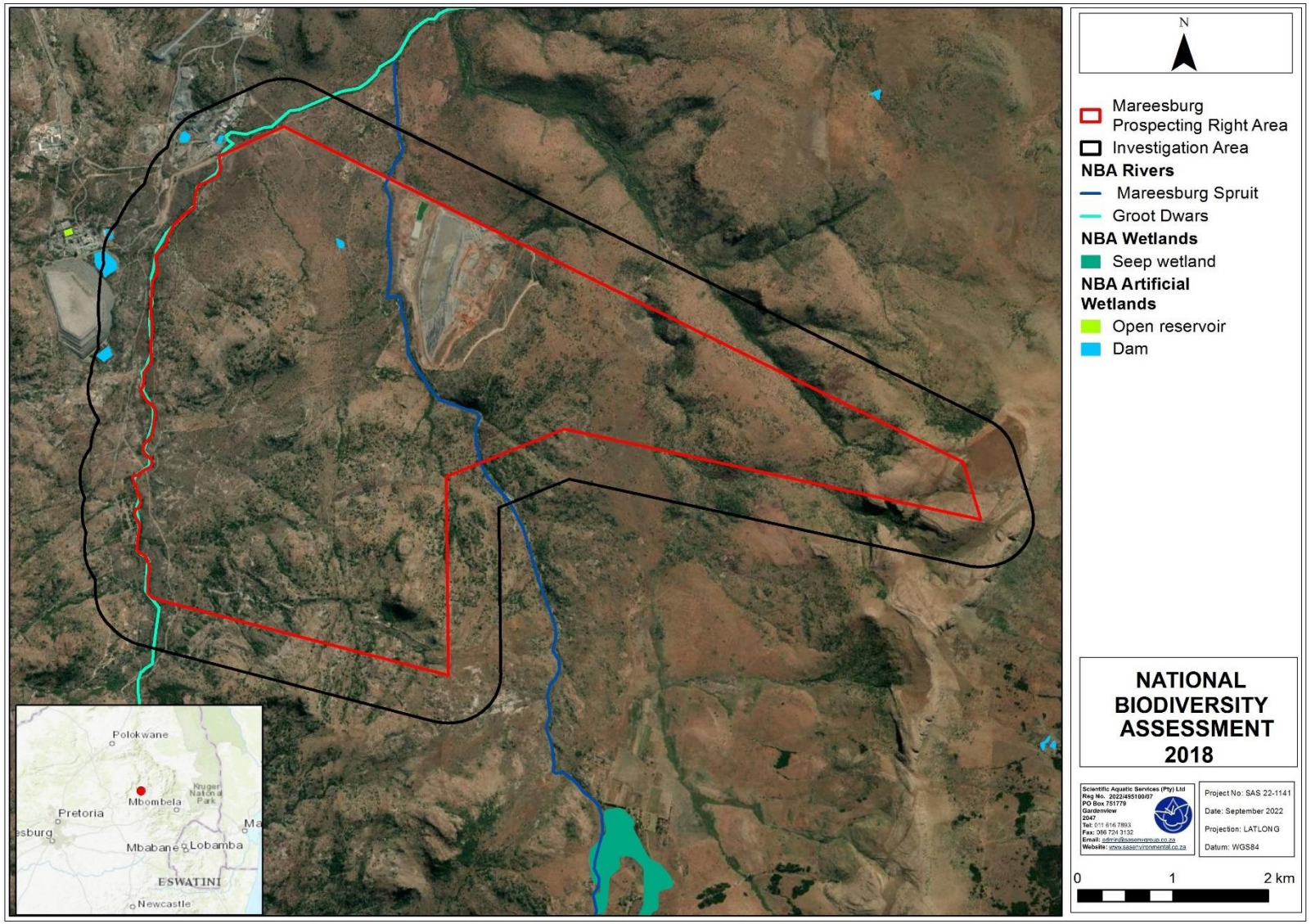


Figure 6: Wetlands and Rivers within the investigation area indicated by the National Biodiversity Assessment, 2018.

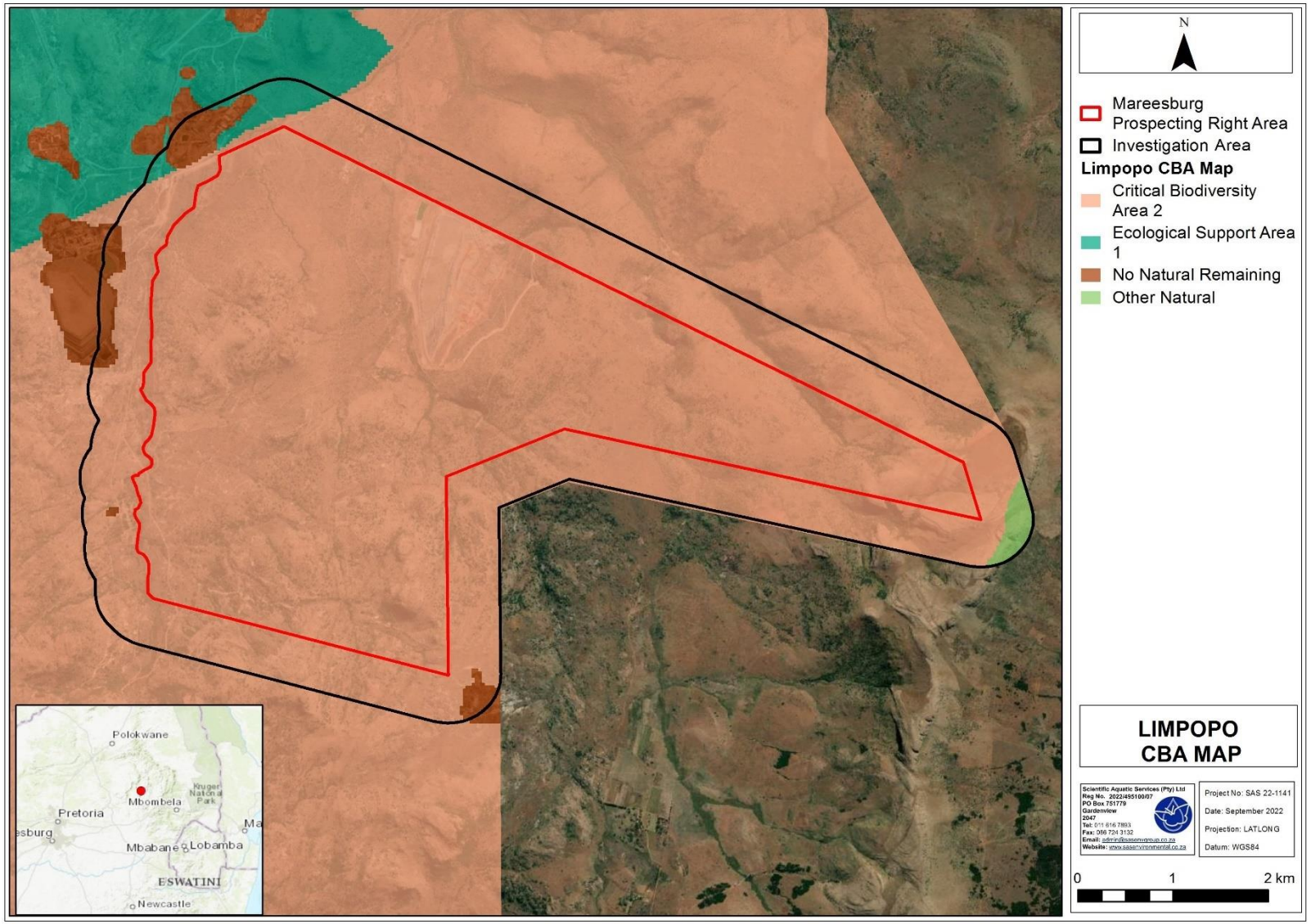


Figure 7: Designations in the Study and Investigation Areas according to the Limpopo Conservation Plan 2018 (Sekhukhune Bioregional Plan).

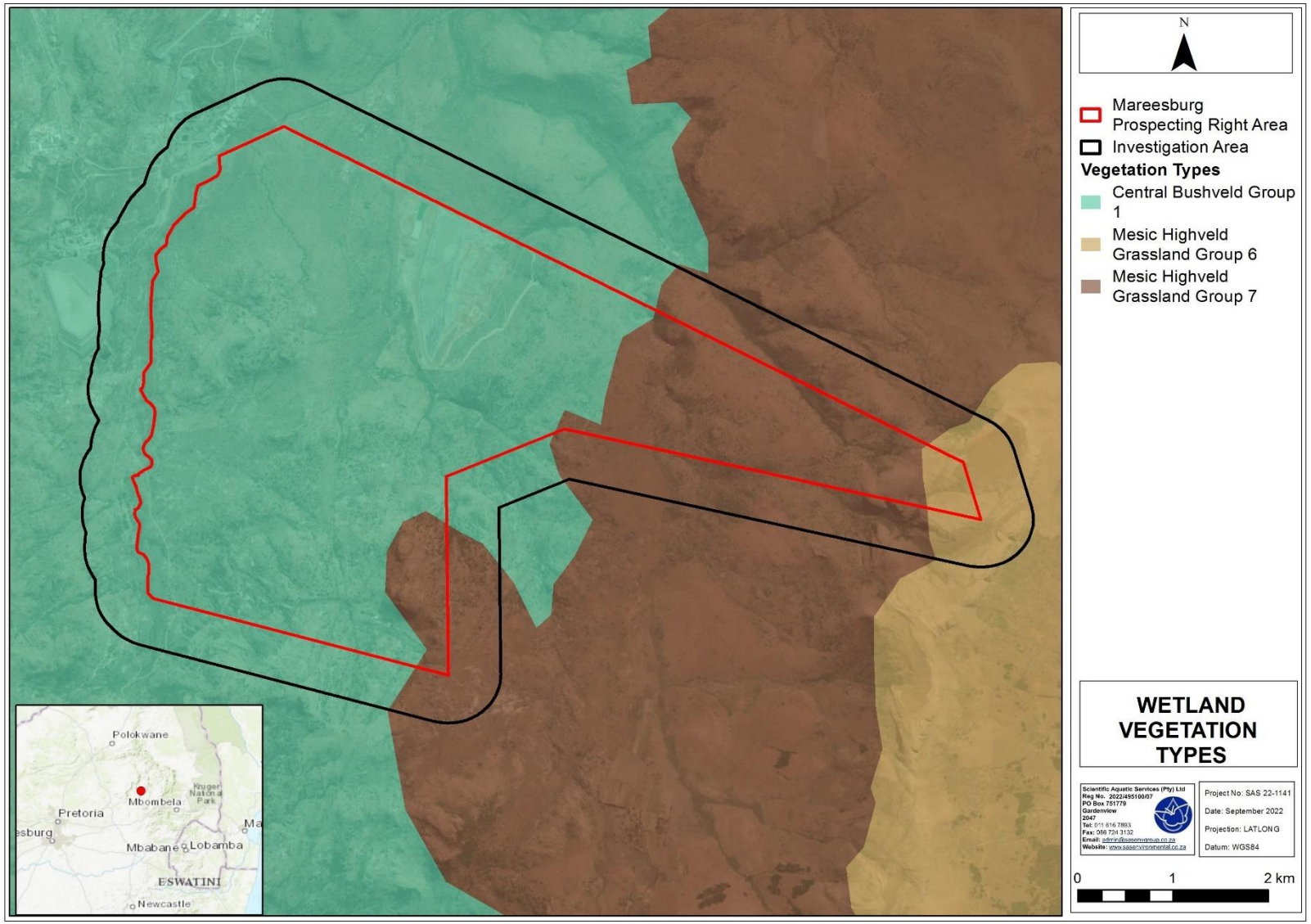


Figure 8: Wetland Vegetation Types in the Study and Investigation Areas.

