SCIENTIFIC AQUATIC SERVICES

FRESHWATER ECOSYSTEM ASSESSMENT

AS PART OF THE ENVIRONMENTAL AUTHORISATION PROCESS FOR THE OLIFANTS MANAGEMENT MODEL PROGRAMME BULK RAW WATER STUDY PHASE (OMMP-BRWSP) – PHASE 2F, LIMPOPO PROVINCE.

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EXECUTIVE SUMMARY

Scientific Aquatic Services (SAS) (Pty) Ltd was appointed by the Zutari Ndodana Joint Venture (ZNJV) to conduct a freshwater ecological assessment as part of the Environmental Authorisation process in terms of the Environmental Impact Regulations of 2014 (as amended) as promulgated under the National Environmental Management Act, Act 107 of 1998, as amended (NEMA) for the Olifants Management Model Programme Bulk Raw Water Study Phase (OMMP-BRWSP): Proposed Phase 2F Re-alignment and associated infrastructure in the Limpopo Province. The focus area for the project consists of a proposed realignment and various accesses to the pipeline alignment, and a 300m radius of the infrastructure.

Various non-perennial drainage lines are located within the focus area. These drainage lines have been assessed in detail, and display a largely to seriously modified Present Ecological State (PES) (PES E) due to the high levels of environmental degradation across the wider alignment. All drainage lines were assessed to have a low Ecological Importance and Sensitivity (EIS).

The nature of potential impacts associated with the aspects and activities of the proposed development have been identified and assessed in the context of the application of the ZNJV Impact Assessment methodology. *Prior to application of mitigation,* most activities associated with the construction and operation of the proposed infrastructure have been assessed to be associated with a "low" degree of impact significance to the freshwater environment and *after the application of mitigation* all activities have been assessed to be associated with a "low" or "very low" degree of impact significant provided that all mitigation and control measures are implemented. A key mitigation measure that is crucial to achievement of a maximum of a low impact significance is the utilisation of a pipeline construction method for the drainage line crossings along the re-aligned section that does not involve physical disturbing of soils and riparian habitat, and the use of horizontal directional drilling is recommended in this context. Based on the proviso that all mitigation measures are implemented, it is the professional opinion of the freshwater ecologist that the proposed infrastructure development and associated activities can be granted environmental authorisation.

MANAGEMENT SUMMARY

Scientific Aquatic Services (SAS) (Pty) Ltd was appointed by the Zutari Ndodana Joint Venture to conduct a freshwater ecological assessment as part of the Environmental Authorisation process in terms of the Environmental Impact Regulations of 2014 (as amended) as promulgated under the National Environmental Management Act, Act 107 of 1998, as amended (NEMA) for the Olifants Management Model Programme Bulk Raw Water Study Phase (OMMP-BRWSP): Proposed Phase 2F Re-alignment and associated infrastructure in the Capricorn and Sekhukhune District Municipality and within the Tubatse and Lepelle Nkumpi Local Municipalities in the Limpopo Province. Phase 2F comprises approximately 60 km of pipeline intended to convey water to the Olifantspoort Water Treatment Works (WTW), thereby augmenting the water supply to Polokwane and surrounding rural areas. Several listed activities outlined in the Listing Notice 1 and Listing Notice 3 of the EIA Regulations are expected to be triggered by the construction of the newly proposed infrastructure of Phase 2F, along with the associated access and internal roads. The proposed access points and the proposed pipeline deviation along with a 300m radius around these elements are known as the "focus area".

The purpose of this report is to define the ecology of the freshwater ecosystems associated with the focus area including mapping of the freshwater ecosystems, defining areas of increased EIS and defining the PES of the freshwater ecosystems associated with the focus area. The report also aims to define the socio-cultural and ecological service provision of the freshwater ecosystems and additionally outlines the Recommended Ecological Category (REC), Recommended Management Objective (RMO) and Best Attainable State (BAS) for the freshwater ecosystems. The assessment took the following approach:

- A desktop study was conducted, in which possible freshwater ecosystems were identified for on-site investigation, and relevant national and provincial databases were consulted; and

- The field assessment took place from the 30th to 31st October and 19th November 2024 during which various non-perennial drainage lines located within a potential area of impact of the proposed infrastructure were assessed in detail, using the information gathered during the field assessment.

The results of the detailed assessment of the non-perennial drainage lines are presented in Section 4 of this report, and are summarised in the table below.

Table A: Summary of the assessment results.

Freshwater Ecosystem Grouping	Present Ecological State (PES) / Ecostatus	Ecoservices	Ecological Importance and Sensitivity (EIS)	Recommended Ecological Category / Recommended Management Objective / Best Attainable State
Drainage Lines associated with the proposed accesses 108,1-10 and 1-13 in the Motse River catchment	Riparian IHI PES Category: D	Low or Very Low	Low	REC Category: D BAS Category: D RMO: Maintain
Drainage Lines in the Rapholo River catchment in the central part of the 2D alignment associated with accesses 1-17, 2-6, 2-8 and 2-9	Riparian IHI PES Category: E	Low or Very Low	Low	REC Category: D BAS Category: E RMO: Maintain
Drainage lines located in the Rapholo River catchment in the north-western central part of the 2F alignment associated with the proposed pipeline deviation and accesses 2-13,and 2-22	Riparian IHI PES Category: E	Low or Very Low	Low	REC Category: D BAS Category: E RMO: Maintain

Following the freshwater ecosystem assessment, the ZNJV impact assessment matrix methodology was applied to determine the significance of impacts of the proposed development on the receiving freshwater environment, with the summarised results detailed in Table B:

Table B: Summary of the results of the impact assessment.

Phase	Impact	Impact Pre Mitigation	Impact Post Mitigation
Construction Phase	Construction of the pipeline deviation - potential sedimentation of downgradient drainage lines due to site clearing, poor stockpile control related to pipeline excavation and poor stormwater management	**Low-Negative**	**Very Low negative**
	Construction of the pipeline deviation - potential pollution of downgradient drainage lines due to poor cement mixing / batching practices and poor management of hazardous materials such as paint, hydrocarbons	**Very Low negative**	**Very Low negative**
	Construction of the pipeline deviation - potential sedimentation of downgradient drainage lines due to poorly executed reinstatement and rehabilitation that could lead to erosion of soils	**Low-Negative**	**Very Low negative**
	Construction of the pipeline deviation - direct impacts on riparian habitat related to crossings of four drainage lines that would further degrade the drainage lines through substrate disturbance related to open trenching	**Moderate Negative**	**Very Low negative**
	Access road construction - potential slumping of / dumping of construction waste and excavated material into downgradient drainage lines	**Low-Negative**	**Very Low negative**

Phase	Impact	Impact Pre Mitigation	Impact Post Mitigation
	Access road construction - potential pollution of downgradient drainage lines by sediment and other pollutants such as paint / bitumen and cement	**Low-Negative**	**Very Low negative**
	Proliferation of alien invasive plants (AIPs) in the construction footprint that could encroach into adjacent freshwater ecosystems.	**Low-Negative**	**Very Low negative**
Operation Phase	Potential alteration of hydrology and geomorphology of adjacent / downgradient drainage lines due to poor operational stormwater management and rehabilitation and thus potential development of erosion in the pipeline deviation servitude	**Low-Negative**	**Very Low negative**
	Potential alteration of the hydrology of downgradient drainage lines due to stormwater discharge from access roads	**Low-Negative**	**Very Low negative**
	Potential pollution of downgradient drainage lines due to spills and other road / pipeline maintenance activities, such as emergency excavations which could result in sediment transport into downgradient areas	**Low-Negative**	**Very Low negative**
	Proliferation of AIPs and poor operational control of AIPs in the project footprint that could encroach into adjacent freshwater ecosystems	**Low-Negative**	**Very Low negative**

All activities associated with the construction and operation of the proposed infrastructure have been assessed to be associated with a “low” or “very low” degree of impact significance to the freshwater environment. A key mitigation measure that is crucial to achievement of a maximum of a low impact significance is the utilisation of a pipeline construction method for the drainage line crossings along the re-aligned section that does not involve physical disturbing of soils and riparian habitat, and the use of horizontal directional drilling is recommended in this context. If this method is deemed not technically feasible then a detailed crossing method statement for each crossing needs to be compiled and approved by a freshwater specialist. For the other activities, the low impact significance is a result of no proposed infrastructure footprint being located within any freshwater ecosystem that would result in direct impacts on the receiving freshwater environment, with only indirect impacts being likely. Such indirect impacts are able to be mitigated to a very low impact significance provided the suite of mitigation measures specified in this report are implemented and adhered to.

Based on the proviso that all mitigation measures are implemented, it is the professional opinion of the freshwater ecologist that the proposed development can be granted environmental authorisation.

DOCUMENT GUIDE

The table below provides the specialist report requirements for the assessment and reporting of impacts on aquatic biodiversity in terms of Government Notice (GN) 320 as promulgated in Government Gazette 43110 of 20 March 2020 in line with the Department of Forestry, Fisheries and the Environment (DFFE) screening tool requirements, as it relates to the National Environmental Management Act, 1998 (Act No. 107 of 1998).

No.	Requirements	Section in report
2.1	Assessment must be undertaken by a suitably qualified SACNASP registered specialist	Appendix I
2.2	Description of the preferred development site, including the following aspects-	
2.2.1	a. Aquatic ecosystem type b. Presence of aquatic species and composition of aquatic species communities, their habitat, distribution and movement patterns	Section 3.1, 4.1
2.2.2	Threat status, according to the national web based environmental screening tool of the species and ecosystems, including listed ecosystems as well as locally important habitat types identified	Section 3.1
2.2.3	National and Provincial priority status of the aquatic ecosystem (i.e. is this a wetland or river Freshwater Ecosystem Priority Area (FEPA), a FEPA sub- catchment, a Strategic Water Source Area (SWSA), a priority estuary, whether or not they are free-flowing rivers, wetland clusters, etc., a CBA or an ESA; including for all a description of the criteria for their given status	Section 3.1
2.2.4	A description of the Ecological Importance and Sensitivity of the aquatic ecosystem including: a. The description (spatially, if possible) of the ecosystem processes that operate in relation to the aquatic ecosystems on and immediately adjacent to the site (e.g. movement of surface and subsurface water, recharge, discharge, sediment transport, etc.); b. The historic ecological condition (reference) as well as Present Ecological State (PES) of rivers (in-stream, riparian and floodplain habitat), wetlands and/or estuaries in terms of possible changes to the channel, flow regime (surface and groundwater)	Section 4.3
2.3	Identify any alternative development footprints within the preferred development site which would be of a “low” sensitivity as identified by the national web based environmental screening tool and verified through the Initial Site Sensitivity Verification	N/A
2.4	Assessment of impacts - a detailed assessment of the potential impact(s) of the proposed development on the following very high sensitivity areas/ features:	Section 6
2.4.1	Is the development consistent with maintaining the priority aquatic ecosystem in its current state and according to the stated goal?	Section 4, 7 and 6
2.4.2	Is the development consistent with maintaining the Resource Quality Objectives for the aquatic ecosystems present?	Section 4
2.4.3	How will the development impact on fixed and dynamic ecological processes that operate within or across the site, including: a. Impacts on hydrological functioning at a landscape level and across the site which can arise from changes to flood regimes (e.g. suppression of floods, loss of flood attenuation capacity, unseasonal flooding or destruction of floodplain processes); b. Change in the sediment regime (e.g. sand movement, meandering river mouth/estuary, changing flooding or sedimentation patterns) of the aquatic ecosystem and its sub-catchment; c. The extent of the modification in relation to the overall aquatic ecosystem (i.e. at the source, upstream or downstream portion, in the temporary / seasonal / permanent zone of a wetland, in the riparian zone or within the channel of a watercourse, etc.). d. Assessment of the risks associated with water use/s and related activities.	Section 4.3 and Section 6
2.4.4	How will the development impact on the functionality of the aquatic feature including: a. Base flows (e.g. too little/too much water in terms of characteristics and requirements of system);	Section 6

	b. Quantity of water including change in the hydrological regime or hydroperiod of the aquatic ecosystem (e.g. seasonal to temporary or permanent; impact of over-abstraction or instream or off-stream impoundment of a wetland or river); c. Change in the hydrogeomorphic typing of the aquatic ecosystem (e.g. change from an unchannelled valley-bottom wetland to a channelled valley-bottom wetland); d. Quality of water (e.g. due to increased sediment load, contamination by chemical and/or organic effluent, and/or eutrophication); and e. Fragmentation (e.g. road or pipeline crossing a wetland) and loss of ecological connectivity (lateral and longitudinal).	
2.4.5	How will the development impact on the functionality of the aquatic feature including: a. water including change in the hydrological regime or hydroperiod of the aquatic ecosystem (e.g. seasonal to temporary or permanent; impact of over-abstraction or instream or off-stream impoundment of a wetland or river) b. Change in the hydrogeomorphic typing of the aquatic ecosystem (e.g. change from an unchannelled valley-bottom wetland to a channelled valley-bottom wetland). c. Quality of water (e.g. due to increased sediment load, contamination by chemical and/or organic effluent, and/or eutrophication); d. Fragmentation (e.g. road or pipeline crossing a wetland) and loss of ecological connectivity (lateral and longitudinal); e. The loss or degradation of all or part of any unique or important features (e.g. waterfalls, springs, oxbow lakes, meandering or braided channels, peat soil, etc.) associated with or within the aquatic ecosystem.	Section 6
2.4.6	How will the development impact on key ecosystem regulating and supporting services especially Flood attenuation; Streamflow regulation; Sediment trapping; Phosphate assimilation; Nitrate assimilation; Toxicant assimilation; Erosion control; and Carbon storage.	Section 6
2.4.7	How will the development impact community composition (numbers and density of species) and integrity (condition, viability, predator-prey ratios, dispersal rates, etc.) of the faunal and vegetation communities inhabiting the site?	Section 6
2.4.9	A motivation must be provided if there were development footprints identified as per paragraph 2.3 above that were identified as having a “low” biodiversity sensitivity and were not considered appropriate.	N/A
3.	The report must contain as a minimum the following information:	
3.1	Contact details and curriculum vitae of the specialist including SACNASP registration number and field of expertise and their curriculum vitae;	Appendix I
3.2	A signed statement of independence by the specialist;	Appendix I
3.3	The duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	Section 1
3.4	The methodology used to undertake the impact assessment and site inspection, including equipment and modelling used, where relevant;	Appendix C
3.5	A description of the assumptions made and any uncertainties or gaps in knowledge or data as well as a statement of the timing and intensity of site inspection observations;	Section 1.4
3.6	Areas not suitable for development, to be avoided during construction and operation (where relevant);	N/A
3.7	Additional environmental impacts expected from the proposed development based on those already evident on the site and a discussion on the cumulative impacts;	Section 6
3.8	A suitable construction and operational buffer for the aquatic ecosystem, using the accepted protocol;	N/A
3.9	Impact management actions and impact management outcomes proposed by the specialist for inclusion in the EMPr;	Section 6
3.10	A motivation where the development footprint identified as per 2.3 were not considered stating reasons why these were not being considered; and	N/A
3.11	A reasoned opinion, based on the finding of the specialist assessment, regarding the acceptability or not, of the development and if the development should receive approval, and any conditions to which the statement is subjected.	Summaries and Section 7