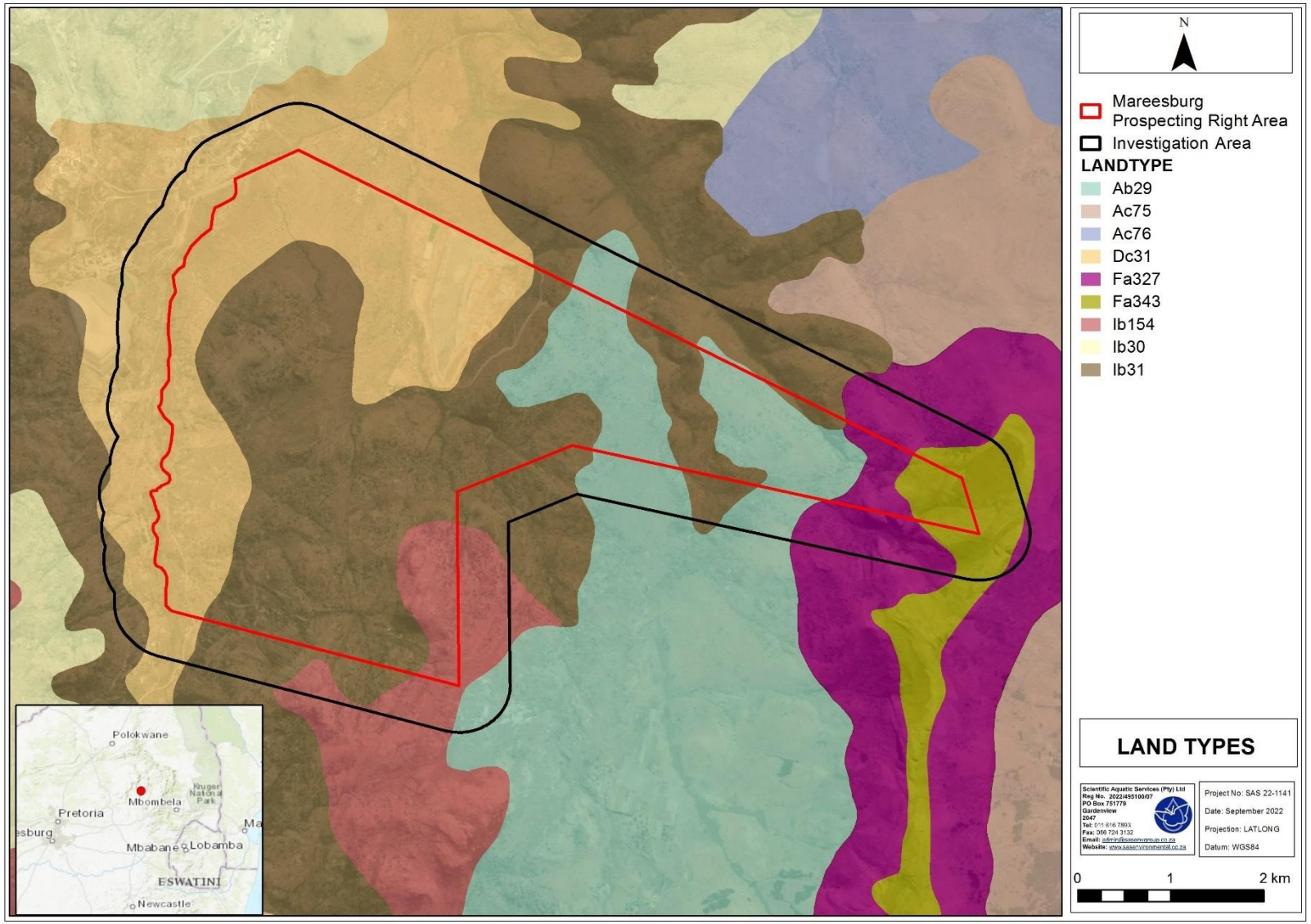


Figure 9: Landtypes within the Study Area and Investigation Areas

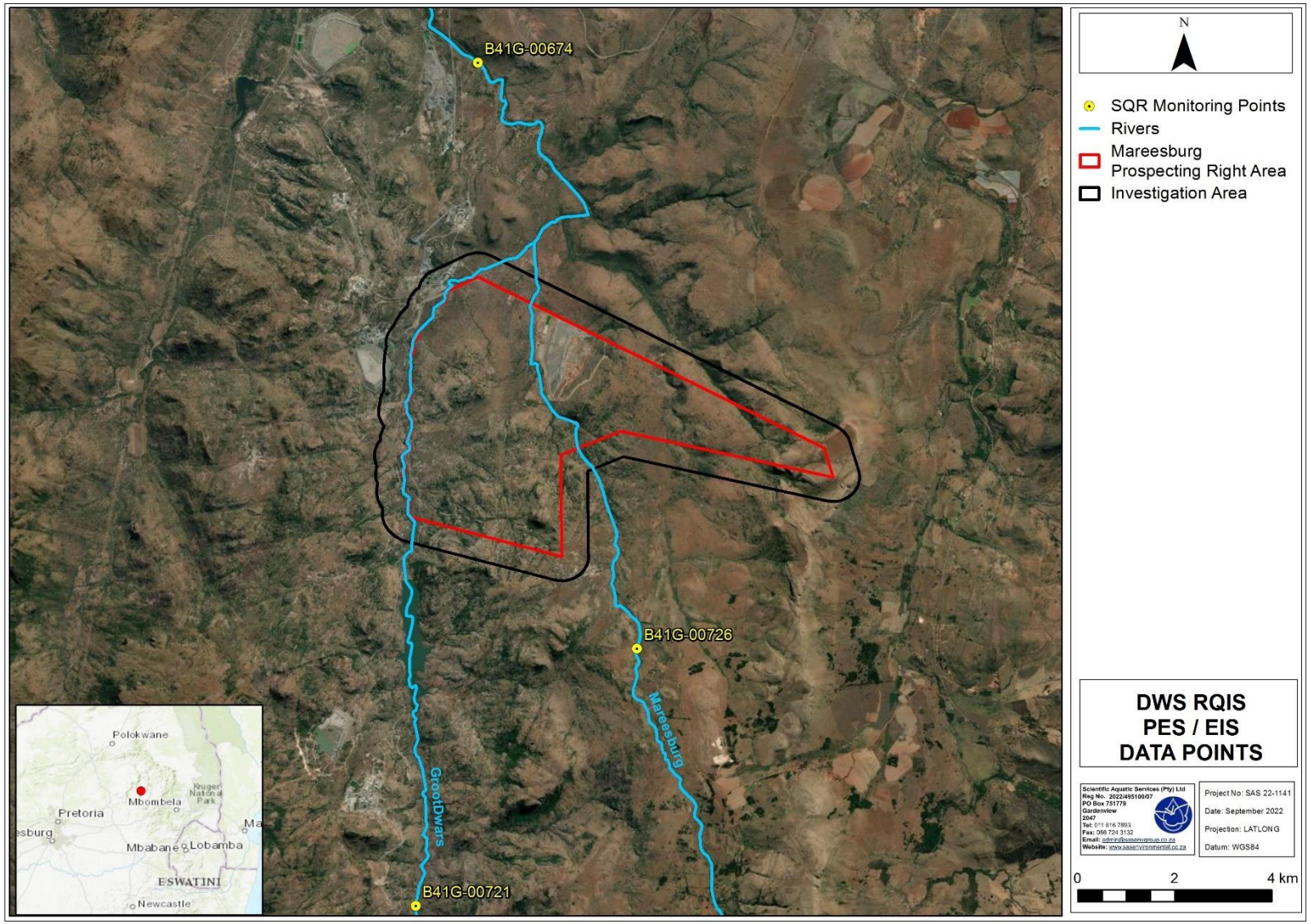


Figure 10: DWS RQIS PES / EIS Data Points

5.1 Department of Water and Sanitation (DWS) Resource Quality Information Services (RQIS) PES/EIS database

The reaches of the Groot Dwars River and the Mareesburg Spruit that traverse the Mareesburg prospecting right area fall within the Western Bankenveld Aquatic Ecoregion and within the B41G quaternary catchment. According to the PES/EIS database as developed by the DWS RQIS Department, the following sub-quaternary catchment reach (SQR) for the Groot Dwars and Mareesburg Spruit is applicable with the SQR monitoring points located approximately 4 km north (B41G-00674), 2 km south east (B41G-00726), and 6.8 km south (B41G-00721) of the study area. The following macro-invertebrate taxa has previously been reported from SQR B41G-00726, B41G-00674 and B41G-00721 (Groot Dwars River and Mareesburg Spruit):

Table 2: Fish species previously collected from or expected in the various SQR monitoring points associated with SQR B41G-00726, B41G-00674, and B41G-00721 (Groot Dwars River and Mareesburg Spruit):

Fish species	B41G - 00726 – Mareesburgspruit	B41G – 00674 (Groot Dwars River)	B41G – 00721 (Groot Dwars River)
Amphilius uranoscopus	✓	✓	✓
Chiloglanis pretoriae	✓	✓	✓
Clarias gariepinus	✓	✓	✓
Enteromius motebensis	✓		✓
Enteromius neefi	✓	✓	✓
Enteromius trimaculatus	✓	✓	
Enteromius unitaeniatus	✓	✓	
Labeo cylindricus	✓	✓	
Labeo molybdinus		✓	
Labeobarbus marequensis	✓	✓	✓
Oreochromis mossambicus		✓	
Pseudocrenilabrus philander	✓	✓	✓
Tilapia sparrmanii	✓	✓	✓

Table 3: Invertebrates previously collected from or expected at the SQR B41G-00726, B41G-00674 and B41G-00721 (Groot Dwars River and Mareesburg Spruit):

Invertebrate species	B41G - 00726 – Mareesburgspruit	B41G – 00674 (Groot Dwars River)	B41G – 00721 (Groot Dwars River)
Aeshnidae	✓		✓
Ancylidae	✓	✓	
Athericidae	✓	✓	✓
Baetidae > 2 sp.	✓	✓	✓
Belostomatidae	✓	✓	✓
Caenidae	✓	✓	✓
Ceratopogonidae	✓	✓	✓
Chironomidae	✓	✓	✓
Chlorocyphidae		✓	✓
Coenagrionidae	✓	✓	✓
Corduliidae	✓		
Corixidae	✓	✓	✓
Crambidae (pyralidae)	✓		
Culicidae	✓	✓	✓
Dixidae	✓		✓
Dytiscidae	✓	✓	✓
Ecnomidae	✓		
Elmidae/dryopidae	✓	✓	✓
Gerridae	✓	✓	✓
Gomphidae	✓	✓	✓
Gyrinidae	✓	✓	✓
Helodidae	✓		
Heptageniidae	✓	✓	✓
Hirudinea	✓		✓
Hydracarina	✓	✓	✓
Hydraenidae	✓	✓	
Hydrometridae	✓	✓	✓
Hydrophilidae	✓		✓
Hydropsychidae	✓ > 2 sp.	✓ 2 sp.	✓ 2 sp.
Hydroptilidae	✓	✓	
Lepidostomatidae	✓		
Leptophlebiidae		✓	✓
Leptoceridae	✓	✓	✓
Libellulidae	✓	✓	✓
Lymnaeidae			✓
Muscidae	✓		✓
Naucoridaenepidae	✓	✓	✓
Notonectidae	✓	✓	✓
Oligochaeta	✓	✓	✓
Perlidae		✓	
Philopotamidae	✓	✓	✓
Physidae			✓
Planorbinae		✓	✓
Pleidae	✓	✓	✓
Potamonautidae	✓	✓	✓
Psephenidae	✓	✓	✓
Psychodidae			✓
Simuliidae	✓	✓	✓
Tabanidae	✓	✓	✓
Thiaridae			✓
Tipulidae	✓	✓	✓
Tricorythidae	✓	✓	✓

Invertebrate species	B41G - 00726 – Mareesburgspruit	B41G – 00674 (Groot Dwars River)	B41G – 00721 (Groot Dwars River)
Turbellaria	✓	✓	✓
Veliidae/mesoveliidae	✓	✓	✓

Table 4: Summary of the ecological status of the sub-quaternary catchment (SQ) reaches associated with the freshwater ecosystems in proximity of the Mareesburg prospecting right area based on the DWS RQS PES/EIS database.

Ecological status	B41G-00726 (Mareesburgspruit)	B41G-00674 (Groot Dwars)	B41G-00721 (Groot Dwars)
Synopsis			
PES Category Median	Largely Natural (Class B)	Largely Modified (Class D)	Moderately Modified (Class C)
Mean EI[4] class	High	High	High
Mean ES[5] class	Very High	Very High	Very High
Length	18.71	11,84	32,04
Stream order	1	2	1
Default EC[6]	Very High (Class A)	Very High (Class A)	Very High (Class A)
PES[7] Details			
Instream habitat continuity MOD[8]	Small	Moderate	Large
RIP/wetland zone continuity MOD	Small	Moderate	Small
Potential instream habitat MOD activities	Moderate	Large	Moderate
Riparian/wetland zone MOD	Small	Moderate	Small
Potential flow MOD activities	Moderate	Large	Moderate
Potential physico-chemical MOD activities	Small	Large	Moderate
EI Details			
Fish spp/SQ	7.00	12.00	8,00
Fish average confidence	4.71	5.00	3,75
Fish representivity per secondary class	Low	Moderate	Low
Fish rarity per secondary class	Moderate	High	Moderate
Invertebrate taxa/SQ	51.00	41.00	48.00
Invertebrate average confidence	3.94	4.17	3.92
Invertebrate representivity per secondary class	Very High	High	Very High
Invertebrate rarity per secondary class	Very High	High	Very High
EI importance: riparian-wetland-instream vertebrates (excluding fish) rating	High	Very High	Low
Habitat diversity class	High	Moderate	Very High
Habitat size (length) class	Low	Low	High
Instream migration link class	Very High	High	Moderate
Riparian-wetland zone migration link	Very High	High	Moderate
Riparian-wetland zone habitat integrity class	Very High	High	Moderate
Instream habitat integrity class	High	Moderate	High
Riparian-wetland natural vegetation rating based on percentage natural vegetation in 500m	Very High	Very High	Very High
Riparian-wetland natural vegetation rating based on expert rating	Low	Low	Low
ES Details			
Fish physical-chemical sensitivity description	Very High	Very High	Very High
Fish no-flow sensitivity	Very High	Very High	Very High

[4] EI = Ecological Importance
[5] ES = Ecological Sensitivity
[6] EC = Ecological Category; default based on median PES and highest of EI or ES means
[7] PES = Present Ecological State; confirmed in database that assessments were performed by expert assessors
[8] MOD = Modification

Ecological status	B41G-00726 (Mareesburgspruit)	B41G-00674 (Groot Dwars)	B41G-00721 (Groot Dwars)
Invertebrates physical-chemical sensitivity description	Very High	Very High	Very High
Invertebrates velocity sensitivity	Very High	Very High	Very High
Riparian-wetland-instream vertebrates (excluding fish) intolerance water level/flow changes description	High	Very High	High
Stream size sensitivity to modified flow/water level changes description	Very High	High	Very High
Riparian-wetland vegetation intolerance to water level changes description	Low	Low	Low

6. SITE SURVEY RESULTS

A site investigation of the study area was undertaken from the 29th to the 31st of August 2022 during the winter season, using visual assessment methods. In addition, a 'bucket' soil auger was used to investigate soils in certain freshwater ecosystems for the presence of hydromorphy where vegetation species composition and structure suggested the presence of wetland habitat.

The site assessment confirmed that, as indicated in the topo-cadastral depiction of natural drainage in the wider area (Figure 4), there are various natural drainage features (freshwater ecosystems) which largely drain northwards into the Groot Dwars River that forms the western boundary of the study area.

Figure 11: A view west across the study area showing the hilly nature of the terrain that characterises much of the study area. Two episodic drainage lines are visible in the centre of the photograph

The steep and hilly terrain in the southern and eastern parts of the study area (Figure 11) strongly influences freshwater drainage in the study area. The northern and north-west parts of the site and the Groot Dwars River valley bottom are less hilly and more gently undulating. The predominant freshwater ecosystem hydrogeomorphic (HGM) type is the non-perennial (episodic) drainage line which tends to occur as very narrow, often steeply incised drainage features due to the hilly and incised nature of terrain over large parts of the study area. Only in the flatter parts of the site do freshwater ecosystems that are characterised by depositional processes occur.

The wider area in which the study and investigation areas fall is characterised by moderate to high volumes of rainfall (especially at higher altitudes which are located in the eastern-most extent of the study area), however the dominance of non-perennial drainage in the study area is strongly influenced by the nature of the substrate that characterises the study area. As detailed in the land type data for the study area (refer to Table 1), significant parts of the study area are characterised by exposed rock, or alternatively by very shallow soils which overlie a bedrock or weathered rock base. Where soils do occur, the nature of the underlying geology

has resulted in the formation of strongly structured clay soils. The structure and very strong clayey nature of these soils is not conducive to the formation of interflow within the soils, and thus surface flow from precipitation is much more dominant than subsoil water movement (interflow). The predominance of surface flows as opposed to interflow and associated seepage is true for most of the first order drainage features in the study and investigation area which are characterised by a bedrock-dominated substate (in certain cases with a complete absence of soil), and catchments that are comprised of rock and very shallow soils. These conditions are not conducive to the maintenance of seasonal / ephemeral flows and these upper sub-catchments are 'flashy' in their nature, with the drainage lines being characterised by flows only for short periods in response to rainfall events.

The drainage features apart from the Groot Dwars River (i.e. the Mareesburg Spruit and another unnamed tributary stream located to the east of the Mareesburg Spruit – see Figure 12) in the study area that were observed to be characterised by active flows during the site visit are characterised by larger catchments, and importantly in a hydrological context, are characterised by the presence of valley bottom and seep wetlands that are located within the flatter terrain of the Vygenhoek area that is located to the south of the study area. The wetlands in the upper catchments of these two perennial streams are critical for maintaining perennial surface flow within these streams.

Figure 12: Flow within the unnamed tributary stream of the Groot Dwars River in the eastern part of the study area

The first order drainage lines are typically charactered by a narrow lateral extent, with some being characterised by the presence of riparian vegetation. In these settings the presence of woody vegetation along the drainage lines may be as much a product of the presence of rock outcropping along the drainage line which offers natural protection from fire as that of moisture availability, with moisture availability being reduced by the nature of runoff in the catchments of these episodic first order drainage lines as discussed above. In a fluvial geomorphic context, most of the first order drainage lines in the southern and eastern parts of the study area can be characterised as mountain headwater streams, which are usually first or second order, very steep-gradient drainage features dominated by vertical flow over bedrock with waterfalls and plunge pools. Reach types in mountain headwater streams include bedrock fall and cascades (Ollis *et al,* 2013).

Figure 13: An example of a higher order episodic drainage line that displays fluvial geomorphic characteristics of a mountain stream

Higher order drainage lines are however characterised by a more distinct woody riparian zone (e.g. Figure 13). In these higher order drainage lines a single macro channel is typically present and the channel bed is predominantly bedrock-dominated, with some localised areas of deposition of alluvial material where the local reach is flatter in terms of its longitudinal profile. These higher order drainage features can be geomorphologically classified as mountain streams (e.g. Figure 13) - steep-gradient streams dominated by bedrock and boulders, locally cobble or coarse gravels in pools, with reach types including cascades, bedrock fall, step-pools and plane beds (Ollis *et al,* 2013).

Within such flatter reaches of the higher order streams and drainage lines, certain reaches of the drainage line were noted to be vegetatively predominated by the presence of herbaceous hydrophytes (e.g. Figure 12) such as *Phragmites mauritianus, Miscanthus junceus, Arundinella nepalensis, Schoenoplectus spp.* and *Cyperus sexangularis.* Such reaches that can contain small areas of hydromorphic soils are typically limited by more rocky-dominated reaches upstream or downstream where no such sediment deposition is able to occur.

The largest fluvial feature in the study area is the Groot Dwars River which forms the western boundary of the study area. The Groot Dwars River is a perennial river, taking the form of an upper foothills stream[9] - a moderately steep, cobble-bed or mixed bedrock-cobble bed channel, with plane bed, pool-riffle or pool-rapid reach types (Ollis *et al*, 2013). The river is characterised by a mix of woody plants (with the most dominant species being *Combretum erythrophylum*) and herbaceous species as detailed above in its riparian zone.

The lithological characteristics of the wider area also have an important bearing on the nature of freshwater ecosystem occurrence in the study area. Most of the site is underlain by igneous rocks of the Bushveld Complex – with the western and central part of the study area falling within the Rustenburg Layered Suite and being characterised by Pyroxenites, Norites, Anorthosites and, Chromitites (western areas) and Bronzites, Harzburgites and Norites (central areas). The far eastern part of the site has a completely different geology and twinned with its higher altitude and resultant higher rainfall, has a slightly different freshwater ecosystem type assemblage. This area is characterised by quartzites of the Steenkampsberg Formation which form part of the Pretoria Group that falls within the Transvaal Supergroup.

In the area underlain by quartzites of the Steenkampsberg Formation, a seep wetland was encountered (Figure 14). The seep wetland occurs along a reach of a drainage line that drains a moderately sloping valley head in this part of the study area. The seep wetland is located on a localised area of slightly more level ground downgradient of a resistant band of quartzite that forms a waterfall, compared to the slopes upgradient and down gradient of the wetland, allowing the accumulation of inorganic and organic material within the wetland. The wetland has a convex cross-sectional profile, being characterised by two narrow channel-like flow paths on the outer parts of each side of the wetland.

[9] As defined by the NFEPA Rivers Database

Figure 14: A view of the seep wetland in the far eastern part of the study area

Soils in the wetland area characterised by the Didema soil form, which is characterised by an organic O topsoil horizon (a topsoil that is characterised by a high percentage of organic material) that is underlain by hard rock. The nature of the quartzite-derived substrate and higher rainfall in this part of the site as compared to the areas to the west entail that interflow is more prominent in this area and active seepage was noted to form active areas of lateral seepage that form part of this larger seep wetland (e.g. Figure 15).

Figure 15: An area of active lateral seepage within the wider seep wetland

The only other seep wetlands located in the study area are located in the northern part of the study area to the west of the Mareesburg Tailings Storage Facility (TSF) and upgradient of the Mareesburg Spruit (Figure 16). These seep wetlands are localised in extent and are likely to be areas of perched water tables where the water table is seasonally sufficiently shallow to allow the occurrence of hydrophytic wetland plant species such as hydrophytic forbs and graminoids. Such seepage areas were noted to be vegetatively dominated by the grass species *Imperata cylindrica* and *Miscanthus junceus* and the sedge *Cyperus sexangularis*.

Figure 16: A seep wetland in the northern part of the study area

The only other wetland in the study area is a channelled valley bottom wetland in the vicinity of the farmhouse in the northern part of the site.

Although a detailed assessment of freshwater state (PES) for the study area has not been undertaken as part of the scope of this assessment, observations relating to anthropogenic influences acting on the freshwater ecosystems in the study area were made during the field investigation.

Mining activity is the most significant impact to freshwater ecosystems in the study area, with the complete transformation of several historically occurring drainage lines having occurred with the establishment of the Mareesburg TSF and more recently other drainage lines having been transformed by clearing of areas on the western side of the Groot Dwars River valley associated with the development of a haul road. Where large scale land transformation has occurred on the site, adjacent freshwater ecosystems have likely also been impacted by the alteration of runoff from their catchments, that would have resulted in alteration to their hydrological and geomorphological state.

The water quality of the Dwars River is also adversely affected by mining activities in its catchment. Where mining activities have not occurred, especially in the central and eastern parts of the study area, there is a very low anthropogenic footprint with very limited livestock grazing occurring. Freshwater ecosystems in this part of the study area are subjected to very low, if any, impact related to the presence and proliferation of alien invasive vegetation.

The distribution and classification of freshwater features in the study area and associated investigation area is indicated in Figures 17 to 20.