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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.
Biodiversity:	The number and variety of living organisms on earth, the millions of plants, animals and micro-organisms, the genes they contain, the evolutionary history and potential they encompass and the ecosystems, ecological processes and landscape of which they are integral parts.
Buffer:	A strip of land surrounding a wetland or riparian area in which activities are controlled or restricted, in order to reduce the impact of adjacent land uses on the wetland or riparian area.
Catchment:	The area where water is collected by the natural landscape, where all rain and run-off water ultimately flows into a river, wetland, lake, and ocean or contributes to the groundwater system.
Delineation (of a wetland):	To determine the boundary of a wetland based on soil, vegetation and/or hydrological indicators.
Ecoregion:	An ecoregion is a "recurring pattern of ecosystems associated with characteristic combinations of soil and landform that characterise that region."
Facultative species:	Species usually found in wetlands (76%-99% of occurrences) but occasionally found in non-wetland areas.
Fluvial:	Resulting from water movement.
Gleying:	A soil process resulting from prolonged soil saturation which is manifested by the presence of neutral grey, bluish or greenish colours in the soil matrix.
Groundwater:	Subsurface water in the saturated zone below the water table.
Hydromorphic soil:	A soil that in its undrained condition is saturated or flooded long enough to develop anaerobic conditions favouring the growth and regeneration of hydrophytic vegetation (vegetation adapted to living in anaerobic soils).
Hydrology:	The study of the occurrence, distribution and movement of water over, on and under the land surface.
Hydrophyte:	Any plant that grows in water or on a substratum that is at least periodically deficient of oxygen as a result of soil saturation or flooding; plants typically found in wet habitats.
Indigenous vegetation:	Vegetation occurring naturally within a defined area.
Mottles:	Soils with variegated colour patterns are described as being mottled, with the “background colour” referred to as the matrix and the spots or blotches of colour referred to as mottles.
Obligate species:	Species almost always found in wetlands (>99% of occurrences).
Perched water table:	The upper limit of a zone of saturation that is perched on an unsaturated zone by an impermeable layer, hence separating it from the main body of groundwater

Perennial:	Flows all year round.
RAMSAR:	The Ramsar Convention (The Convention on Wetlands of International Importance, especially as Waterfowl Habitat) is an international treaty for the conservation and sustainable utilisation of wetlands, i.e., to stem the progressive encroachment on and loss of wetlands now and in the future, recognising the fundamental ecological functions of wetlands and their economic, cultural, scientific, and recreational value. It is named after the city of Ramsar in Iran, where the Convention was signed in 1971.
RDL (Red Data listed) species:	Organisms that fall into the Extinct in the Wild (EW), critically endangered (CR), Endangered (EN), Vulnerable (VU) categories of ecological status
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 50cm of the surface
Temporary zone of wetness:	the outer zone of a wetland characterised by saturation within 50cm of the surface for less than three months of the year
Watercourse:	In terms of the definition contained within the National Water Act, a watercourse means: • A river or spring; • A natural channel which water flows regularly or intermittently; • A wetland, dam or lake into which, or from which, water flows; and • Any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse; • and a reference to a watercourse includes, where relevant, its bed and banks
Wetland Vegetation (WetVeg) type:	Broad groupings of wetland vegetation, reflecting differences in regional context, such as geology, climate, and soils, which may in turn have an influence on the ecological characteristics and functioning of wetlands.

ACRONYMS

AIP	Alien Invasive Plant
BA	Basic Assessment
CA	Competent Authority
CR	Critically Endangered.
BAS	Best Attainable State
BGIS	Biodiversity Geographic Information Systems
BPR	Break Pressure Reservoir
CBA	Critical Biodiversity Area
CSIR	Council of Scientific and Industrial Research
DFFE	Department of Forestry, Fisheries and the Environment
DMRE	Department of Mineral Resources and Energy
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 / Electrical Conductivity
EIA	Environmental Impact Assessment
EIS	Ecological Importance and Sensitivity
EMC	Ecological Management Class
EMPr	Environmental Management Programme
EN	Endangered
ES	Ecological Sensitivity
ESA	Ecological Support Area
EW	Extinct in the Wild
EWR	Ecological Water Requirements
FEPA	Freshwater Ecosystem Priority Areas
FSA	Fish Support Area
GG	Government Gazette

GIS	Geographic Information System
GN	Government Notice
GPS	Global Positioning System
HGM	Hydrogeomorphic
IHAS	Invertebrate Habitat Assessment System
LT	Least Threatened
LWUA	Lebalelo Water User Association
MAP	Mean Annual Precipitation
MIRAI	Macro-Invertebrate Response Assessment Index
NBA	National Biodiversity Assessment
NEMA	National Environmental Management Act (Act 107 of 1998) as amended
NFEPA	National Freshwater Ecosystem Priority Areas
NT	Near Threatened
NWA	National Water Act (Act 36 of 1998) as amended
ONA	Other Natural Areas
ORWRDP-2	Olifants River Water Resources Development Project
OMMP-BRWSP	Olifants Management Model Programme Bulk Raw Water Study Phase
PES	Present Ecological State
QDS	Quarter Degree Square
RAM	Risk Assessment Matrix
REC	Recommended Ecological Category
RMO	Resource Management Objective
RoD	Record of Decision
RQIS	Research Quality Information Services
SACNASP	South African Council for Natural Scientific Professions
SANBI	South African National Biodiversity Institute
SA RHP	South African River Health Programme
SAS	Scientific Aquatic Services
SQR	Sub quaternary catchment reach
subWMA	Sub-Water Management Area
SuDS	Sustainable Drainage Systems
SWMP	Stormwater Management Plan
SWSA	Strategic Water Source Area
TCTA	Trans Caledon Tunnel Authority
VU	Vulnerable
WetVeg Groups	Wetland Vegetation Groups
WMA	Water Management Areas
WRC	Water Research Commission
WTW	Water Treatment Works
WUA	Water Use Authorisation
ZoR	Zone of Regulation

1 INTRODUCTION

1.1 Background

Scientific Aquatic Services (SAS) (Pty) Ltd was appointed by the Zutari Ndodana Joint Venture (ZNJV) to conduct a freshwater ecological assessment as part of the Environmental Authorisation process in terms of the Environmental Impact Regulations of 2014 (as amended) as promulgated under the National Environmental Management Act, Act 107 of 1998, as amended (NEMA) for the Olifants Management Model Programme Bulk Raw Water Study Phase (OMMP-BRWSP): Proposed Phase 2F Re-alignment and associated infrastructure in in the Capricorn and Sekhukhune District Municipality and within the Tubatse and Lepelle Nkumpi Local Municipalities in the Limpopo Province. Phase 2F comprises approximately 60 km of pipeline intended to convey water to the Olifantspoort Water Treatment Works (WTW), thereby augmenting the water supply to Polokwane and surrounding rural areas. Several listed activities outlined in the Listing Notice 1 and Listing Notice 3 of the EIA Regulations are expected to be triggered by the development of the newly proposed infrastructure of Phase 2F, along with the associated access and internal roads. The proposed access points and the proposed pipeline deviation, along with a 300m radius of the access points and deviation (to allow for the assessment of the access routes, the exact alignment of which has not been provided for assessment) are known as the “focus area”.

This freshwater report has been compiled as part of the environmental specialist studies required to be undertaken in support of the Environmental Authorisation process. A site visit for the freshwater ecosystem assessment was undertaken from the 30th to the 31st October and the 19th November 2024. Fieldwork was undertaken to obtain accurate ground-truthed results so as to guide the assessment of impacts of the proposed infrastructure on the freshwater environment. This study aims to provide information to enable the assessment of the impact of the new proposed infrastructure to ensure the ongoing functioning of the ecosystems, such that local and regional conservation requirements and the provision of ecological services in the local area are supported, while considering the need for sustainable economic development.

1.2 Scope of Work

Specific outcomes in terms of this report are outlined below:

- A background study of relevant national, provincial and municipal datasets (such as the National Freshwater Ecosystem Priority Areas [NFEPA] 2011 database; the Department of Water and Sanitation Research Quality Information Services [DWS RQIS PES/EIS], (2014) database, National Biodiversity Assessment (NBA) (2018), and the Limpopo Conservation Plan (2018) were undertaken to aid in defining the Present Ecological State (PES) and Ecological Importance and Sensitivity (EIS) of the freshwater ecosystems in the focus area;
- All freshwater ecosystems associated with the focus area were delineated using desktop methods verified according to the "Department of Water Affairs and Forestry (DWAF)[1] (2008)[2]: A practical field procedure for identification of wetlands and riparian areas". Aspects such as soil morphological characteristics and wetness along with vegetation types were used to verify the freshwater ecosystems;
- The freshwater ecosystem classification assessment was undertaken according to the Classification System for Wetlands and other Aquatic Ecosystems in South Africa. User Manual: Inland systems (Ollis *et al*., 2013);
- A freshwater sensitivity verification was undertaken in line with Under the Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Aquatic Biodiversity, (GN320 of March 2020), in the context of the assigning of aquatic biodiversity (freshwater) sensitivity by the Department of Forestry Fisheries and Environment (DFFE) web-based environmental screening tool;
- The PES of the freshwater ecosystems were assessed according to the resource directed measures guideline as advocated by Macfarlane *et al.* (2008);
- The EIS of the freshwater ecosystems were determined according to the method described by Rountree and Kotze*,* (2013);
- The Ecoservices of the freshwater ecosystems were assessed according to "A technique for rapidly assessing ecosystem services supplied by wetlands" (Kotze *et al.,* 2020);
- The freshwater ecosystem boundaries and legislated zones of regulation (ZoRs) were depicted for the freshwater ecosystems, where applicable;

[1] The Department of Water Affairs and Forestry (DWAF) was formerly known as the Department of Water Affairs (DWA) and subsequently 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] Even though 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.

- Allocation of a suitable Recommended Management Objective (RMO), Recommended Ecological Category (REC) and Best Attainable State (BAS) of the freshwater ecosystems were assigned based on the results obtained from the PES and EIS assessments;
- The Zutari impact assessment methodology was applied to identify potential impacts that may affect the freshwater ecosystems as a result of the proposed development, and to aim to quantify the significance thereof; and
- To present management and mitigation measures which should be implemented during the various development phases to assist in minimising the impact of the stockpile operation on the receiving freshwater environment.

1.3 Technical Project Description

1.3.1 Overall Project Context

Phase 2 of the Olifants River Water Resources Development Project (ORWRDP-2) is a Department of Water and Sanitation (DWS) project, which underwent an environmental impact assessment (EIA) process and obtained a positive Record of Decision (RoD) from the Department of Environmental Affairs (DEA – now DFFE) in 2006 in terms of the Environmental Conservation Act, No. 73 of 1989 (ECA). After many appeals by large organisations, including the Kruger National Park, the Minister decided to grant the Revised RoD (RRoD) (ref: 12/12/20/553), dated 16 October 2006.

The approved ORWRDP-2 consists of various phases as defined below. These were previously implemented by the Trans-Caledon Tunnel Authority (TCTA). The phases are designed and implemented in a phased manner, depending on need and availability of finances. For this reason, phase specific Environmental Management Programmes (EMPrs) are developed and submitted for approval to the Competent Authority (CA):

- Phase 2A: Construction of De Hoop Dam
- Phase 2B: Pipeline from Flag Boshielo Dam to Pruissen near Mokopane (72 km)
- Phase 2B+: Consists of a raw water pipeline from Pruissen Reservoir to the proposed Sekuruwe WTW, including offtakes to the proposed Mokopane WTW and two commercial user offtakes.
- Phase 2C: Pipeline from De Hoop Dam to Mooihoek
- Phase 2D: Pipeline from Steelpoort to Mooihoek (24 km)
- Phase 2E: Pipeline from Mooihoek to Havercroft Junction (14 km)
- **Phase 2F: Pipeline from Havercroft Junction to Olifantspoort (44 km)**

- Phase 2G: Possible second pipeline parallel to Phase 2B
- Phase 2H: Changes and additions to the current Phase 2H (Lebalelo Network); and
- Phase 2I: Pipeline from De Hoop Dam to the proposed Eskom Tubatse Pump-storage Hydro-electric Scheme..

The ORWRDP-2 has since been reconstituted to become the OMMP-BRWSP in recent years, with the Lebalelo Water User Association (LWUA) acting as the implementing agent for the following portions of the project:

- Phase 2B
- Phase 2B+
- Phase 2D; and
- **Phase 2F**

Furthermore, since inception, the project has acquired the status of strategic importance, and recently on 05 March 2023 the project was classified as a Strategic Integrated Project (SIP) under the SIP 19 (i.e., Water and Sanitation Infrastructure Portfolio). As such, it is critical that the project must be expedited in terms of Schedule 2 (Section 17(2)) of the Infrastructure Development Act, No. 23 of 2014. The purpose of this piece of legislation is to provide facilitation and coordination of public infrastructure development which is of economic significance or social importance in South Africa and to ensure that infrastructure development in the country is given priority in planning, approval, and implementation.

1.3.2 Description of Phase 2F

Phase 2F comprises approximately 60 km of pipeline intended to convey water to the Olifantspoort WTW, thereby augmenting the water supply to Polokwane and surrounding rural areas. The alignment of Phase 2F starts near Havercroft Junction, deviating from the R37 to take a more direct route to the Olifantspoort WTW, following existing gravel roads along part of the way. The pipeline starts as a 1,200 mm diameter over 18.5 km, reducing to a 1,000 mm diameter over 25.6 km, originating at the Klipfontein Balancing Dam (or Break Pressure Dam) with a projected capacity of 21 ML.

The project area spans two local municipalities—Greater Tubatse and Lepelle Nkumpi—and two district municipalities—Capricorn and Greater Sekhukhune—within the Limpopo Province. Along the pipeline route, several mines are located, including RPM Twickenham, Cromex Mining Mecklenburg, Sefateng Chrome Mines, and ARM Bokoni Platinum Mine (Atok), previously owned by Anglo Platinum.

An Environmental Authorisation (EA) (ref:14/12/16/3/3/1/1626) was obtained for Phases 2E & 2F in May 2017 from the DFFE. This authorisation was valid for five (5) years and lapsed in June 2022. Following an interactive public participation process (PPP) in April 2022, facilitated by DWS and ZNJV, Condition 7 of the EA was amended on 2 May 2017 (ref: 14/12/16/3/3/1/1626/AM1). The revised condition stipulates that the activity must commence within ten years of the authorisation issue date (i.e., by 2 May 2027), after which the authorisation will lapse, necessitating a new application for EA to proceed with the activity.

Several listed activities outlined in the National Environmental Management Act, No. 107 of 1998 (NEMA) Listing Notice 1 [General Notice (GN) R983 of 2014] and Listing Notice 3 (GN R985 of 2014) are expected to be triggered by the construction of the newly proposed infrastructure of Phase 2F, along with the associated access and internal roads. Consequently, these activities require authorisation by means of a Basic Assessment (BA) process as outlined in Regulations 19 - 20 of the EIA Regulations of 2014 (GN R982 of 2014). Included in this application, as part of the project infrastructure, are the access and internal roads required for the construction of the entire Phase 2F alignment.

1.4 Assumptions and Limitations

The following assumptions and limitations are applicable to this report:

- It is important to note that although all data sources used provide useful and often verifiable, high-quality data, the various databases used do not always provide an entirely accurate indication of the actual site characteristics within the focus area at the scale required to inform the authorisation process. However, this information is considered useful as background information to the study;
- Global Positioning System (GPS) technology is inherently inaccurate and some inaccuracies due to the use of handheld GPS instrumentation may occur. If more accurate assessments are required, the freshwater ecosystems will need to be surveyed and pegged according to surveying principles and with surveying equipment;
- Wetland, riparian and terrestrial zones create transitional areas where an ecotone is formed as vegetation species change from terrestrial to obligate/facultative species. Within this transition zone, some variation of opinion on the freshwater ecosystem boundaries may occur. However, if the DWAF (2008) 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. It is, however, expected that the freshwater ecosystems that may be affected by the proposed activities have been accurately

assessed and considered, based on the site observations undertaken in terms of freshwater ecosystem ecology;

- The freshwater ecosystem delineations as presented in this report are regarded as a best estimate of the freshwater ecosystem boundaries based on the site conditions present at the time of assessment;
- As the majority of the freshwater ecosystems within the focus area and within the wider region (with the exception of larger rivers such as the Olifants River) are either ephemeral or episodic in character, certain areas were encountered that did not display more than one watercourse characteristic as defined by the DWAF (2008) method (such as containing alluvial or inundated soils, or is characterised by riparian vegetation adapted to saturated conditions). In addition, due to historical and ongoing landuse factors these drainage lines are extremely highly impacted, with very limited to no riparian habitat remaining in certain locations. As a result, identification of the outer boundary of the riparian zones proved difficult in some areas and therefore delineations were augmented with the use of digital satellite imagery. Nevertheless, the freshwater ecosystem delineations as presented in this report are regarded as a best estimate of the riparian boundaries based on the site conditions present at the time of assessment and the results obtained are considered sufficiently accurate to allow informed planning and decision making to take place;
- Due to the homogenous nature of the freshwater ecosystems in the wider area in terms of physical characteristics and hydrogeomorphic (HGM) form, in terms of their hydrology and in terms of the extremely high levels of impact and resultant degradation, a generalised assessment of the state (PES) and EIS of certain drainage lines, grouped according to the catchment and local area in which there are located. Accordingly PES / EIS scores and assessment of ecoservices were grouped into three categories:
    - Drainage lines located in the Motse River catchment (south-eastern part of the 2F alignment);
    - Drainage line located in the upper part of the Rapholo River catchment (central part of the 2F alignment);
    - Drainage lines located in the lower point of the Rapholo River catchment (north-western part of the 2F alignment);
- Specialist reports for the current scope are only in support of environmental authorisation under the EIA Regulations of 2014, as amended. As such the Department of Water and Sanitations (DWS) Risk Assessment Matrix (RAM) as contained within GN 4167 as published in the GG 49833 of 08 December 2023 as it

relates to the National Water Act, 1998 (Act No. 36 of 1998) as amended, has not been applied to the proposed project.

- It is important to note that only certain components of the wider 2F project (i.e. the accesses and the pipeline deviation) are being assessed in this report;
- The accesses as provided by the client in kmz format were points and not road alignments. While an effort was made to identify likely access routes (i.e. existing roads / tracks) between the point and the pipeline servitude, no definitive alignment was provided to specialists and where relevant freshwater ecosystems located within the applicable zone of regulation (ZoR) of the provided access point were assessed. Accordingly a 300m focus area was designated, as this encompassed the areas between the access points and the pipeline servitude, thereby encompassing potential access routes. It must be noted that once the exact access routes are determined, the impact assessment may need to be revised;
- No methodology for the proposed crossing of drainage lines located along the 2F proposed deviation has been provided for assessment. Accordingly recommendations have been made in terms of the construction methodology that needs to be utilised for crossing of the drainage lines that will prevent impacts on the affected drainage lines.

1.5 Legislative Requirements and Provincial Guidelines

The following legislative requirements and relevant provincial guidelines were taken into consideration during the assessment. Although the current application is not for Water Use Authorisation (WUA) under the NWA, the tenets of the NWA and its associated government notices were considered. A detailed description of these legislative requirements is presented in Appendix B:

- Constitution of the Republic of South Africa, 1996[3];
- 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 4167 as published in the Government Gazette 49833 of 08 December 2023 as it relates to the National Water Act, 1998 (Act No. 36 of 1998) as amended;
- The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA);

[3] 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.

- The National Environmental Management: Biodiversity Act: Alien and Invasive Species Regulations, 2014;
- The DFFE National Web-based Environmental Screening Tool (hereafter the "screening tool").

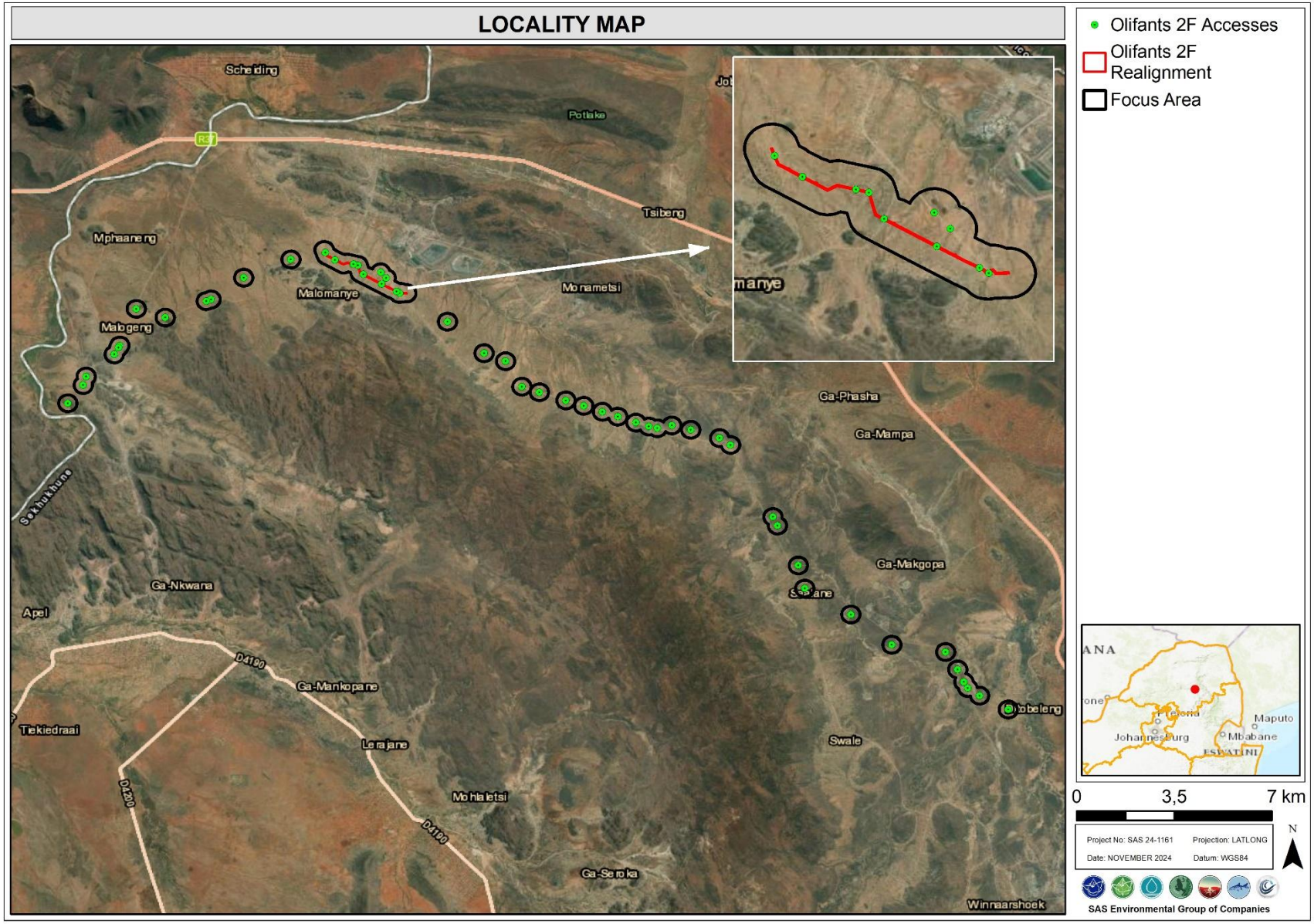


Figure 1: Digital satellite image depicting the proposed infrastructure and focus area in relation to surrounding areas.

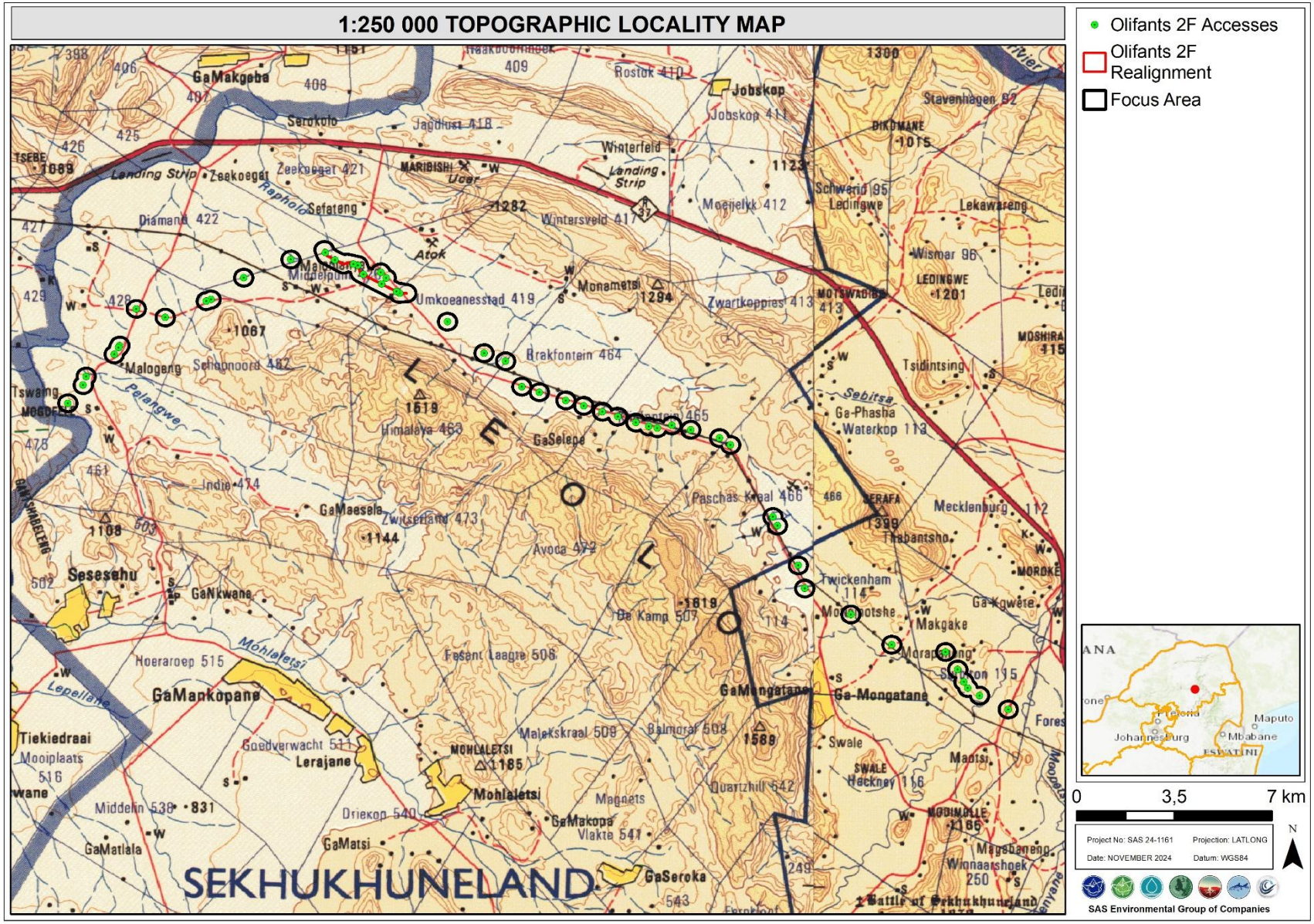


Figure 2: Location of the proposed infrastructure and focus area depicted on a 1:250 000 topographical map in relation to the surrounding area.