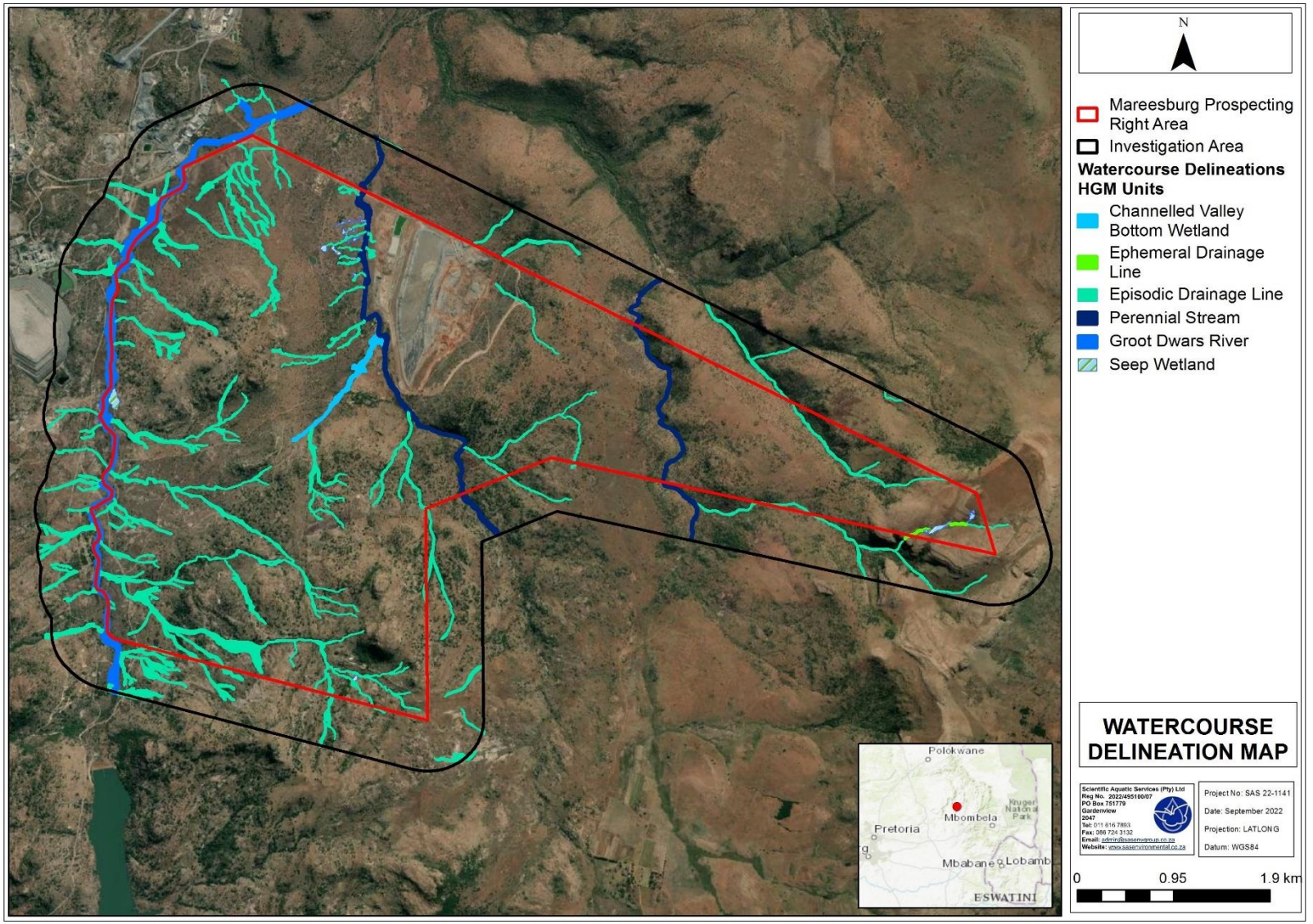


Figure 17: Freshwater ecosystems located within the study and investigation areas

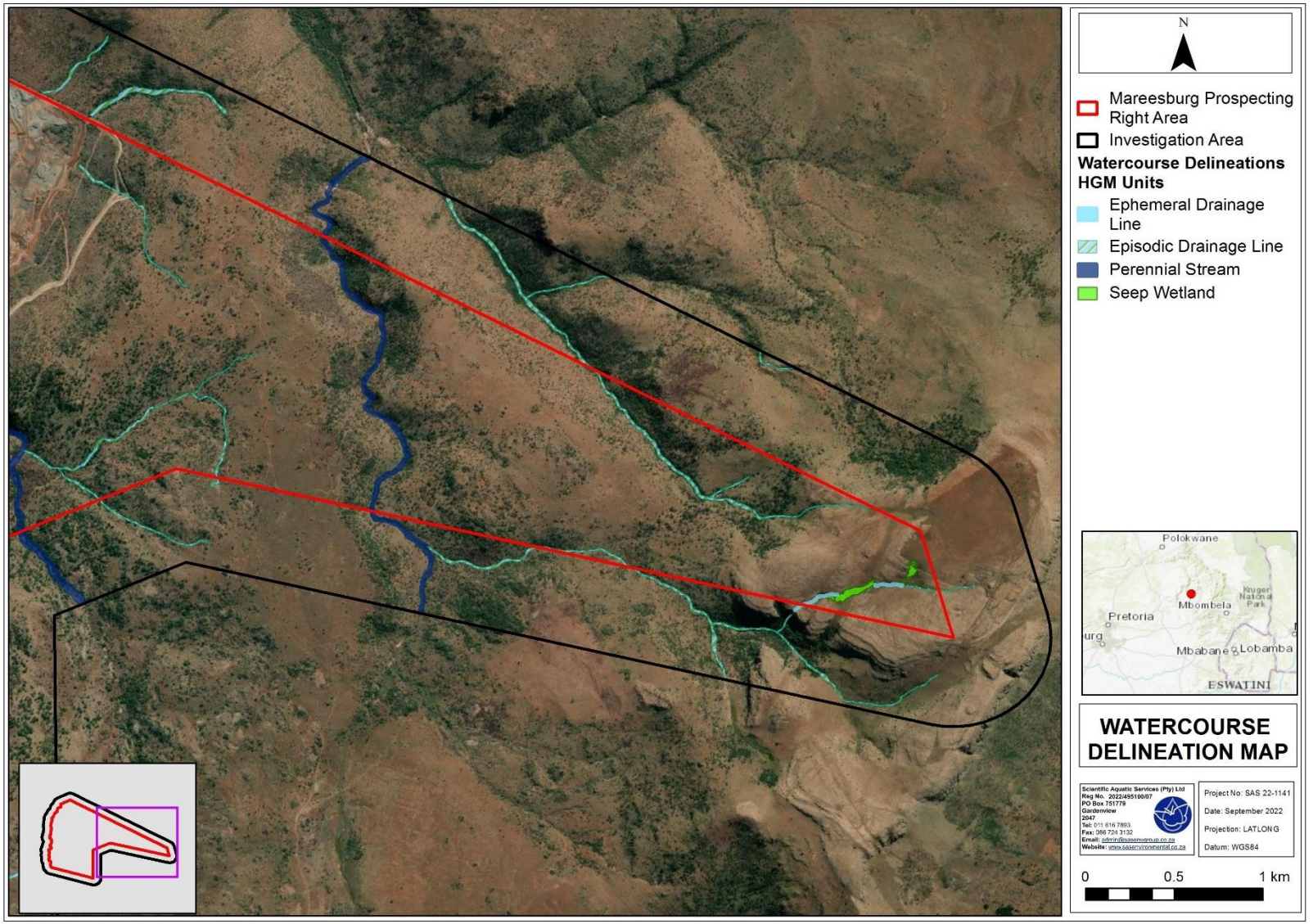


Figure 18: Freshwater ecosystems located within the eastern parts of the study and investigation areas

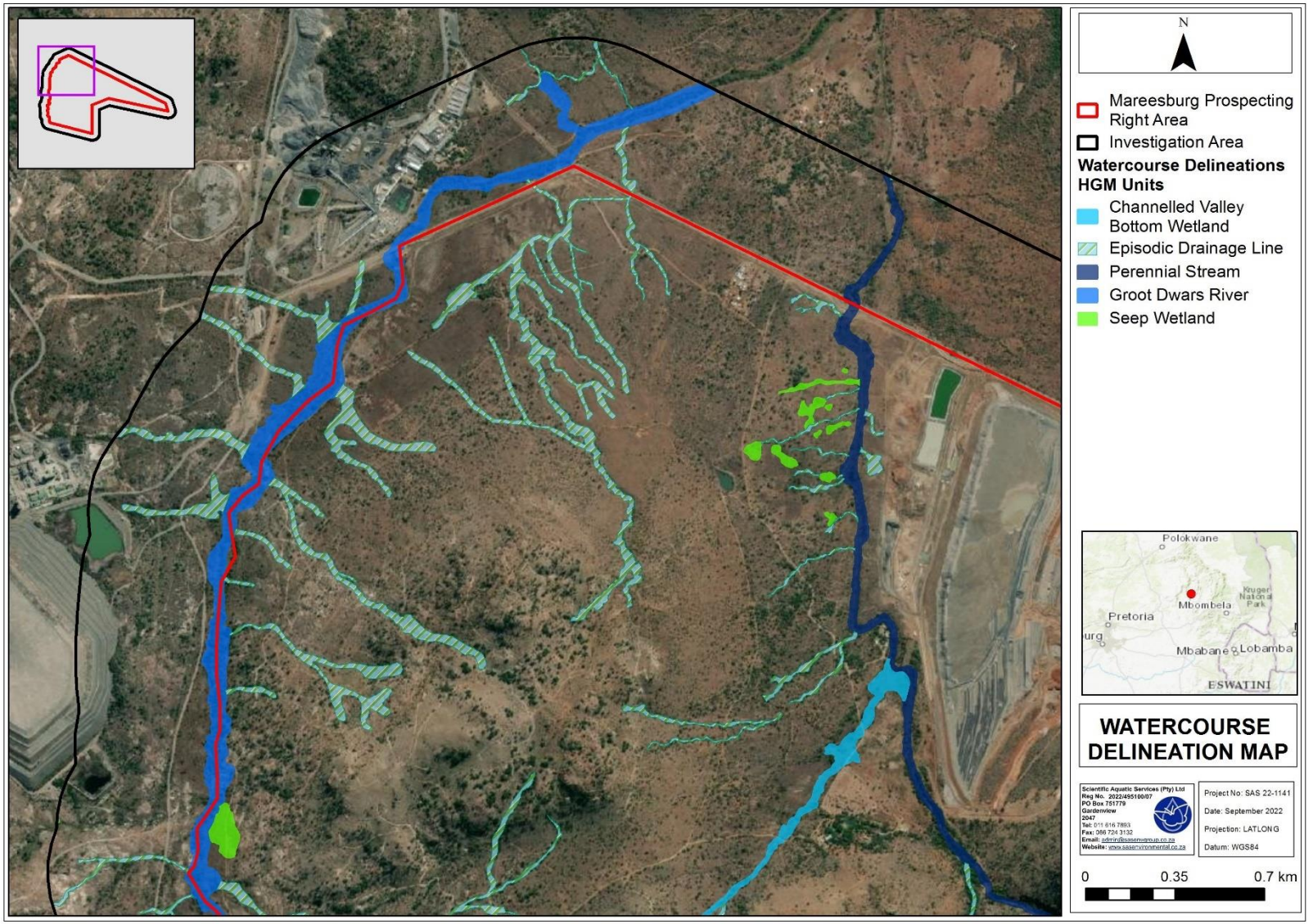


Figure 19: Freshwater features located within the northern parts of the study and investigation areas