2 ASSESSMENT APPROACH AND METHODOLOGY

2.1 Freshwater Ecosystem Definition

For the purposes of this investigation, the definition of a watercourse and wetland habitat were taken as per that in the NWA. The definitions are as follows:

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 to be a watercourse,
and a reference to a watercourse includes where relevant, its bed and banks.

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."

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 composition and physical structure distinct from those of adjacent areas.

For the purposes of this investigation, the definition of a freshwater ecosystem is considered to be synonymous with the definition of a watercourse as per the NWA as amended and the terms may be used interchangeably in this report.

2.2 Desktop Study

A Desktop assessment was conducted as part of the freshwater study. Background study of relevant national, provincial and municipal datasets was undertaken to aid in defining the PES and EIS of the freshwater ecosystems. The results from the desktop assessment are presented in Section 3 of the report.

2.3 Freshwater Ecosystem Field Verification

As mentioned in Section 1.2 historical and current digital satellite imagery, topographic maps, and available provincial and national wetland databases were utilised to aid in the delineation of those portions of the freshwater ecosystems associated with the focus area and investigation following the field assessment. The following was taken into consideration when utilising the above during delineation:

- Linear features: since water flows/moves through the landscape, freshwater ecosystems often have a distinct linear element to their signature which makes them discernible on aerial photography or satellite imagery;
- Vegetation associated with freshwater ecosystems: a distinct increase in density as well as shrub size near flow paths;
- Hue: water flow paths often show as white/grey or black and outcrops or bare soil displaying varying chroma created by varying vegetation cover, geology and soil conditions. Changes in the hue of vegetation with freshwater ecosystem vegetation often indicated on black and white images as areas of darker hue (dark grey and black). In colour imagery these areas mostly show up as darker green and olive colours or brighter green colours in relation to adjacent areas where there is less soil moisture or surface water present; and
- Texture: with areas displaying various textures, created by varying vegetation cover and soil conditions.

The freshwater ecosystem delineation was verified in the field at pre-selected points where freshwater ecosystems were identified to be located within the focus area and this delineation 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 soil;
- Vegetation adapted to saturated soil; and
- The presence of alluvial soil in stream systems.

A field assessment was undertaken from 31 to 31 October and on the 19th of November 2024, during which the presence of any riparian or wetland characteristics as defined by DWAF (2008) and by the NWA were noted (please refer to Section 4 of this report). In addition to the delineation process, detailed assessments of the delineated freshwater ecosystems located within a pre-determined radius of potential impact in the focus area were undertaken, at which time, factors affecting the integrity of the freshwater ecosystems were taken into consideration and aided in the determination of the functioning and the ecological and socio-cultural services provided by the freshwater ecosystems. A detailed explanation of the methods of assessment undertaken is provided in Appendix C of this report.

2.4 Freshwater Ecosystem Mapping

All freshwater ecosystems associated with the focus area were delineated on a desktop basis, with these delineations being ground-truthed in the field at certain pre-selected points where possible with the use of a GPS. Geographic Information System (GIS) was used to project these features onto digital satellite imagery and topographic maps. The freshwater ecosystem map is presented in Section 4.

2.5 Freshwater Ecosystem Detailed Assessment

As detailed in Section 1.2 above, freshwater ecosystems located within a pre-determined radius of potential impact of the access points and pipeline deviation alignment were assessed in terms of PES, EIS and ecoservices.

3 RESULTS OF THE DESKTOP ANALYSIS

3.1 Analyses of Relevant Databases

The following section contains data accessed as part of the desktop assessment and are presented as a “dashboard” report below (Table 1). The dashboard report aims to present concise summaries of the data on as few pages as possible to allow for integration of results by the reader to take place. Where required, further discussion and interpretation is provided.

It is important to note that although all data sources used provide useful and often verifiable, high-quality data, the various databases used do not always provide an entirely accurate indication of the focus areas actual site characteristics at the scale required to inform the authorisation process. Nevertheless, this information is considered useful as background information to the study, is important in legislative contextualisation of risk and impact, and

was used as a guideline to inform the assessment and to focus on areas and aspects of increased conservation importance. It must, however, be noted that site assessment of key areas may potentially contradict the information contained in the relevant databases, in which case the site verified information must carry more weight in the decision-making process. The information contained in the dashboard report below is intended to provide background to the landscape of the focus area. Actual site conditions at the time of the assessment may differ to the background information provided by various datasets. Please refer to Section 4 for details pertaining to the site investigation.

Table 1: Desktop data relating to the characteristics of the freshwater ecosystems associated with the focus area and wider 2F alignment [Quarter Degree Squares (QDS) 2429BD & 2430AC].

Aquatic ecoregion and sub-regions in which the focus area is located	
Ecoregion	Eastern Bankenveld
Catchment	Olifants North
Quaternary Catchment	B52E, B52G, B52J & B71E
WMA	Olifants
SubWMA	Middle Olifants
Dominant characteristics of the Eastern Bankenveld (Kleynhans *et al.*, 2007a)	
Ecoregion Level II	9.03
Dominant primary terrain morphology	Closed hills, Mountains; Moderate and high relief, low mountains
Dominant primary vegetation types	Mixed Bushveld
Altitude (m a.m.s.l)	500 to 2300
MAP (mm)	400 to 700
Coefficient of Variation (% of MAP)	20 to 34
Rainfall concentration index	55 to 64
Rainfall seasonality	Early summer
Mean annual temp. (°C)	14 to 22
Winter temperature (July) °C	2 to 20 °C
Summer temperature (Feb) °C	12 – 30 °C
Median annual simulated runoff (mm)	20 to 150

Detail of the focus area in terms of the National Freshwater Ecosystem Priority Area (NFEPA) (2011) database	
FEPA CODE	Portions of the access points in the south eastern sections are located within an **Upstream Management (Code 4)** catchment, while the rest of the focus area is not indicated to be within a FEPA catchment. Upstream Management Areas are sub-quaternary catchments in which human activities need to be managed to prevent the degradation of downstream river FEPAs and Fish Support Areas. Upstream Management Areas do not include management areas for wetland FEPAs, which need to be determined at a finer scale**.**
Wetland vegetation (WetVeg) Type	The focus area is indicated to be within the Central Bushveld Group 1 and Central Bushveld Group 7 WetVeg types. Group 1 is considered critically endangered (CR) while Group 7 is considered to be Least Threatened (LT) by Mbona *et al*, (2015).
NFEPA Rivers	According to the NFEPA Rivers Database, the Monametsi River traverses the focus area associated with Access Points 2F2-29 and 2F2-31 and is indicated to be in a Heavily to Critically Modified (Class Z) ecological condition.
NFEPA Wetlands	The database indicates one artificial unchanneled valley bottom wetland in the focus area associated with Access Point 2F2-31. The artificial wetland is indicated as being in a Heavily to Critically Modified (Class Z) ecological condition. This feature is indicated as a Dam by the NBA (2018) database.

Strategic Water Source Areas for Surface Water (2021)
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. The SWSA for groundwater reflect areas that have high groundwater recharge and where the groundwater forms a nationally important resource. The 2021 MTPA database (Lötter, M.C. and Le Maitre, D) was used for surface water, while the WRC 2017 database (Le Maitre, D.C. *et al.*) was used for the groundwater SWSAs.
The 2F realignment, the accesses, or the associated focus area are not indicated to be within a surface water SWSA. Portions in the north are, however, indicated to be within the Northern Lowveld Escarpment groundwater SWSA.

Detail of the focus area in terms of the National Biodiversity Assessment (2018): South African Inventory of Inland Aquatic Ecosystems (SAIIAE) (National Wetland Map 5 is included in the NBA)
According to the NBA National Wetland Map 5 Database, no natural wetlands are indicated to be traversed by the 2F realignment, the accesses, or the associated focus area. The Artificial Wetlands Database indicates a dam in the focus area associated with Access Points 2F2-29 and 2F2-31. According to the NBA Rivers Database, the Monametsi (Rapholo) River traverses the focus area associated with Access Point 2F2-31 and is indicated to be Moderately Modified (PES: C), Critically Endangered (ETS) and Poorly Protected (EPL).
National Web-based Screening Tool (2020; Accessed 2024)
The screening tool is intended to allow for pre-screening of sensitivities in the landscape to be assessed within the Environmental Authorisation (EA) process. This assists with implementing the mitigation hierarchy by allowing developers to adjust their proposed focus area to avoid sensitive areas.
The 2F realignment and all access points are indicated to be of low sensitivity for the aquatic biodiversity theme.

Detail of the focus area in terms of the Land Type Data (Job et al., 2019)	
The 2F realignment, the accesses, and the associated focus area are indicated to be within Db244, Ea88, Ia177 and Ib453 land type groupings. **Db land types** accommodate duplex soils and gleycutanic soils, including Estcourt, Sterkspruit, Swartland, Valsrivier and Kroonstad soil forms. After subtracting exposed rock land, these Land Types consist of land with more than 50% duplex soils. Db refers to land where brown duplex soils are dominant. Katspruit, duplex soils and black clay soils usually occupy bottomland terrain positions with streambeds and erosion. **EA land types** accommodate high base status, dark-coloured and/or red-structured soils, usually of clay texture, associated with basis igneous rocks. More than half of the land surface is covered by vertic, melanic or red structured diagnostic horizons. Duplex soils or exposed rock may cover significant portions of the land surface, but vertic, melanic or red structured horizons are dominant. **Ia land types** are characterised by undifferentiated deep soil deposits. The soils within this landtype are typically deep pedologically youthful soils, which occur mostly along river courses, valley bottoms and in lower lying areas. Soils are usually weakly structured, with a great variety of colour (often mottled) and often, several layers have been deposited (usually by water) with different soil textures. **Ib land type** 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.	
Detail of the proposed focus area in terms of the Limpopo Conservation Plan Version 3 (2018)	
Critical Biodiversity Area (CBA)	The northern section of the focus area and access points 2F2 25-30, 2F2 01-12, and 2F2-16 are indicated as CBA 1 and 2 areas. CBA areas are irreplaceable site areas required to meet biodiversity patterns and/or ecological process targets. No alternative sites are available to meet targets. The goal is to maintain the CBA in a natural state with limited or no biodiversity loss.
Ecosystem Support Area (ESA)	The southern and central portions of the focus area are indicated to be located within ESA 1 areas. ESAs are areas with natural habitats that are important for supporting ecological processes. The goal is to avoid additional/new impacts on ecological processes.
Other Natural Areas (ONA)	The majority of the realigned pipeline and remaining access points in the south are classified as ONAs. ONAs are natural and intact areas but are not required to meet targets or identified as ESAs or CBAs.
No Natural Remaining (NNR)	The remaining portions of the realigned pipeline and access points in the central and northern sections are indicated as NNR. NNRs are areas with no significant direct biodiversity value. These are either not natural areas, or they are degraded natural areas that are not required as ESA. These areas include mining, intensive agriculture, urban, industry, and human infrastructure.

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.

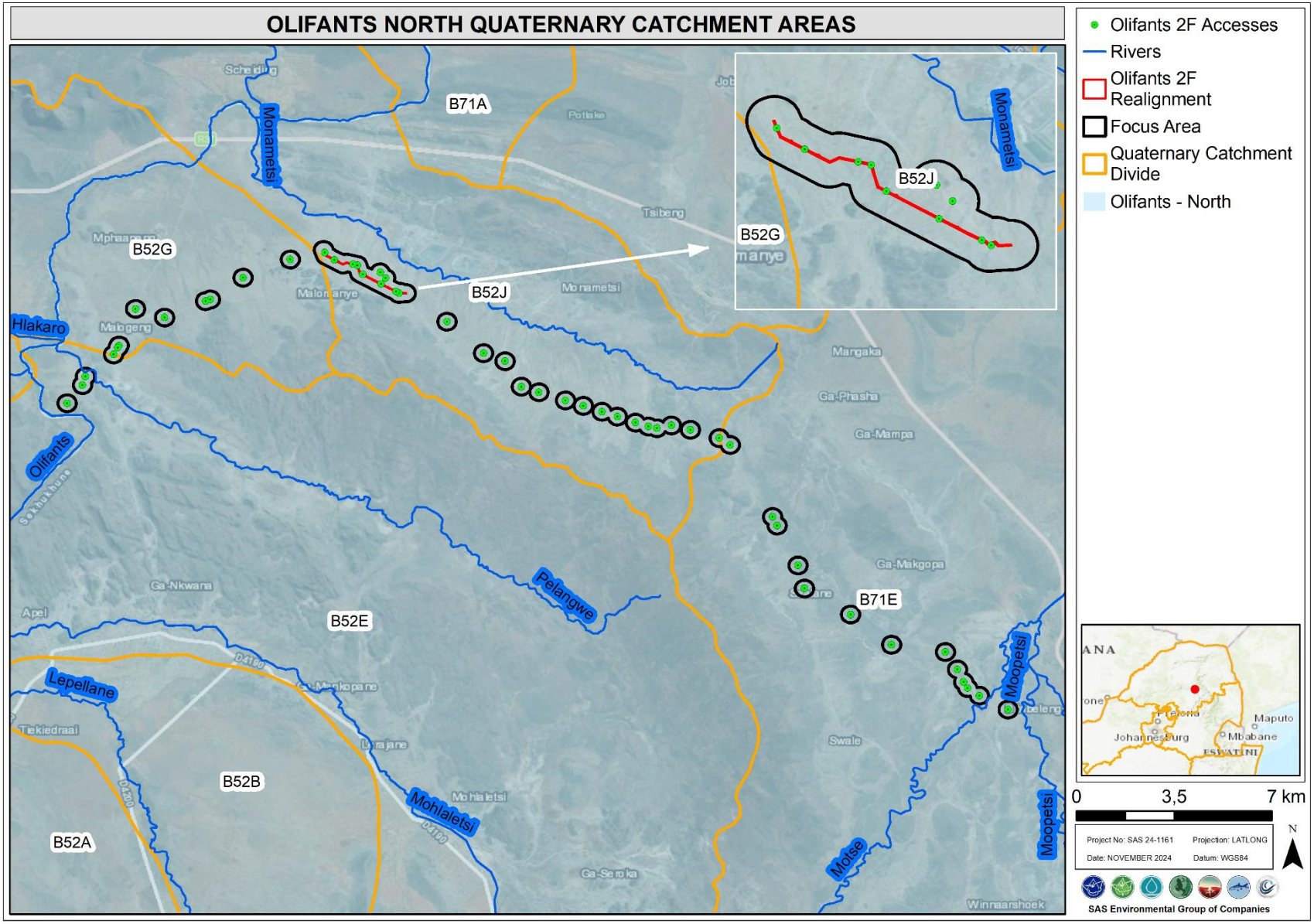


Figure 3: Quarternary catchments associated with the wider 2F alignment.

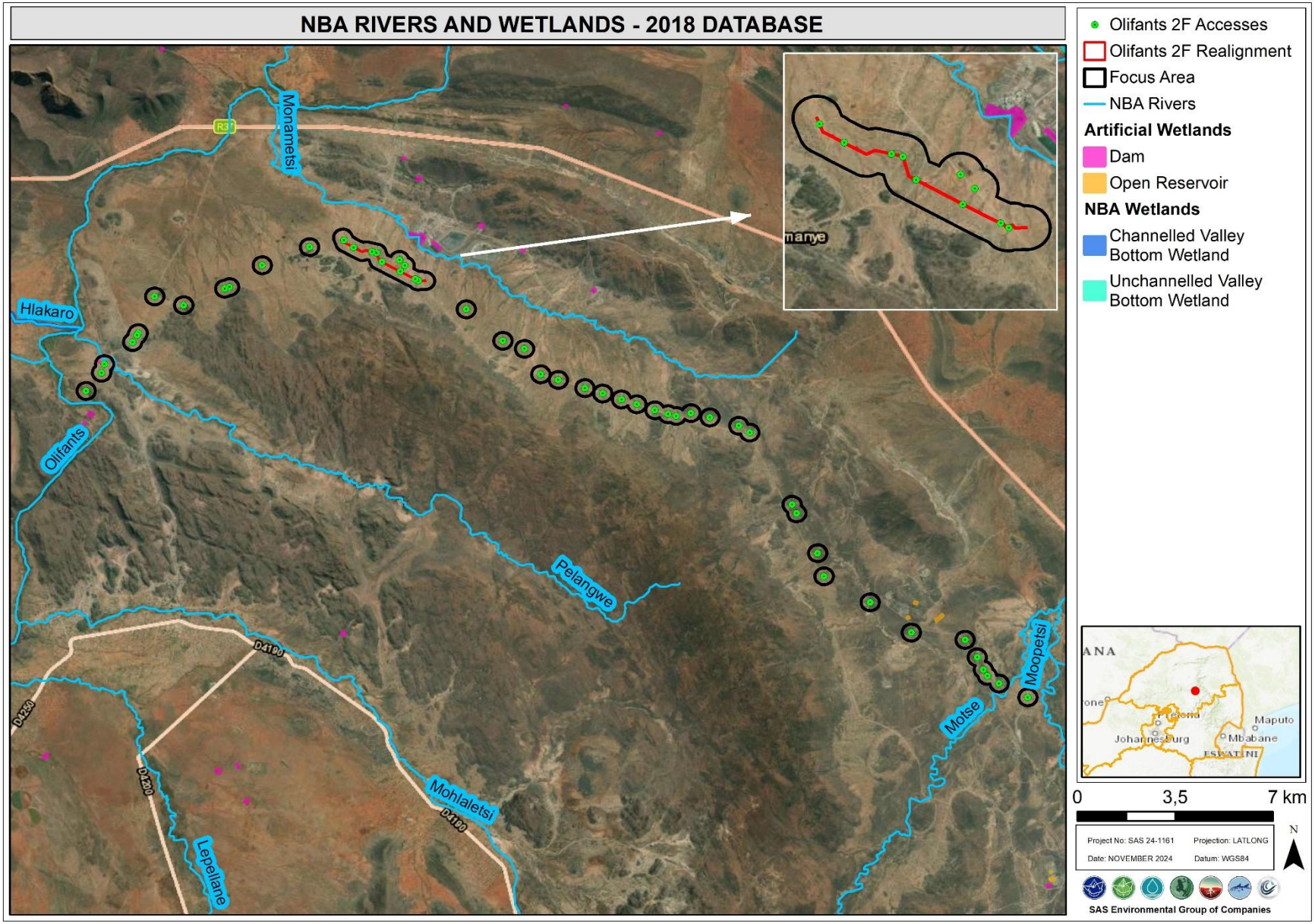


Figure 4:Freshwater Ecosystems associated with the wider 2F alignment according to the NBA (2018) Freshwater Database.

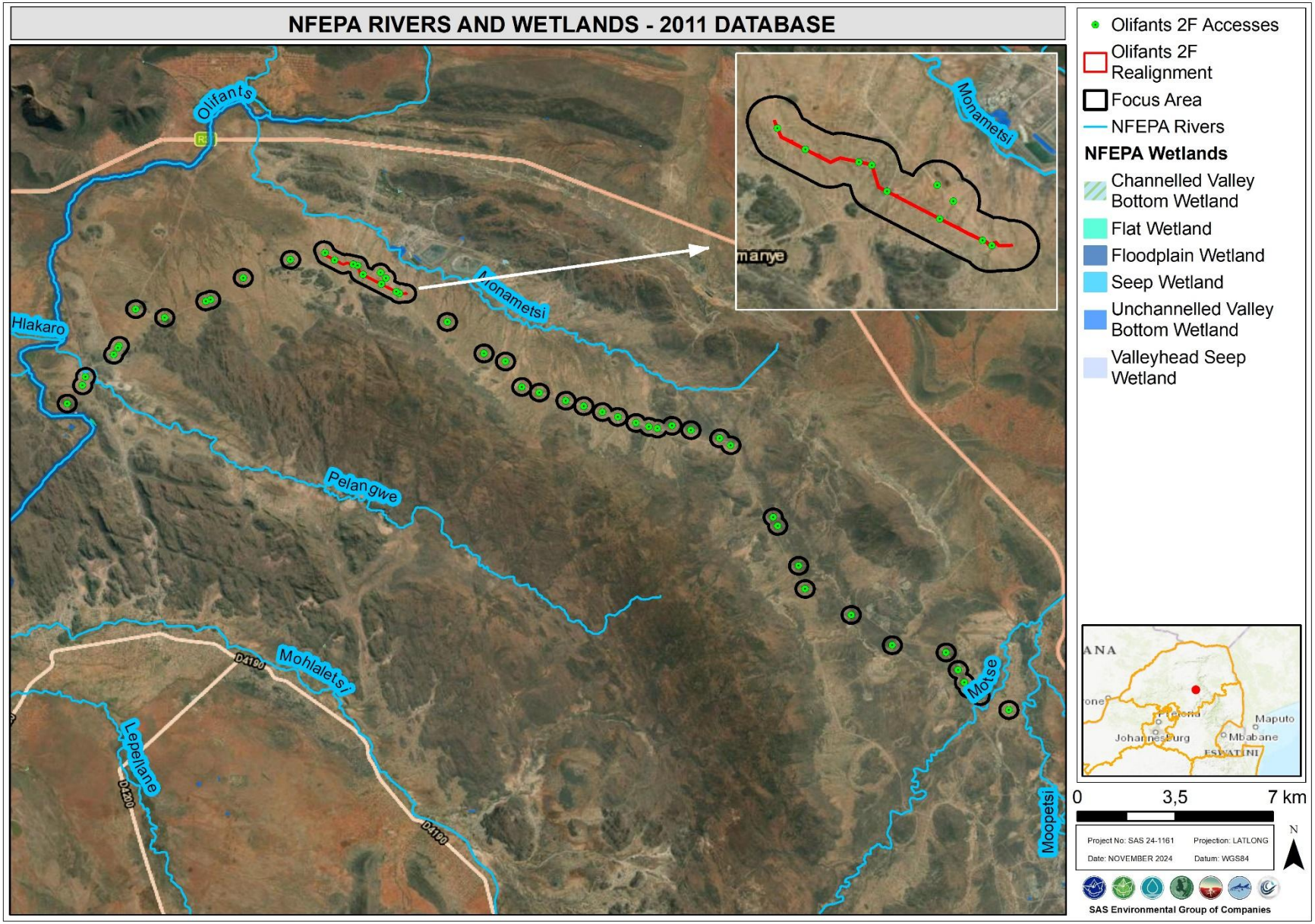


Figure 5:Freshwater Ecosystems associated with the wider 2F alignment according to the NFEPA (2011) Freshwater Database.

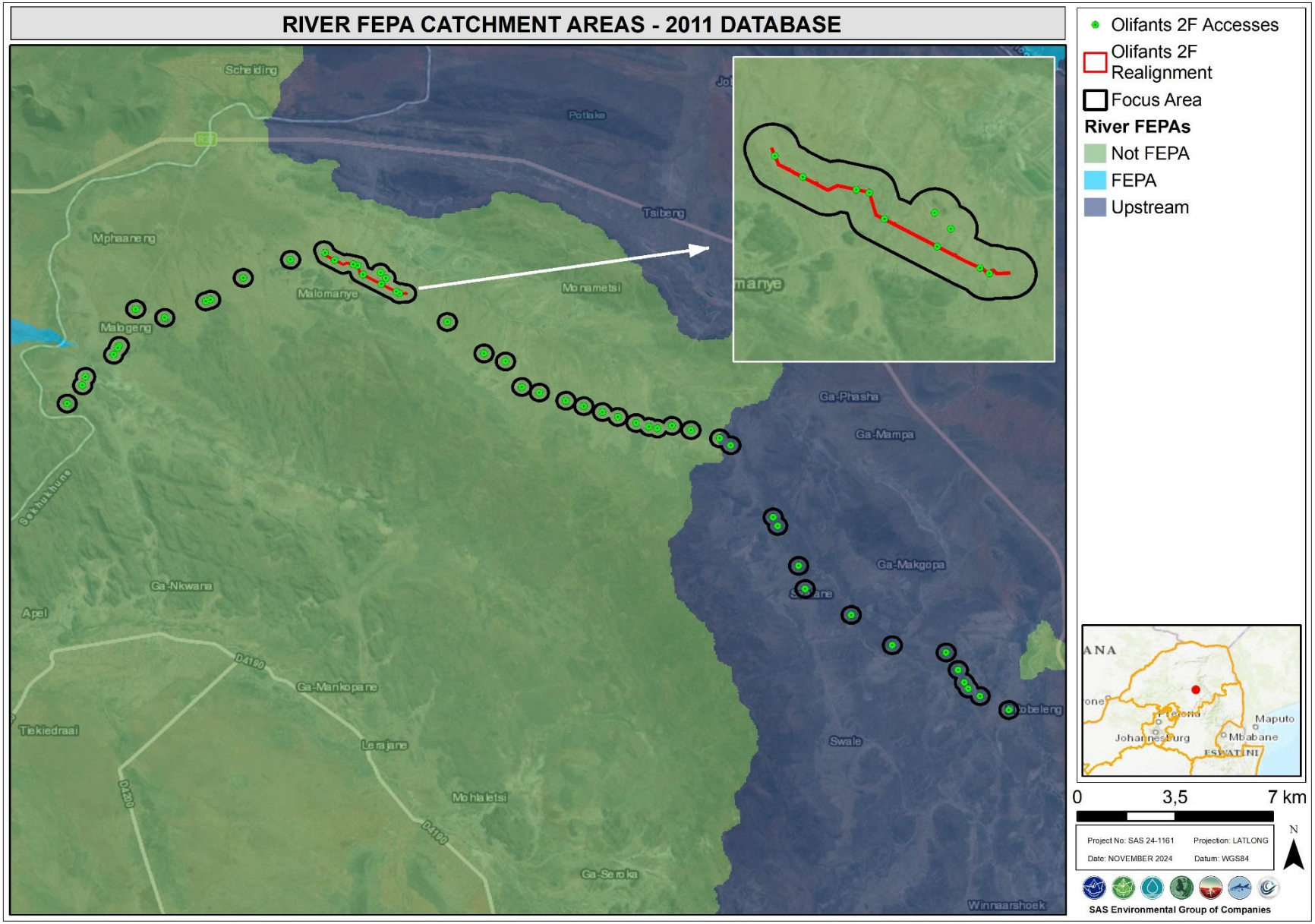


Figure 6: NFEPA catchments associated with the wider 2F alignment according to the NFEPA (2011) Freshwater Database