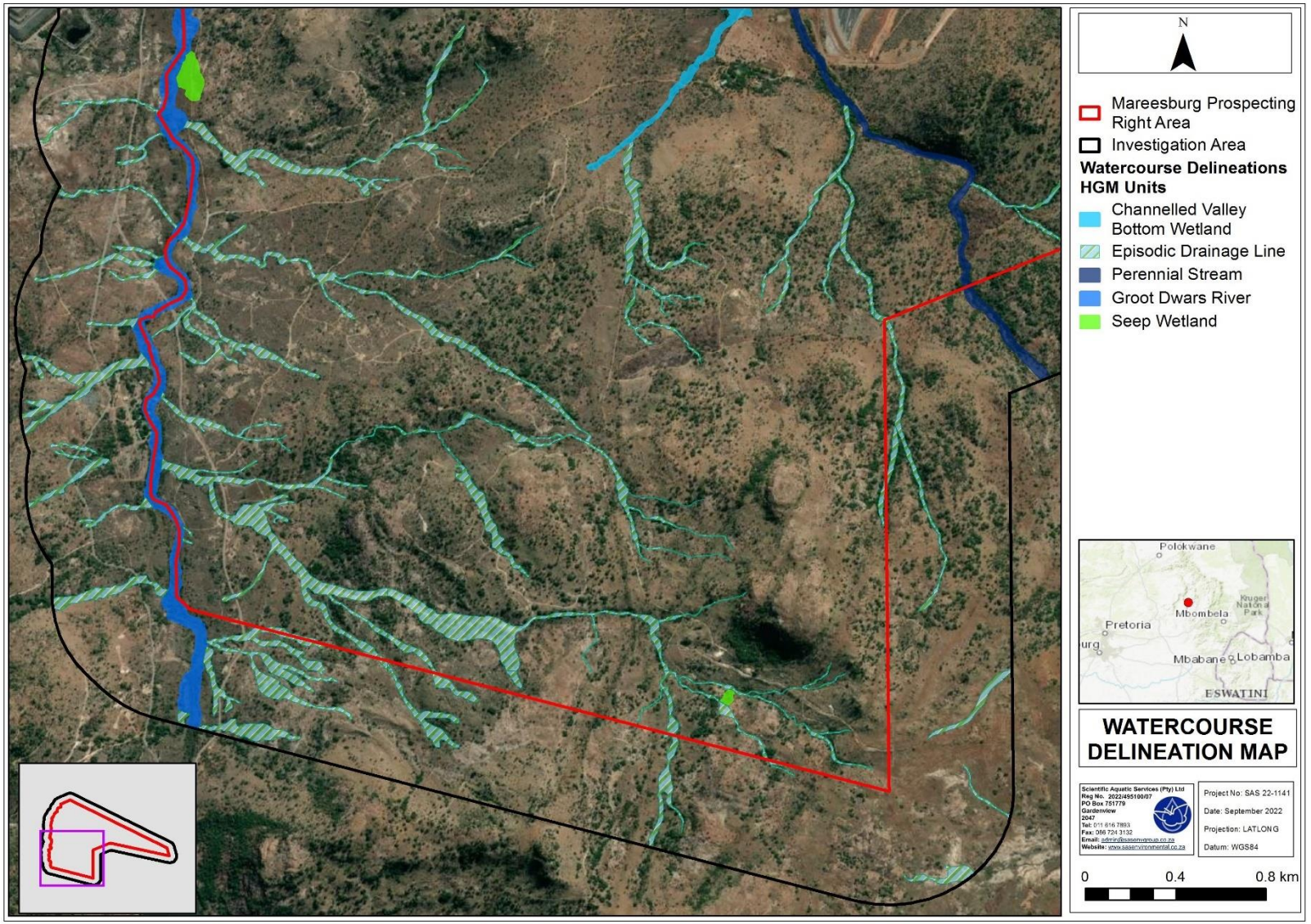


Figure 20: Freshwater features located within the southern parts of the study and investigation areas

6.1 Freshwater Sensitivity

As described in Section 5, the DFFE Web-based Screening Tool has designated the study area and the majority of the investigation area as being of very high aquatic biodiversity sensitivity, based on the designation of aquatic CBAs and the location of the study area within freshwater ecosystem priority area quinary catchments (the study area is located within a CODE 1 FEPA catchment).

The site verification undertaken has confirmed the presence of various freshwater ecosystems across the study area. Although many of these freshwater ecosystems are first order drainage features taking the form of episodic drainage lines, their importance from a freshwater sensitivity perspective must not be understated, as they drain into higher order drainage features in the valley floors and eventually into the Groot Dwars River which has been designated as a River FEPA. Impacts on these drainage features would have downstream impacts which would take on extra significance considering the importance of the catchment in which they fall. Although the FEPA status applies to the primary river reach within the quinary catchment (i.e. that of the Upper Dwars River and Mareesburg Spruit), the surrounding land and smaller stream network needs to be managed in a way that maintains the good condition of the primary river reach. As detailed above many of the freshwater ecosystems in the study area have a very low anthropogenic impact footprint and are accordingly likely to be in a near natural state.

Due to their location within a Phase 1 FEPA catchment, twinned with the near natural state of many of the freshwater ecosystems in the undeveloped parts of the site, all freshwater ecosystems in the study and investigation areas must be considered as being of very high sensitivity. Under the Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Aquatic Biodiversity, (GN320 of March 2020), for areas of very high aquatic biodiversity sensitivity an Aquatic Biodiversity Report must be produced. However the context of the proposed prospecting right-related activities must be considered in terms of the likely impacts on the freshwater environment that could result. The non-invasive nature of the proposed activities is considered to pose a low quantum of risk to the freshwater ecosystems in the study area, especially if any prospecting-related physical activity occurs away from the freshwater ecosystems. Accordingly the nature of the proposed activity is considered to pose a low risk of impact to the freshwater ecosystems in the study area and those downstream, and accordingly for the purposes of the prospecting rights application, an aquatic biodiversity / freshwater compliance statement is considered sufficient.

However it is recommended that a future Aquatic Biodiversity Specialist Assessment must be undertaken should the prospecting rights application be altered to allow any activities other than non-invasive activities as currently proposed by the applicant that would result in the potential for impacts on freshwater resources to result from such prospecting activities. Such an Aquatic Biodiversity Specialist Assessment must also be undertaken for any future mining-right or mining activities-related application for Environmental Authorisation and a Water Use Authorisation.

7. LEGISLATIVE REQUIREMENTS

The following legislative requirements were considered during the assessment.

- The Constitution of the Republic of South Africa, 1996[10];
- The National Environmental Management Act, 1998 (Act No. 107 of 1998) as amended (NEMA);
- The National Water Act, 1998 (Act No. 36 of 1998) as amended (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); and
- The Minerals and Petroleum Resources Development Act, 2002 (Act No.28 of 2002) (MPRDA).

The legislative context of a regulated zone(s) of activity for the protection of freshwater ecosystems as based on the above legislation can be summarised as follows:

Table 5: Articles of Legislation and the relevant zones of regulation applicable to each article.

Regulatory authorisation required	Zone of applicability
Water Use Authorisation. Application for water uses as stipulated in Section 21(c) and (i) of the National Water Act, 1998 (Act No. 36 of 1998) as amended. **Department of Water and Sanitation (DWS)**	**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 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: • **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;** • 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 • **a 500 m radius from the delineated boundary (extent) of any wetland or pan in terms of this regulation.**

[10] Since 1996, the Constitution has been amended by seventeen amendments acts. The Constitution is formally entitled the 'Constitution of the Republic of South Africa, 19996". 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.

Regulatory authorisation required	Zone of applicability
	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) as amended regarding the use of water for mining and related activities aimed at the protection of water resources. 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 in its current and future phases complies with GN704 of the National Water Act, 1998 (Act No. 36 of 1998) as amended which contains regulations on use of water for mining and related activities aimed at the protection of water resources. GN704 states that: *No person in control of a mine or activity may:* *(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;* *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 No. 107 of 1998) EIA Regulations (2014), as amended in 2017.	**Activity 12 of Listing Notice 1 (GN 327) of the National Environmental Management Act, 1998 (Act No.107 of 1998) EIA regulations (as amended in 2017)** The development of— (i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs—; a) within a watercourse; b) in front of a development setback; or c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse. excluding— (aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour; (bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies; (cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies; (dd) where such development occurs within an urban area; (ee) where such development occurs within existing roads, road reserves or railway line reserves; or (ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of the commencement of development and where indigenous vegetation will not be cleared.
	Activity 14 of Listing Notice 3 (GN 324) of the National Environmental Management Act, 1998 (Act No.107 of 1998) EIA regulations (as amended in 2017). The development of— (i) dams or weirs, where the dam or weir, including infrastructure and water surface area exceeds 10 square metres; or (ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs—

Regulatory authorisation required	Zone of applicability
	(a) within a watercourse; (b) in front of a development setback; or (c) if no development setback has been adopted, within 32 metres of a watercourse, within Limpopo Province: i. Outside urban areas; (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;

As the prospecting and the acquisition of the rights to prospect is expected to be non-invasive, i.e. not involve any physical activity, then the prospecting (right) alone would not trigger either a Section 21 (c) and (i) water use, or Activity 12 in terms of Listing Notice 1 of the EIA Regulations of 2014 as amended in 2017. Similarly under Listing Notice 3 of the EIA Regulations no activities associated with a Zone of Regulation are expected to apply to the proposed prospecting right. Thus no Zones of Regulation would apply to the application for the prospecting, as contemplated.

However if the nature of the prospecting changed to involve any physical activity, then these legislative triggers may become relevant along with the applicable zones of regulation and their associated environmental authorisations which would apply to the identified natural watercourses:

- A 32 m Zone of Regulation (ZoR) in accordance with the National Environmental Management Act, 1998 (Act No. 107 of 1998), applying to all identified watercourses and wetlands; and
- A 100 m, as well as a 500 m ZoR in accordance with the National Water Act, 1998 (Act No. 36 of 1998) applying to all identified freshwater ecosystems (with the 500m ZoR applying to all wetlands).

Figures 22 to 28 below indicate the potential Zones or Regulation in the study area and in the Investigation area.

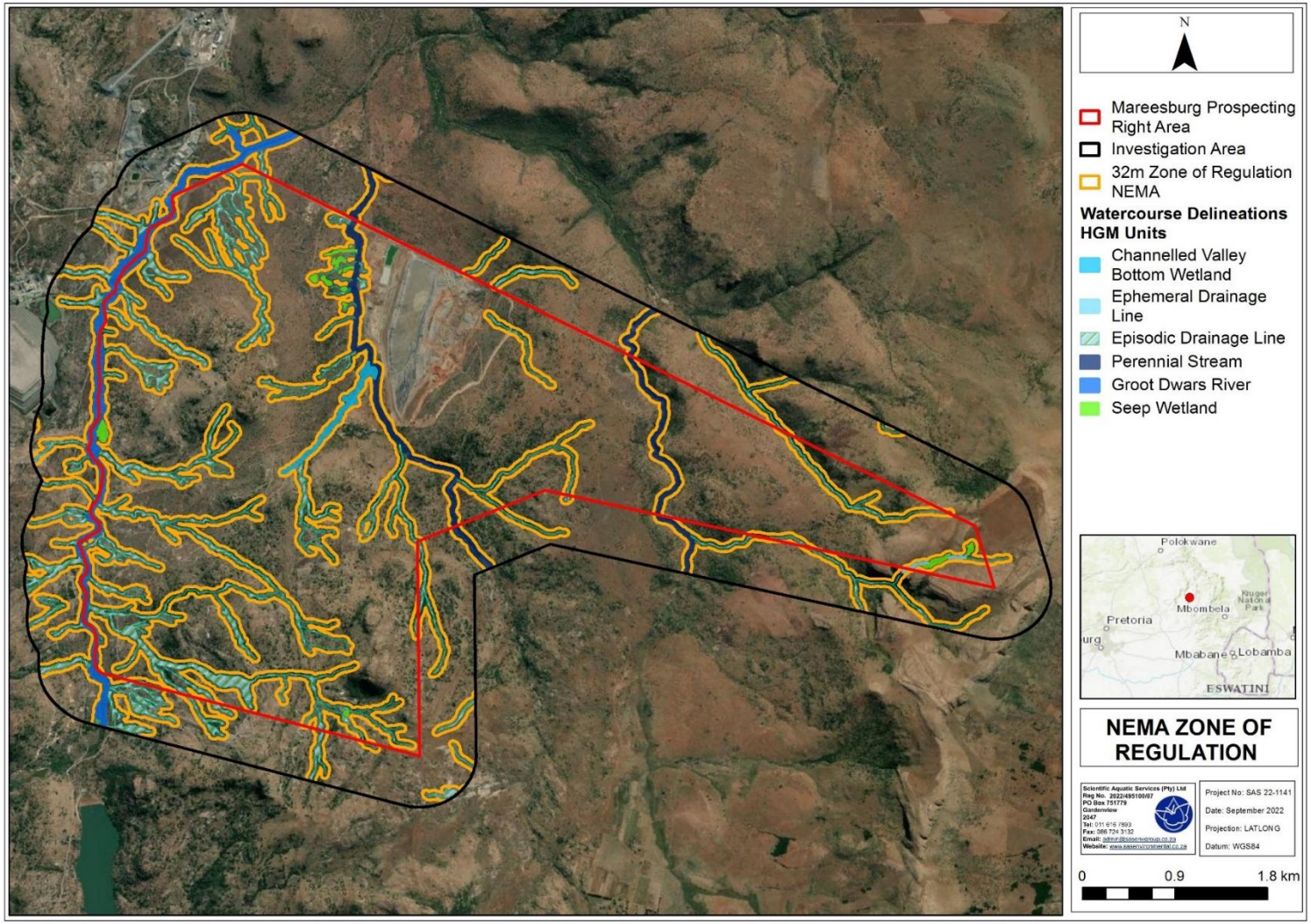


Figure 21: Potential Zones of Regulation related to NEMA in the study and investigation areas