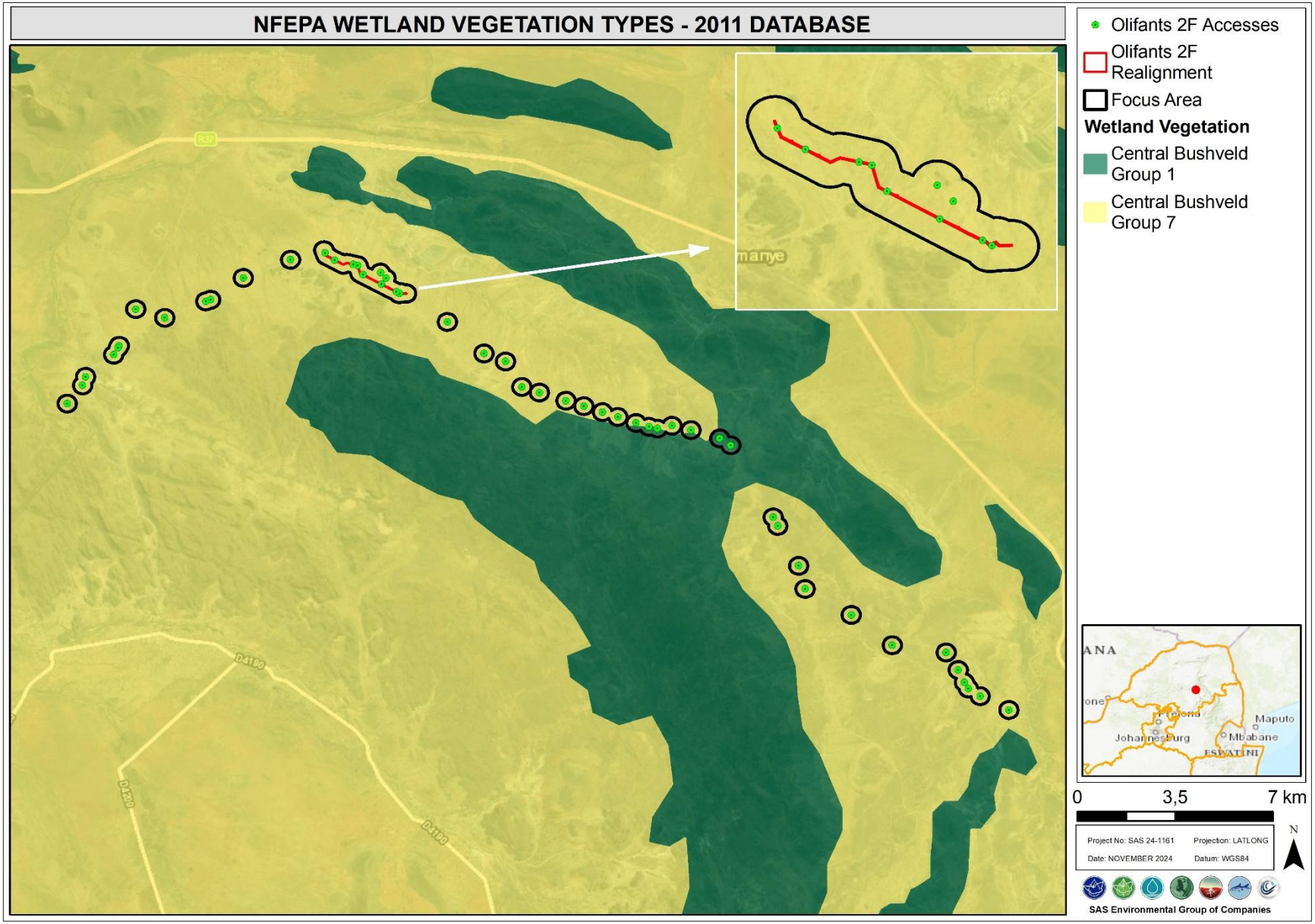


Figure 7: Freshwater Ecosystems in the focus area according to the NFEPA (2011) Database.

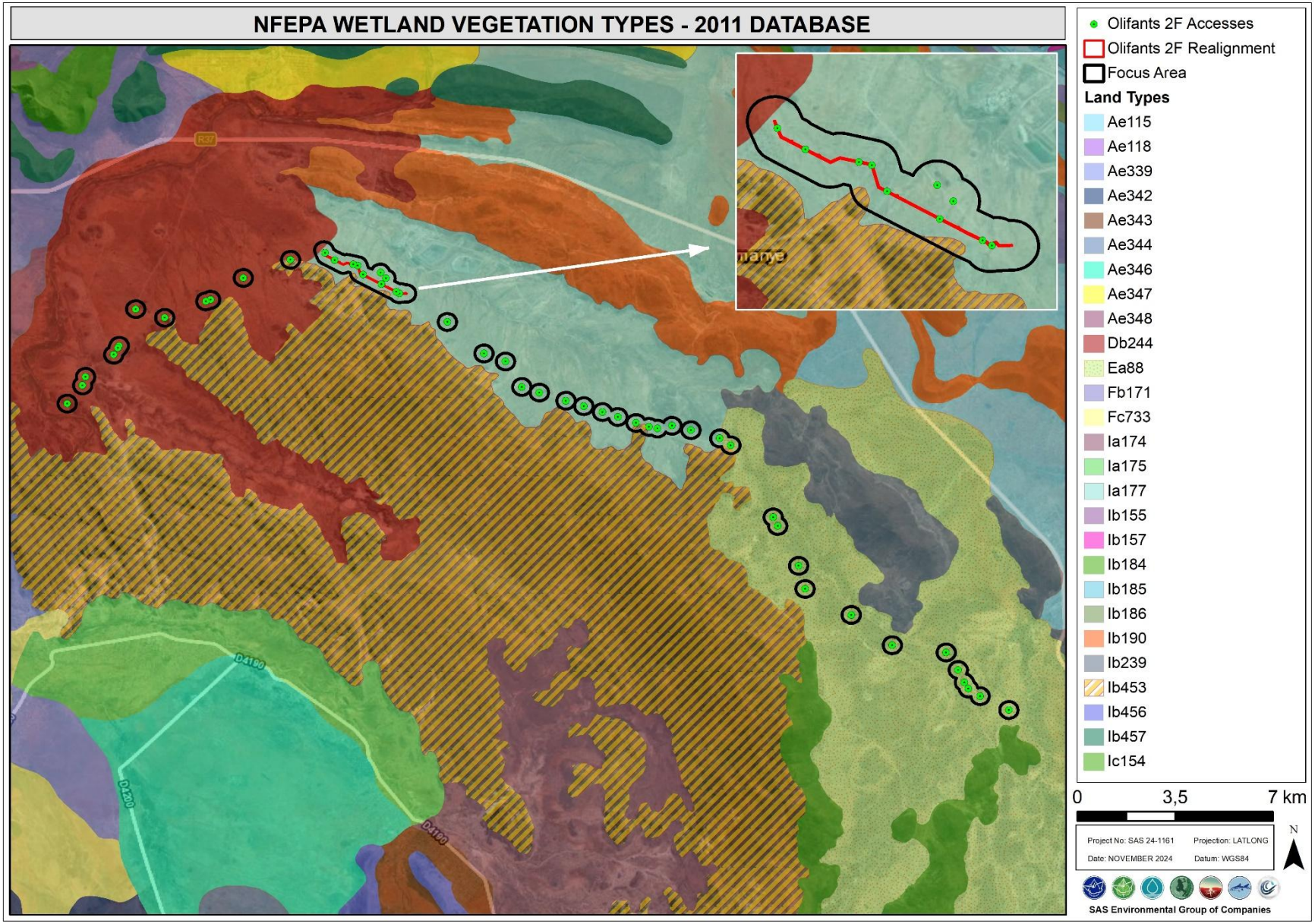


Figure 8: Land Types within the focus area (Job *et al.*, 2019).

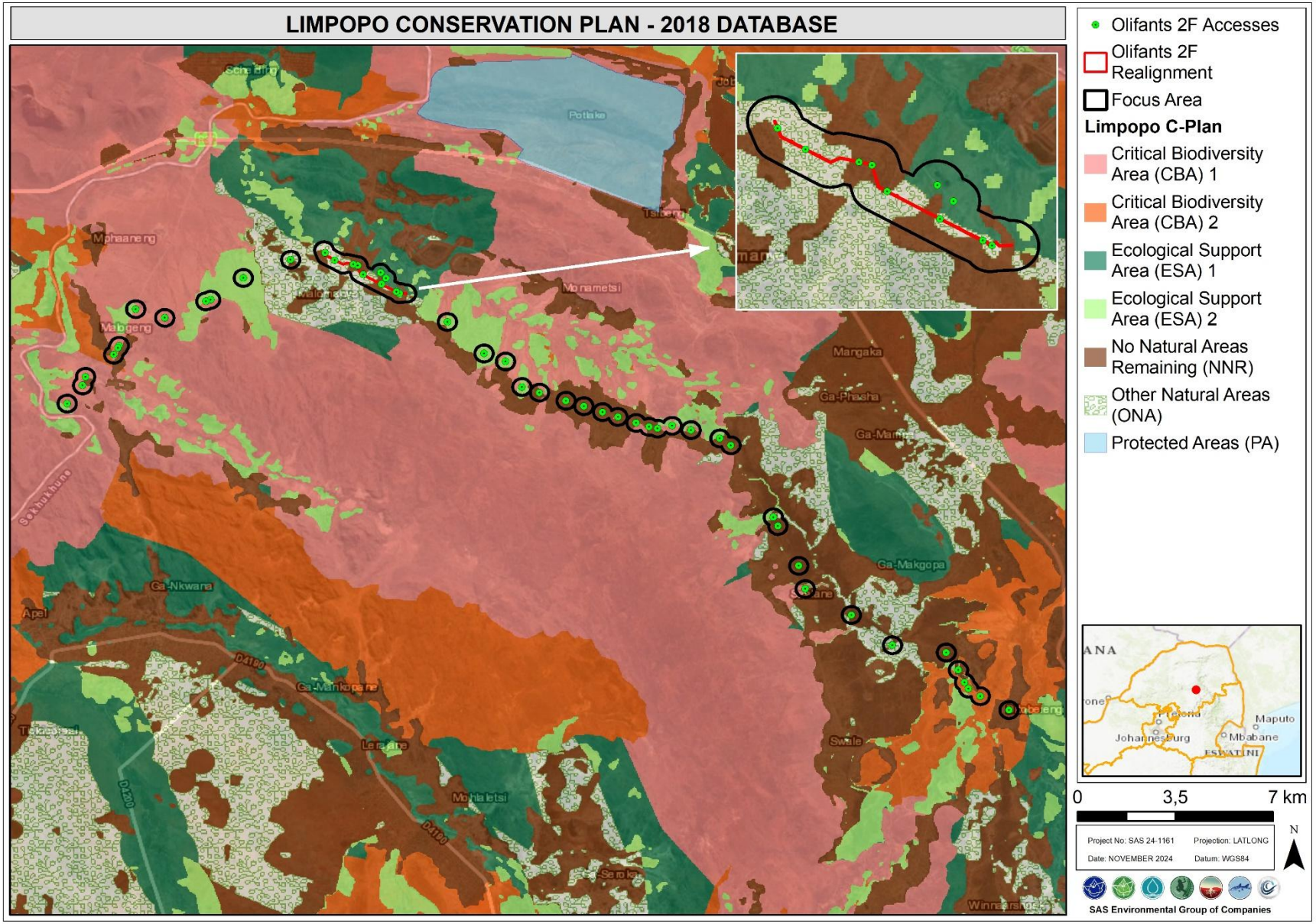


Figure 9: Areas of Conservation Importance according to the Limpopo Conservation Plan (2018).

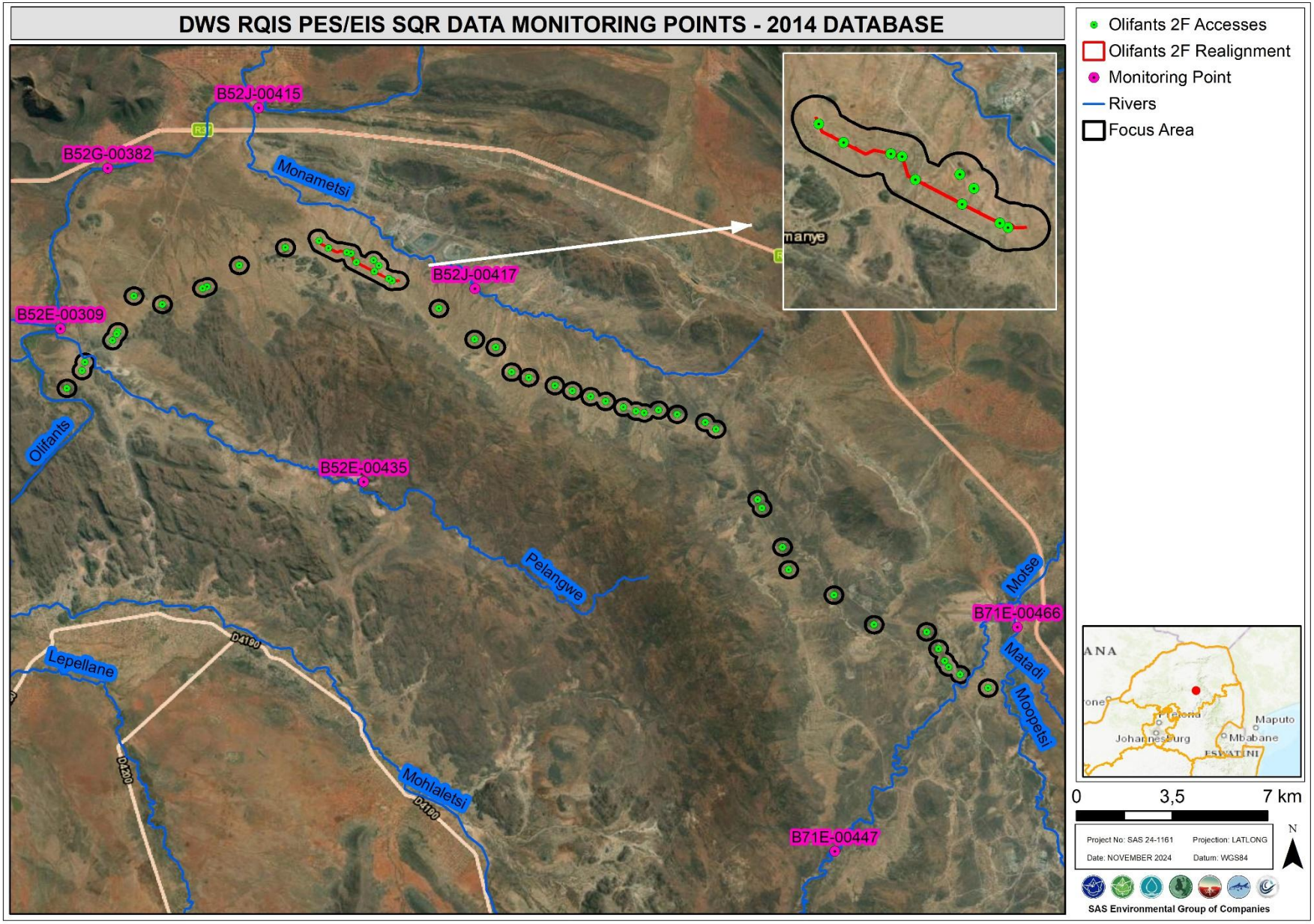


Figure 10: DWS RQIS PES/EIS SQR Data Monitoring Points in relation to the focus area.