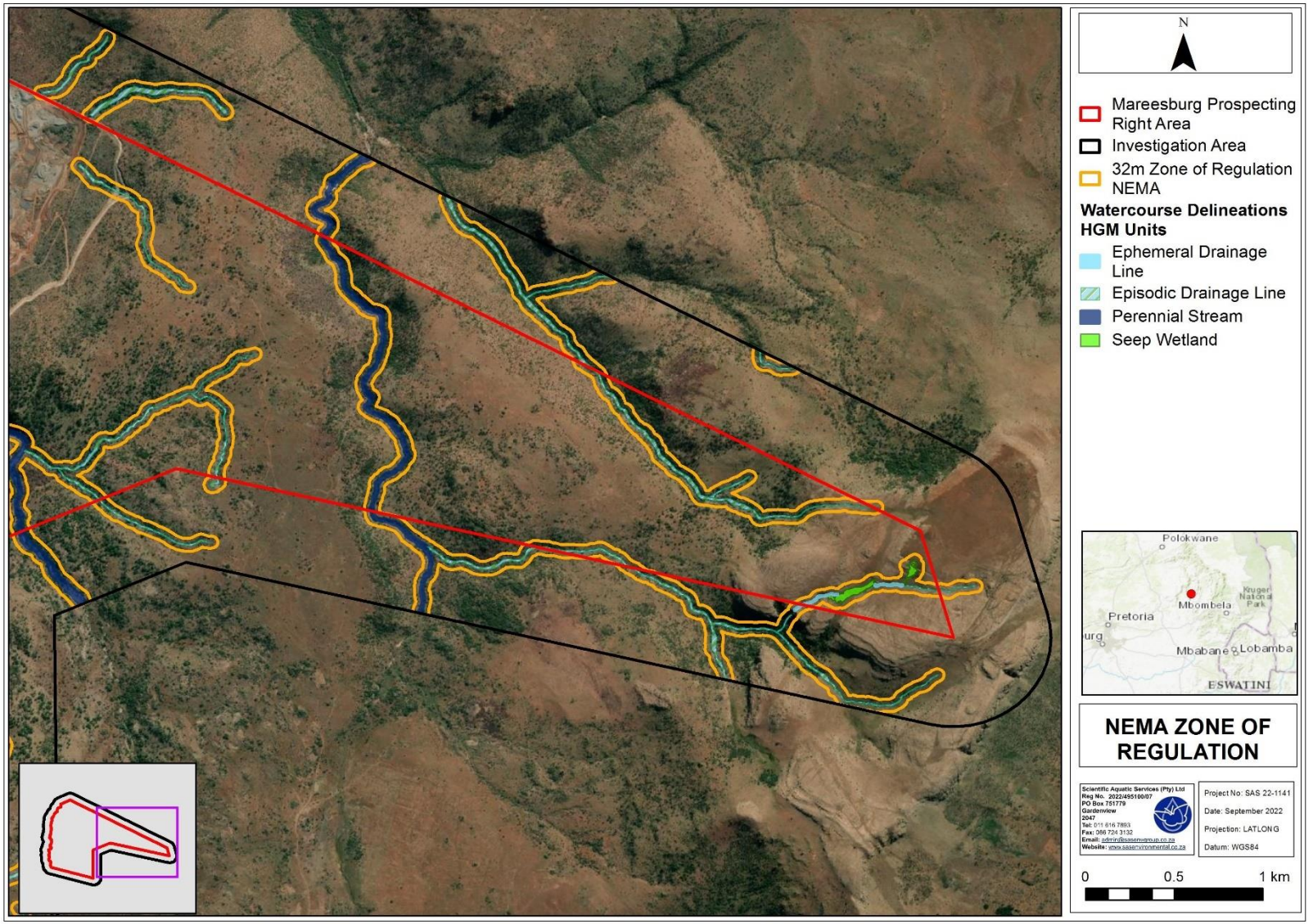


Figure 22: Potential Zones of Regulation related to NEMA in the eastern parts of the study and investigation areas

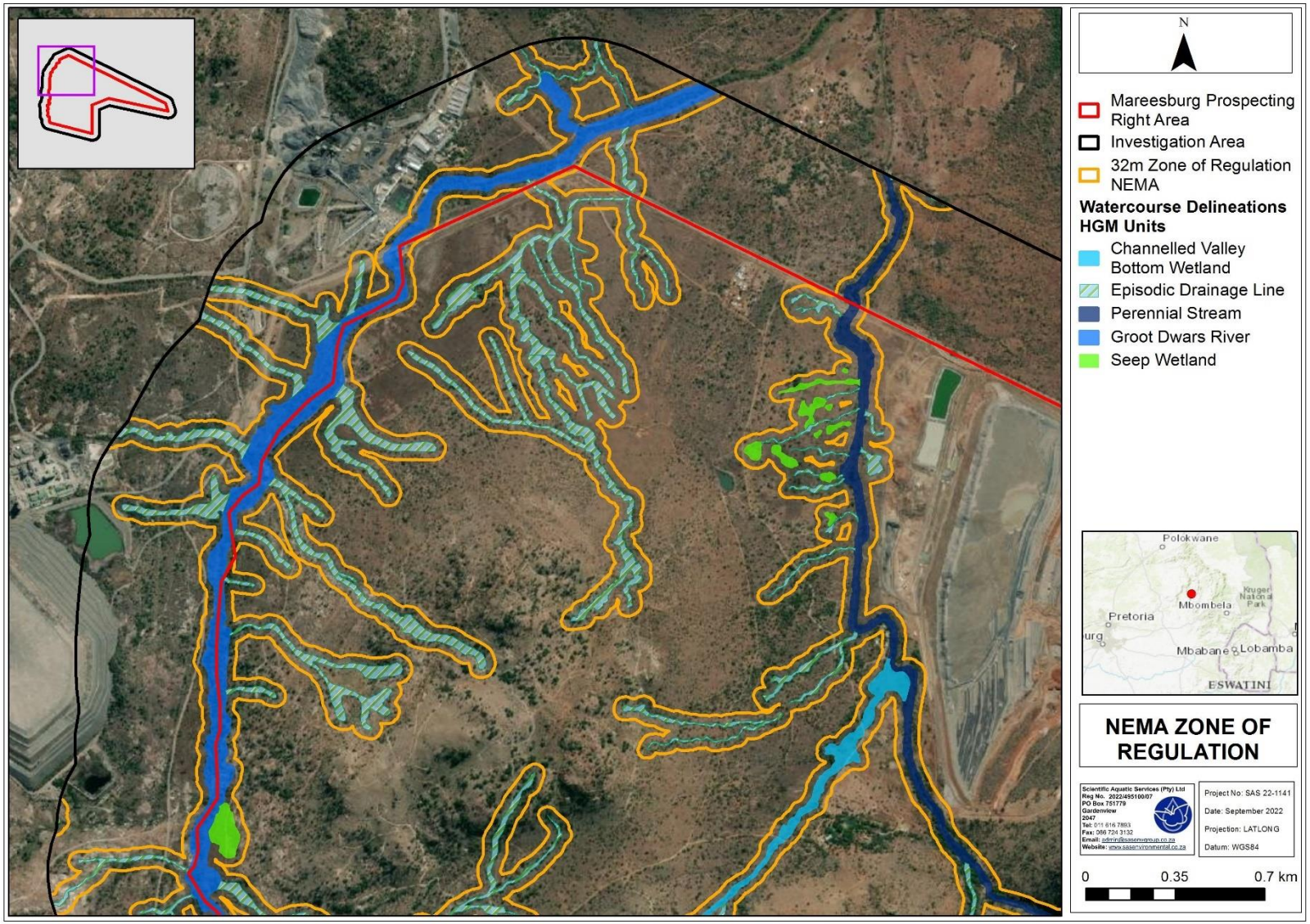


Figure 23: Potential Zones of Regulation related to NEMA in the northern parts of the study and investigation areas

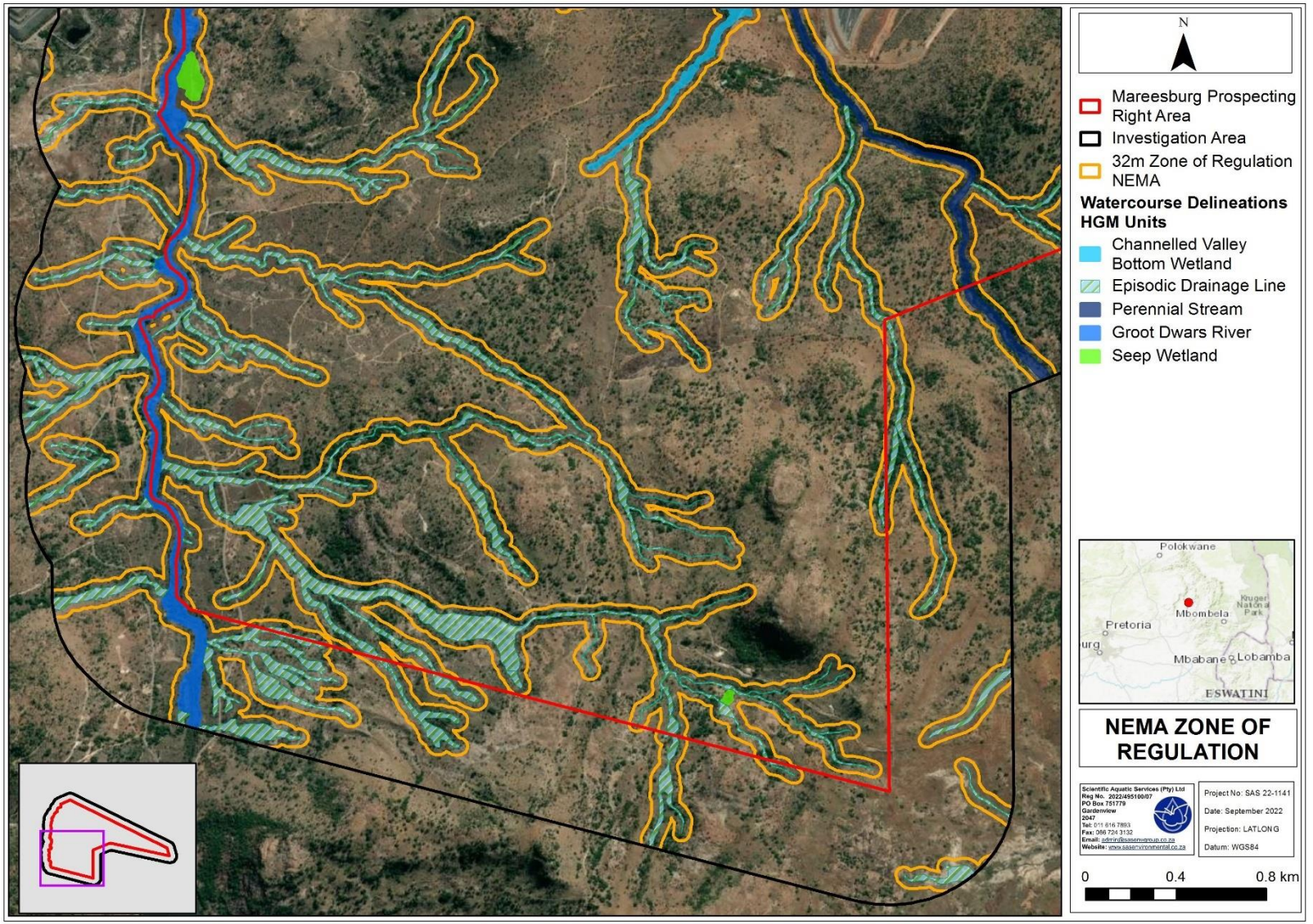


Figure 24: Potential Zones of Regulation related to NEMA in the southern parts of the study and investigation areas