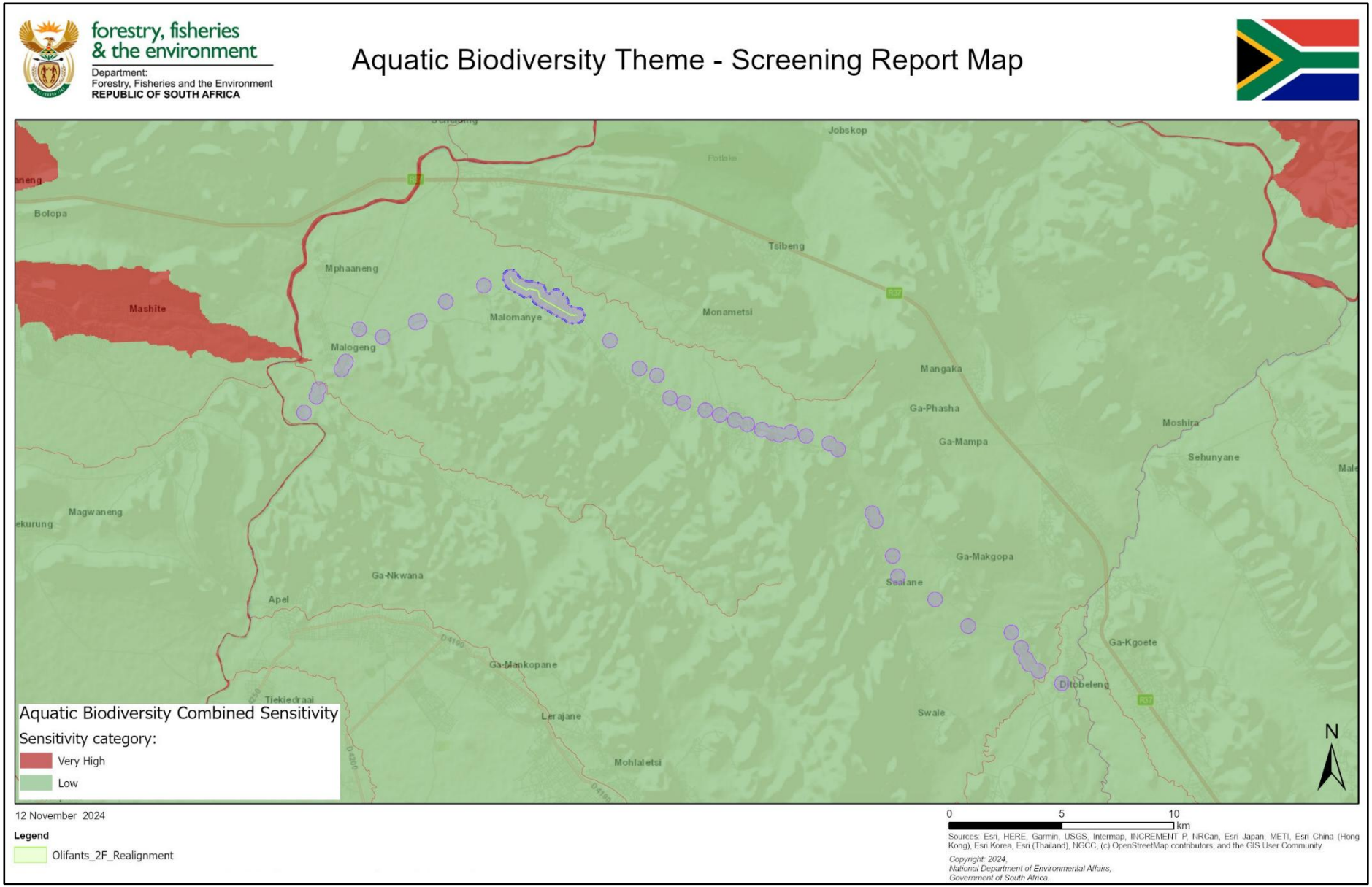


Figure 11: Aquatic Biodiversity Sensitivity for the wider 2F alignment as assigned by the DFFE Web-based Screening Tool.

3.2 Ecological Status of Sub-Quaternary Catchments [Department of Water and Sanitation (DWS) Resource Quality Services (RQS) PES/EIS Database]

The reach of the rivers that traverse the focus are located within the **Eastern Bankenveld** Aquatic Ecoregion within the **B52E, B71E and B52J** quaternary catchments. According to the PES/EIS database, as developed by the DWS RQIS department, the following SQRs are applicable (Figure 10):

- B52E - 00309 (Olifants River;
- B52G - 00382 (Olifants River);
- B52J – 00415 (Olifants River);
- B52J - 00417 (Monametsi (Rapholo) River;
- B71E-00447 (Motse River); and
- B71E-00466 (Moopetsi River).

Key information on aquatic fish species, aquatic macro-invertebrates, and background conditions associated with the above SQR points as contained in this database and pertaining to the Present Ecological State (PES), ecological importance (EI) and ecological sensitivity (ES) are described below in Tables 2-4.

.

Table 2: Freshwater fish species previously collected from or expected in the various SQR monitoring points associated with the SQRs:

Fish species	B52J-00417 (Monametsi River)	B52J – 00415 (Olifants River)	B52G-00382 (Olifants River)	B52E-00309 (Olifants River)	B71E-00466 (Moopetsi River)	B71E-00447 (Motse River)
Amphilius uranoscopus	-		-		-	-
Chiloglanis paratus	-	✓	✓	✓	-	-
Chiloglanis pretoriae	-	✓	✓	✓	-	-
Chiloglanis swierstrai	-	✓	✓	✓	-	-
Clarias gariepinus	-	✓	✓	✓	-	-
Enteromius mattozi		✓	✓	✓		
Enteromius neefi	-		✓		-	-
Enteromius paludinosus		✓	✓	✓		
Enteromius trimaculatus	-	✓	✓	✓	-	-
Enteromius unitaeniatus	-	✓	✓	✓	-	-
Enteromius viviparus		✓	✓	✓		
Labeo cylindricus	-	✓	✓	✓	-	-
Labeo molybdinus	-	✓	✓	✓	-	-
Labeo rosae		✓	✓	✓		
Labeobarbus marequensis	-	✓	✓	✓	-	-
Marcusenius pongolensis		✓	✓	✓	-	-
Mesobola brevianalis		✓	✓	✓	-	-
Micralestes acutidens		✓	✓	✓	-	-
Opsaridium peringueyi	-	✓	✓		-	-
Oreochromis mossambicus	-	✓	✓	✓	-	-
Pseudocrenilabrus philander	-	✓	✓	✓	-	-
Schilbe intermedius		✓	✓	✓	-	-
Synodontis zambezensis		✓	✓	✓	-	-
Tilapia rendalli		✓	✓	✓	-	-
Tilapia sparrmanii	-	✓	✓		-	-

Table 3: Freshwater macro-invertebrates previously collected from or expected in the various SQR monitoring points associated with the SQRs:

Aquatic macro-invertebrate taxa	B52J-00417 (Monametsi River)	B52J–00415 (Olifants River)	B52G-00382 (Olifants River)	B52E-00309 (Olifants River)	B71E-00466 (Moopetsi River)	B71E-00447 (Motse River)
Aeshnidae	-	✓	✓	✓	-	-
Ancylidae	-	✓	✓	✓	-	-
Atyidae	-	✓	✓	✓	-	-
Baetidae > 2 Sp	-	✓	✓	✓	-	-
Belostomatidae	-	✓	✓	✓	-	-
Bulininae	-	✓	✓	✓	-	-
Caenidae	-	✓	✓	✓	-	-
Ceratopogonidae	-	-	✓	✓	-	-
Chironomidae	-	✓	✓	✓	-	-
Chlorocyphidae	-	✓	✓	✓	-	-
Coenagrionidae	-	✓	✓	✓	-	-
Corbiculidae	-	✓	✓	✓	-	-
Corduliidae	-	✓	✓	✓	-	-
Corixidae	-	✓	✓	✓	-	-
Culicidae	-	✓	✓	✓	-	-
Dytiscidae	-	✓	✓	✓	-	-
Ecnomidae	-	✓	✓	✓	-	-
Elmidae/Dryopidae	-	✓	✓	✓	-	-
Gerridae	-	✓	✓	✓	-	-
Gomphidae	-	✓	✓	✓	-	-
Gyrinidae	-	✓	✓	✓	-	-
Helodidae	-	-	-	✓	-	-
Heptageniidae	-	✓	✓	✓	-	-
Hirudinea	-	✓	✓	✓	-	-
Hydracarina	-	✓	✓	-	-	-
Hydraenidae	-	✓	✓	✓	-	-
Hydrometridae	-	✓	✓	✓	-	-
Hydrophilidae	-	✓	✓	✓	-	-
Hydropsychidae 2 Sp	-	✓	✓	✓	-	-
Hydroptilidae	-	✓	✓	✓	-	-

Aquatic macro-invertebrate taxa	B52J-00417 (Monametsi River)	B52J–00415 (Olifants River)	B52G-00382 (Olifants River)	B52E-00309 (Olifants River)	B71E-00466 (Moopetsi River)	B71E-00447 (Motse River)
Leptoceridae	-	✓	✓	✓	-	-
Leptophlebiidae	-	✓	✓	✓	-	-
Libellulidae	-	✓	✓	✓	-	-
Lymnaeidae	-	✓	✓	✓	-	-
Muscidae	-	✓	✓	✓	-	-
Naucoridae	-	✓	✓	✓	-	-
Nepidae	-	✓	✓	✓	-	-
Notonectidae	-	✓	✓	✓	-	-
Oligochaeta	-	✓	✓	✓	-	-
Philopotamidae	-	✓	✓	✓	-	-
Physidae	-	✓	✓	✓	-	-
Planorbinae	-	✓	✓	✓	-	-
Pleidae	-	✓	✓	✓	-	-
Polymitarcyidae		-	-	✓	-	-
Porifera	-	✓	✓	✓	-	-
Potamonautidae	-	✓	✓	✓	-	-
Psephenidae	-	✓	✓	-	-	-
Simuliidae	-	✓	✓	✓	-	-
Sphaeriidae	-	✓	✓	✓	-	-
Tabanidae	-	✓	✓	✓	-	-
Thiaridae	-	✓	✓	✓	-	-
Tipulidae	-	✓	✓	✓	-	-
Tricorythidae	-	✓	✓	✓	-	-
Turbellaria	-	✓	✓	✓	-	-
Unionidae	-	✓	✓	✓	-	-
Veliidae/Mesoveliidae	-	✓	✓	✓	-	-

Table 4: Freshwater macro-invertebrates previously collected from or expected at the SQRs:

Ecological status	B52J-00417 (Monametsi River)	B52J – 00415 (Olifants River)	B52G-00382 (Olifants River)	B52E-00309 (Olifants River)	B52E-00435(Pelangwe River)	B71E-00466 (Moopetsi River)	B71E-00447 (Motse River)
Synopsis							
PES Category Median	Seriously Modified (Class E)	Largely Modified (Class D)	Largely Modified (Class D)	Largely Modified (Class D)	Moderately Modified (Class C)	Seriously Modified (Class E)	Largely Modified (Class D)
Mean EI[4] class	Low	Moderate	High	High	High	Low	Low
Mean ES[5] class	Low	High	High	High	High	Very Low	Low
Length	26.60	0.50	14.00	0.20	29.50	2.40	32.97
Stream order	1	5	5	5	1	2	1
Default EC[6]	Low (D)	High (B)	High (B)	High (B)	High (B)	Low (D)	Low (D)
PES[7] Details							
Instream habitat continuity MOD[8]	Large	Small	Small	Small	Moderate	Moderate	Large
RIP/wetland zone continuity MOD	Large	Moderate	Moderate	Moderate	Moderate	Serious	Large
Potential instream habitat MOD activities	Serious	Large	Large	Large	Serious	Serious	Serious
Riparian/wetland zone MOD	Serious	Large	Large	Moderate	Moderate	Serious	Serious
Potential flow MOD activities	Small	Large	Serious	Serious	Small	Moderate	Moderate
Potential physico-chemical MOD activities	Serious	Large	Large	Large	Large	Serious	Large
EIError! Bookmark not defined. Details							
Fish spp/SQ	-	16.00	23.00	21.00	-	-	-
Fish average confidence	-	1.00	3.35	1.00	-	-	-
Fish representivity per secondary class	-	High	Very High	Very High	-	-	-
Fish rarity per secondary class	-	Very High	Very High	High	-	-	-
Invertebrate taxa/SQ	-	53.00	54.00	54.00	-	-	-
Invertebrate average confidence	-	2.21	3.11	1.74	-	-	-

[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	B52J-00417 (Monametsi River)	B52J – 00415 (Olifants River)	B52G-00382 (Olifants River)	B52E-00309 (Olifants River)	B52E-00435(Pelangwe River)	B71E-00466 (Moopetsi River)	B71E-00447 (Motse River)
Invertebrate representivity per secondary class	-	Very High	Very High	Very High	-	-	-
Invertebrate rarity per secondary class	-	Very High	Very High	High	-	-	-
EI importance: riparian-wetland-instream vertebrates (excluding fish) rating	Low	Very High	High	High	High	Very Low	Low
Habitat diversity class	Moderate	Low	Very Low	Very High	Very High	Low	High
Habitat size (length) class	Moderate	Very Low	Low	Very Low	Moderate	Very Low	Low
Instream migration link class	Moderate	Very High	Very High	Very High	High	High	Moderate
Riparian-wetland zone migration link	Moderate	High	High	High	High	Low	Moderate
Riparian-wetland zone habitat integrity class	Low	Moderate	Moderate	High	High	Low	Low
Instream habitat integrity class	Low	Moderate	Moderate	Moderate	Low	Low	Low
Riparian-wetland natural vegetation rating based on percentage natural vegetation in 500m	Low	Low	High	Very High	High	Very Low	Very High
Riparian-wetland natural vegetation rating (expert)	Low	Low	Low	Low	High	Very High	Low
ESError! Bookmark not defined. Details							
Fish physical-chemical sensitivity description	-	Very High	Very High	Very High	-	-	-
Fish no-flow sensitivity	-	Very High	Very High	Very High	-	-	-
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	Low	High	High	High	High	Very Low	Low

Ecological status	B52J-00417 (Monametsi River)	B52J – 00415 (Olifants River)	B52G-00382 (Olifants River)	B52E-00309 (Olifants River)	B52E-00435(Pelangwe River)	B71E-00466 (Moopetsi River)	B71E-00447 (Motse River)
Stream size sensitivity to modified flow/water level changes description	High	Low	Low	Low	Very High	Low	High
Riparian-wetland vegetation intolerance to water level changes description	Low	Low	Low	Low	Low	Low	Low

4 FRESHWATER RESULTS

4.1 Freshwater Ecosystem Characterisation

In preparation for the field assessment, aerial photographs, digital satellite imagery and provincial and national wetland databases (as outlined in Section 2 of this report) were used to identify areas of interest at a desktop level. All possible measures were undertaken to ensure all freshwater ecosystems which are located in the focus area were identified, delineated, and assessed.