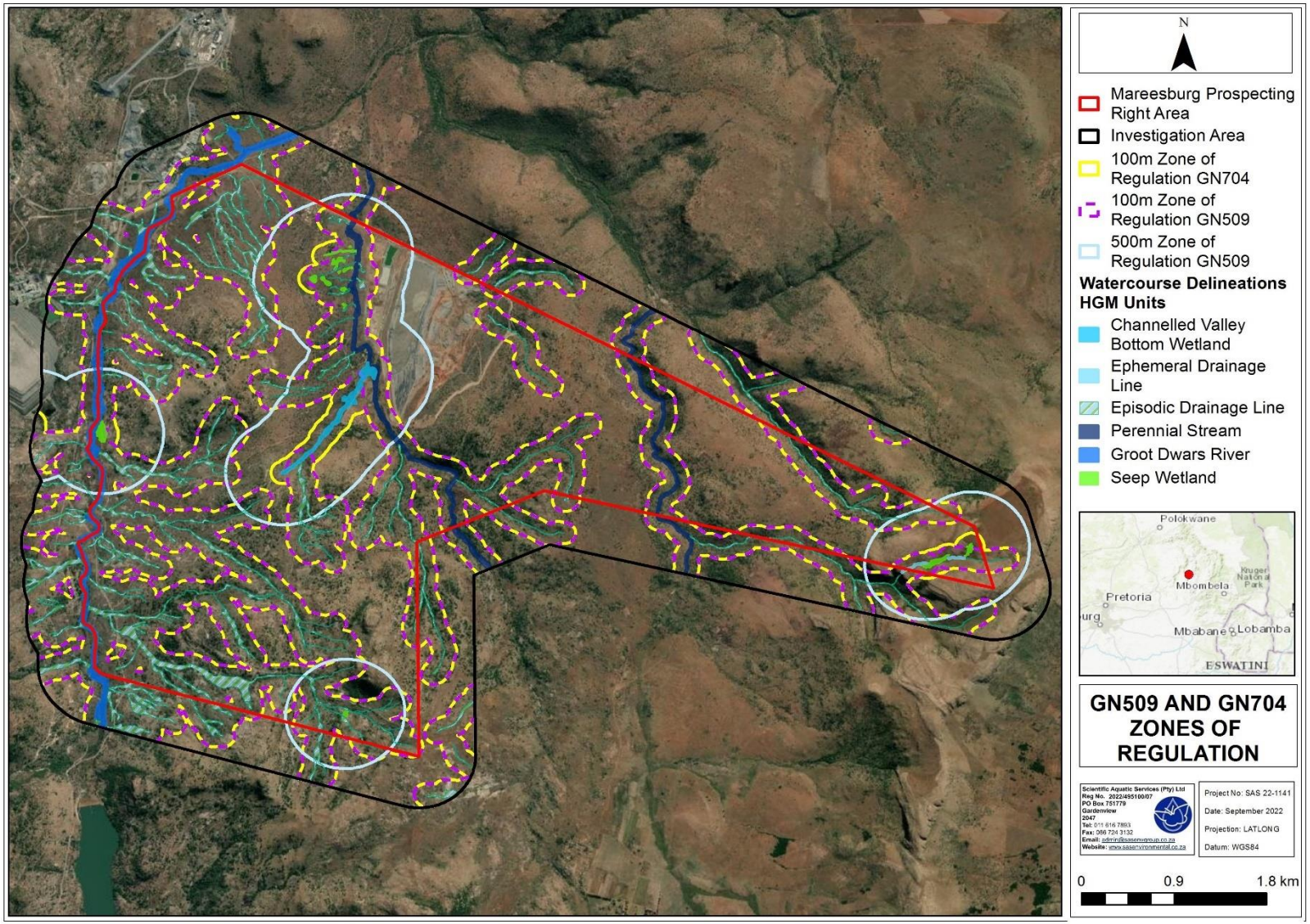


Figure 25: Potential Zones of Regulation related to the NWA in the study and investigation areas

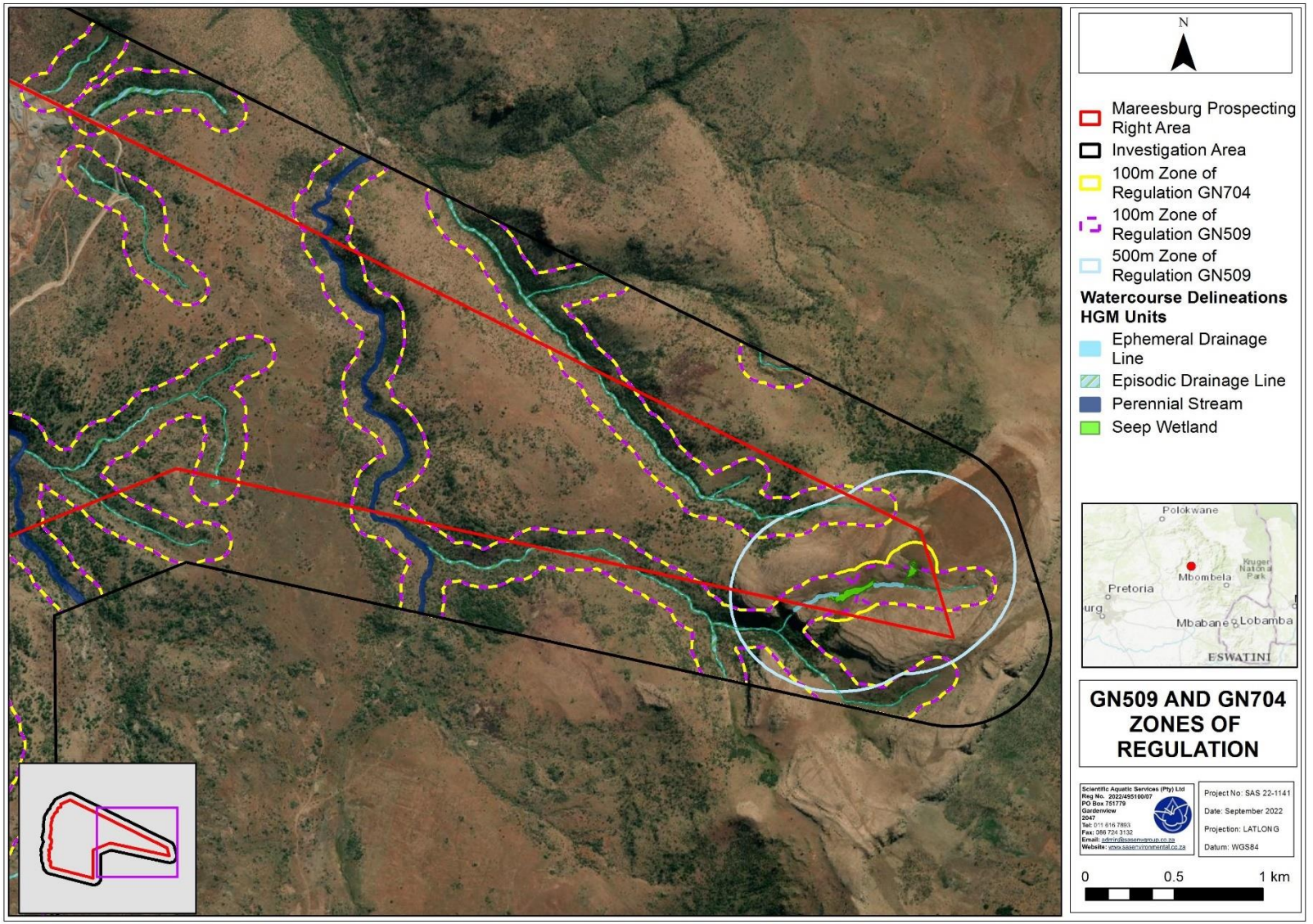


Figure 26: Potential Zones of Regulation related to the NWA in eastern parts of the study and investigation areas

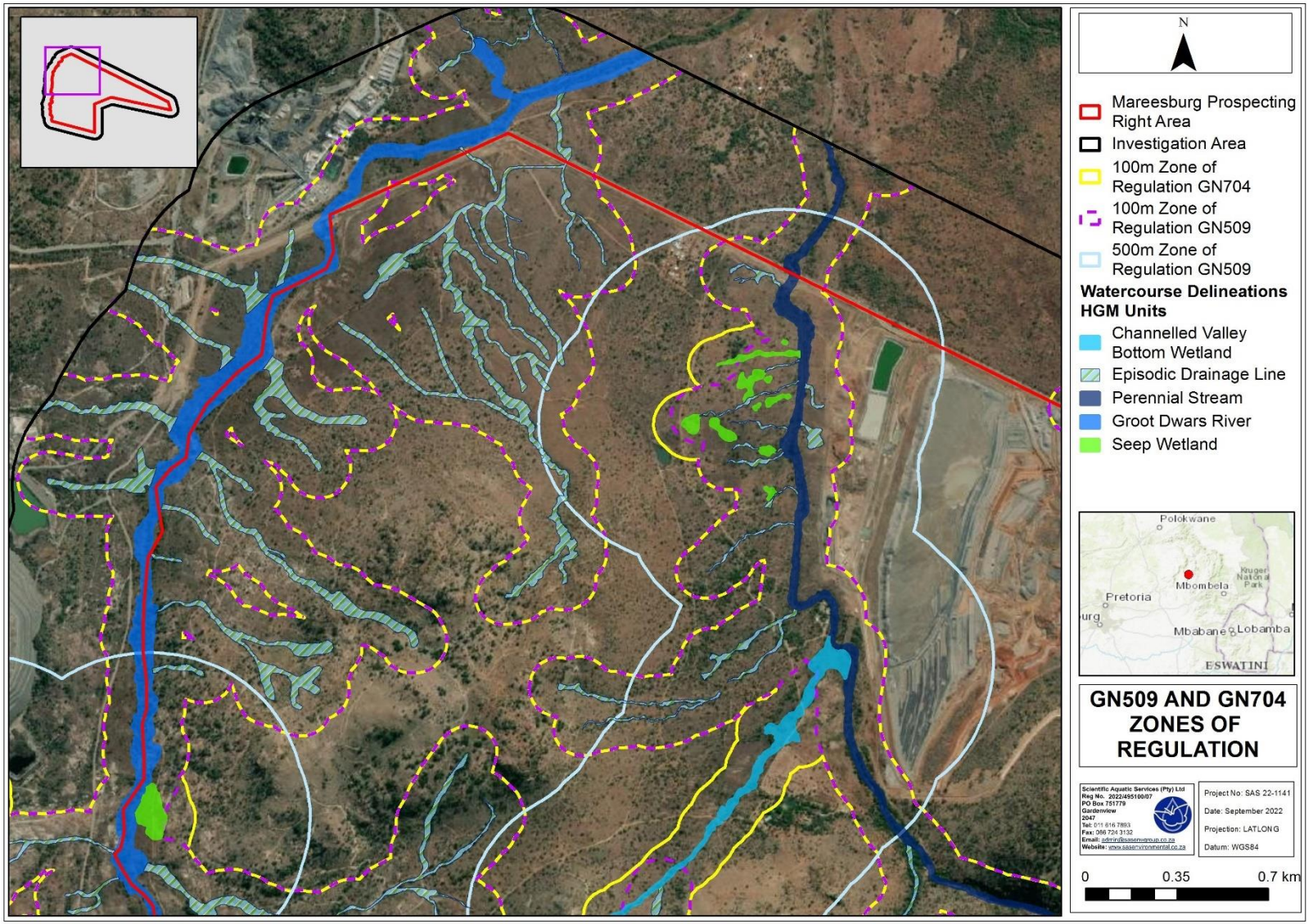


Figure 27: Potential Zones of Regulation related to the NWA in the northern parts of the study and investigation areas

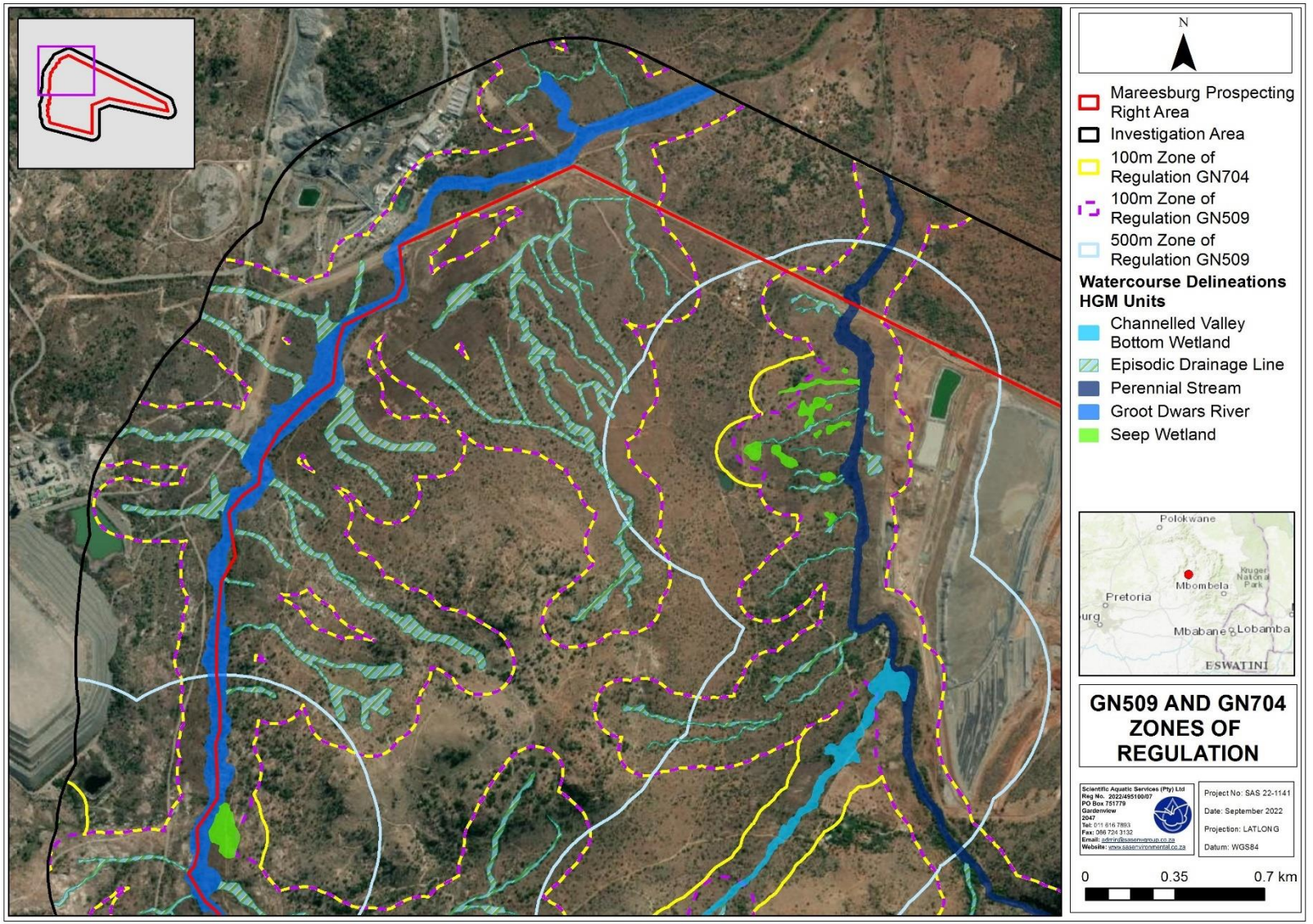


Figure 28: Potential Zones of Regulation related to the NWA in the southern parts of the study and investigation areas

8. CONCLUSION

8.1 Summary of Desktop Verification Outcome/Findings

Based on the site verification undertaken by Scientific Aquatic Services and the findings thereof presented in this report, numerous freshwater ecosystems were confirmed to occur in the study area associated with the application for (non-invasive) prospecting rights on the Farm Mareesburg 8 JT. The majority of these freshwater ecosystems are non-perennial episodic drainage lines in terms of their hydrology regime, but certain wetlands, streams and the Groot Dwars River are located within the study area.

The designation of very high sensitivity to wetland features in the study area by the DFFE Screening Tool has been supported through the findings of the freshwater assessment that has confirmed the very high sensitivity of all freshwater ecosystems in the study area.

Under the Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Aquatic Biodiversity, (GN320 of March 2020), for areas of very high aquatic biodiversity sensitivity an Aquatic Biodiversity Assessment must be produced. However due the non-invasive nature of the proposed prospecting activity (i.e. comprising of no significant physical activities and thus no prospecting-related impacts on the freshwater features in the study area) the approach of producing such a compliance statement was taken.

Table 6: Outcome of Freshwater Assessment Findings

Screening Tool Assigned Sensitivity	Verified Sensitivity	Outcome Statement / Plan of Study	Relevant Section Motivating Verification
Very High	All freshwater ecosystems in the study area have been verified to be very high sensitivity freshwater ecosystems, due to their location within a Phase 1 FEPA catchment and due to the natural state of many of these freshwater ecosystems	Due to the low risk posed by the proposed prospecting rights application-related activities, an aquatic compliance statement is considered adequate for the application for EA. It recommended that a future Aquatic Biodiversity Specialist Assessment must be undertaken ***should the prospecting rights application be altered or approved to allow any activities other than non-invasive activities as currently proposed by the applicant that would result in the potential for impacts on freshwater resources to result from such prospecting activities***. Such an Aquatic Biodiversity Specialist Assessment must also be undertaken for any future mining-right or mining activities-related application for Environmental Authorisation in the Study Area.	Section 6.1

8.2 Compliance Statement/Impact Statement

The prospecting right, as being applied for would entail non-invasive prospecting activities in the study area, thus no significant physical activities are proposed to be undertaken. Accordingly no impacts to the freshwater environment or freshwater ecosystems in the study area are envisioned and the risk profile to the freshwater environment is considered low to negligible. The freshwater ecosystems in the study area have been confirmed to be of very high aquatic biodiversity / freshwater sensitivity. Should the prospecting activities, as proposed, remain non-invasive (with no physical activity on the site), the prospecting activities will not result in an impact (new or cumulative) on the freshwater ecosystems in the study area and the prospecting right in its current form is associated with a low risk to the freshwater environment in the study area. The risk profile would change if any physical activities on the site were introduced.

8.3 Reasoned Opinion for issuing of EA

Due to the non-invasive nature of the proposed prospecting on the site (i.e. no associated physical activities and use of previous data), no significant impact on the freshwater environment in the site is anticipated. As such it is the professional opinion of the freshwater specialist that the prospecting right application be granted Environmental Authorisation, subject to prospecting remaining non-invasive with no associated physical activities in the study area. Due to the very high sensitivity associated with the freshwater ecosystems in the study area, it is recommended that a future Aquatic Biodiversity Specialist Assessment must be undertaken should the prospecting rights application be altered or approved to allow any activities other than non-invasive activities as currently proposed by the applicant that would result in the potential for impacts on freshwater resources to result from such prospecting activities. Such an Aquatic Biodiversity Specialist Assessment must also be undertaken for any future mining-right or mining activities-related application for Environmental Authorisation, particularly within any potential Zone of Regulation as detailed in Section 7 above.

.

9. REFERENCES

Department of Water Affairs and Forestry (DWAF). 2005. Final draft: A practical field procedure for identification and delineation of wetlands and Riparian areas.

Department of Water Affairs and Forestry (DWAF). 2008. *Updated Manual for the Identification and Delineation of Wetlands and Riparian Areas,* prepared by M. Rountree, A. L. Batchelor, J. MacKenzie and D. Hoare. Report no. X. Stream Flow Reduction Activities, Department of Water Affairs and Forestry, Pretoria, South Africa.

Department of Water and Sanitation (DWS). 2014. A Desktop Assessment of the Present Ecological State, Ecological Importance and Ecological Sensitivity per Sub Quaternary Reaches for Secondary Catchments in South Africa. Secondary: C2 Compiled by RQIS-RDM: Online available: https://www.dwa.gov.za/iwqs/rhp/eco/peseismodel.aspx.

Nel, JL, Driver, A., Strydom W.F., Maherry, A., Petersen, C., Hill, L., Roux, D.J, Nienaber, S., Van Deventer, H., Swartz, E. & Smith-Adao, L.B. 2011. *Atlas of Freshwater Ecosystem Priority Areas in South Africa: Maps to support sustainable development of water resources.* Water Research Commission Report No. TT 500/11, Water Research Commission, Pretoria.

NFEPA: Driver, A., Nel, J.L., Snaddon, K., Murruy, K., Roux, D.J., Hill, L., Swartz, E.R., Manuel, J. and Funke, N. 2011. Implementation Manual for Freshwater Ecosystem Priority Areas. Water Research Commission. Report No. 1801/1/11. Online available: http://bgis.sanbi.org/nfepa/project.asp

Ollis, D.J., Snaddon, C.D., Job, N.M. & Mbona, N. 2013. Classification System for Wetlands and other Aquatic Ecosystems in South Africa. User Manual: Inland Systems. SANBI Biodiversity Series 22. South African National Biodiversity Institute, Pretoria

Van Deventer, H., Smith-Adao, L., Collins, N.B., Grenfell, M., Grundling, A., Grundling, P-L., Impson, D., Job, N., Lötter, M., Ollis, D., Petersen, C., Scherman, P., Sieben, E., Snaddon, K., Tererai, F. & Van der Colff, D. 2019. *South African National Biodiversity Assessment 2018: Technical Report. Volume 2b: Inland Aquatic (Freshwater) Realm. CSIR report number CSIR/NRE/ECOS/IR/2019/0004/A. South African National Biodiversity Institute, Pretoria. http://hdl.handle.net/20.500.12143/6230*.

Van Deventer, H.; Smith-Adao, L.; Mbona, N.; Petersen, C.; Skowno, A.; Collins, N.B.; Grenfell, M.; Job, N.; Lötter, M.; Ollis, D.; Scherman, P.; Sieben, E.; Snaddon, K. 2018. *South African Inventory of Inland Aquatic Ecosystems. South African National Biodiversity Institute, Pretoria. Report Number: CSIR report number CSIR/NRE/ECOS/IR/2018/0001/A; SANBI report number http://hdl.handle.net/20.500.12143/5847*.

APPENDIX A - INDEMNITY AND DECLARATION OF INDEPENDENCE

INDEMNITY AND TERMS OF USE OF THIS REPORT

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 and its staff reserve the right to, 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.

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)
Paul da Cruz BA Hons (Geography and Environmental Studies) (University of Witwatersrand)

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) BSc (Hons) Zoology (Aquatic Ecology) (University of Johannesburg) BSc (Zoology, Geography and Environmental Management) (University of Johannesburg)		
Registration / Associations	Registered Professional Natural 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		

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

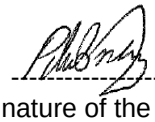
I, Stephen van Staden, declare that -

- 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.

Signature of the Specialist

I, Paul da Cruz, 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.



Signature of the Specialist

APPENDIX B - CV OF SPECIALISTS

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 Licence 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 PAUL DA CRUZ

PERSONAL DETAILS

Position in Company	Senior Ecologist
Joined SAS Environmental Group of Companies	2022

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Registered Certificated Scientist at South African Council for Natural Scientific Professions (SACNASP)
Registered Environmental Assessment Practitioner (EAP) with the Environmental Assessment Practitioners Association of South Africa (EAPASA)
Member of the South African Wetland Society (SAWS)

EDUCATION

Qualifications

BA (Hons) (Geography and Environmental Studies) (University of the Witwatersrand)	1998
BA (Geography) (University of the Witwatersrand)	1997

Short Courses

Taxonomy of Wetland Plants (Water Research Commission)	2017
Advanced Grass Identification (Frits van Outshoorn)	2010
Grass Identification (Frits van Outshoorn),	2009
Soil Form Classification and Wetland Delineation; (TerraSoil Science)	2008

AREAS OF WORK EXPERIENCE

South Africa – All Provinces
Southern Africa – Lesotho, Botswana
International – United Kingdom (England and Scotland

DEVELOPMENT SECTORS OF EXPERIENCE

1. Renewable energy (Wind and solar)
2. Linear developments (energy transmission, telecommunication, pipelines, roads, border infrastructure)
3. Nature Conservation and Ecotourism Development
4. Commercial development
5. Residential development
6. Environmental and Development Planning and Strategic Assessment
7. Industrial/chemical; Non-renewable power Generation