During the assessment, various non-perennial drainage lines were identified in the focus area. The majority of these drainage lines form tributaries of the Olifants River and form part of the generally northward draining network of drainage that flows into the Olifants River to the north of the 2F alignment. The overall drainage of systems associated with the 2F alignment can be roughly divided into two parts based on one of two larger rivers into which all drainage flows. The western parts of the alignment are within part of the upper catchment of the Rapholo River that flows into the Olifants River at the western end of the Bogalatladi Settlement. Drainage systems in the south-eastern part of the alignment forms tributaries of the Motse River, which itself drains north-eastwards and confluences with the Olifants River neat the settlement of Senyakho near the Mecklenburg Mine.

These freshwater ecosystems were classified according to the classification system (Ollis *et. al.*, 2013) as Inland Systems, falling within the Eastern Bankenveld Aquatic Ecoregion. The focus area falls within the Central Bushveld Groups 1 and 7 Wetland Vegetation Type, which are indicated as critically endangered (CR) and near threatened (NT) respectively according to Mbona *et al*. (2015). These freshwater ecosystems were further classified at Level 3 and Level 4 of the classification system as summarised in Table 5 below.

Table 5: Characterisation of the freshwater ecosystems associated with the focus area according to the Classification System (Ollis *et. al*., 2013).

Freshwater Ecosystem	Level 3: Landscape unit	Level 4: HGM Type
Non-Perennial Drainage Line	**Valley floor:** The base of a valley, situated between two distinct valley side-slopes.	**River**: A linear landform with clearly discernible bed and banks, which permanently or periodically carries a concentrated flow of water. A river is taken to include both the active channel and the riparian zone as a unit.

In addition to the ephemeral /episodic drainage lines, the wider area within which the proposed development is located is characterised by numerous small, poorly defined preferential flow paths, which convey surface water during periods of rainfall but do not retain water for sufficient periods of time to allow for the formation of either riparian or wetland characteristics.

Some such preferential flow paths may be indicated on topographic data, or may possess floodlines, but as they do not possess defined riparian zones or wetland characteristics, they are not depicted nor assessed in this report. However, in the event that a 1:100 year floodline has been determined for such preferential flow paths by a suitably qualified specialist, they will be considered as watercourses from a legal standpoint and will thus be subject to the provisions of the applicable legislation.

4.2 Freshwater Ecosystem Delineation

As noted in Section 3, the freshwater ecosystems associated with the focus area were initially delineated using desktop methods (use of aerial photographs, digital satellite imagery and topographical maps), and the non-perennial drainage lines located in the focus area were refined in the field by ground-truthing the desktop delineations at certain pre-selected points. The delineations as presented in this report are thus regarded as a best estimate of the freshwater ecosystem boundaries based on the site conditions present at the time of assessment.

The following indicators were used to delineate the boundaries of the identified freshwater ecosystems:

- Terrain units were used as one of the primary indicators, as the majority of freshwater ecosystems are located within valley floors where a well-defined, low-lying area is present, and water is likely to collect and/or move through the landscape;
- Vegetation was generally considered as a primary indicator as a clear distinction in structure on the edges of riparian zones as compared to surrounding non-freshwater vegetation communities was noted; and
- Hydrological characteristics were used as a primary indicator, such as the presence of definitive hydromorphological features such as flow channels and banks, as well as the presence of alluvial material.

Figure 12 below indicates the presence of freshwater ecosystems in relation to the focus area.

The detailed assessment of the freshwater ecosystems within the focus area is detailed in Tables 6-8 below.

Due to the relatively homogenous characteristics and similarities of modifying impacts (that are present within many of the freshwater ecosystems) which are common to virtually all freshwater ecosystems associated with the focus area, the various HGM units (many of which

possess only weakly defined riparian zones) were grouped according to the part of the wider 2F alignment and sub-catchment in which they are located. Since the drainage systems all possess very similar characteristics, the assessment of PES, EIS and Ecoservices was applied collectively to the drainage lines in the respective areas, as any variation in the outcome of each individual drainage line unit was to be assessed, is likely to be negligible.

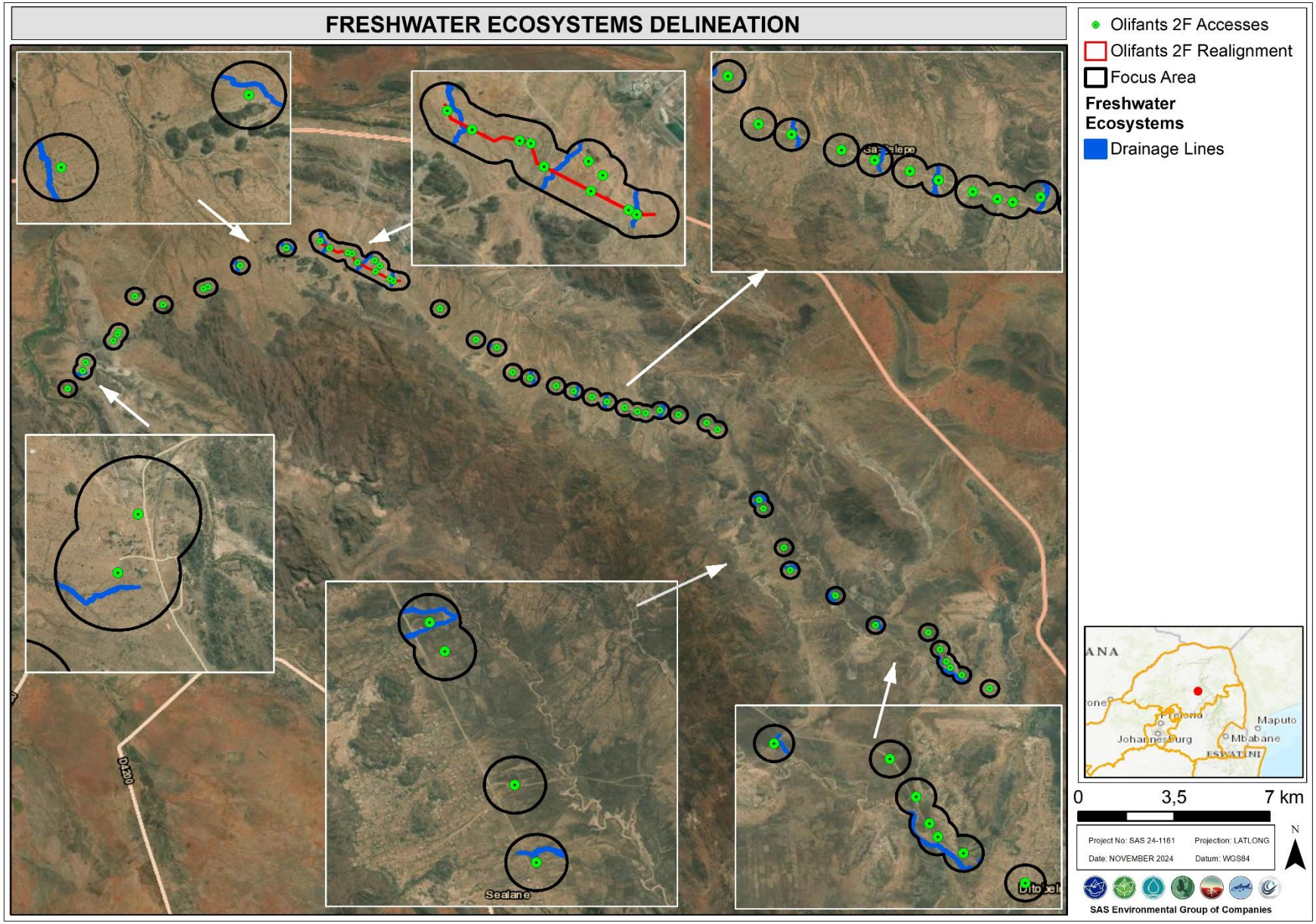
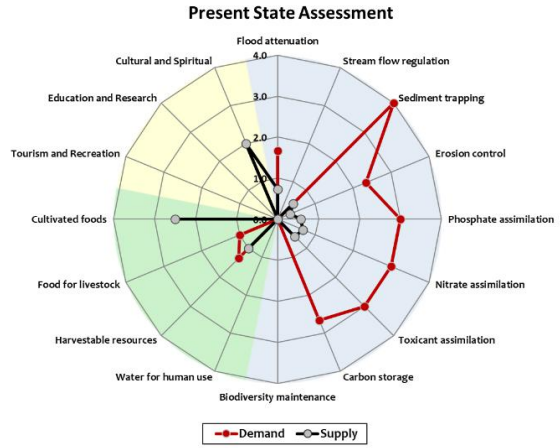


Figure 12: Freshwater ecosystem occurrence in the context of the focus area.

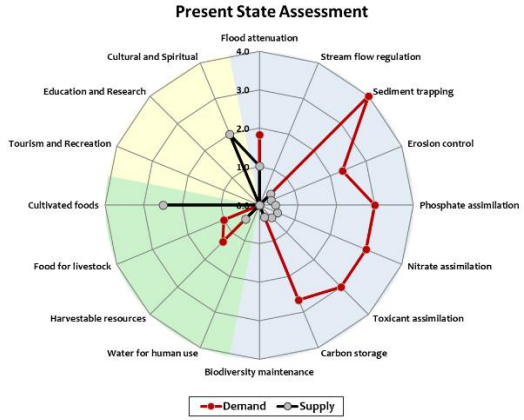
4.3 Freshwater Detailed Assessment Results

Table 6: Summary of the assessment of the non-perennial drainage lines associated with the access points 1-08, 1-10 and 1-13 in the catchment of the Motse River.

<table>
<tr><td colspan="2">Ecological & socio-cultural service provision graph:
 
</td><td>    
Photograph notes: Top left: View of the channel and riparian zone of the drainage line downstream of the existing road close to the access point 1-10; Top right: The channel of the drainage line near access point 1-13 displaying accelerated bank erosion; Bottom left: Residual riparian trees that have been felled along the drainage line upstream of access point 1-13; Bottom right: Dumping of refuse in the riparian zone of the drainage line denuded of vegetation at the access point 1-08.</td></tr>
<tr><td>Ecoservice provision</td><td colspan="2">All services – Low or Very Low
The three drainage lines assessed in the Motse River catchment have been collectively assessed to provide no more than a low degree of ecological goods and service provision. This is largely due to the degraded (largely modified) state of the drainage lines. As such the ability of the drainage lines to provision services is of such a low level that for most metrics demand significantly exceeds supply. Although certain reaches exist which are in a slightly better state, the existing riparian vegetation (habitat) represents a significant deviation from reference conditions, with the natural heterogeneity of riparian vegetation being largely replaced with the indigenous encroacher Dichrostachys cinerea. Due to their largely modified state the drainage lines accordingly act as effective flow conduits in the landscape with very few if any hydrological regulating services provisioned.
.</td></tr>
<tr><td>PES/ discussion</td><td colspan="2">Riparian IHI PES Category: D
The PES of the three drainage lines located within the catchment of the Motse River in the south-eastern most part of the 2F alignment have been assigned a riparian PES score of D. This reflects a largely modified state, which is indicative of a present state where large areas of riparian habitat have been lost and limited areas of intact habitat remain. This denudation of natural vegetation in much of the</td></tr>
</table>

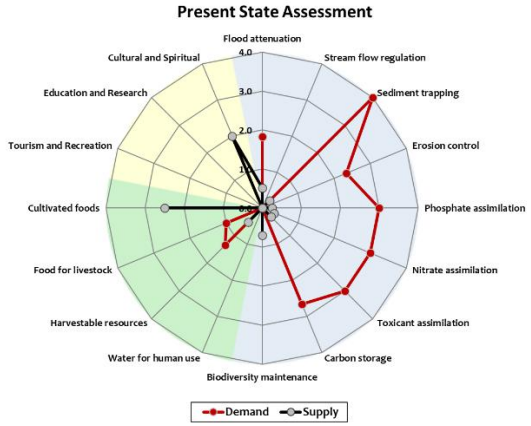
<table>
<tr><td></td><td colspan="3">catchments of the reaches of these drainage lines has contributed to the degradation of the drainage lines, especially through modification of runoff patterns. The altered hydrological regime has led to accelerated bank erosion with the omni-present livestock contributing to development of lateral erosion. Livestock along with chronic levels of natural resource use in the form of felling of trees and shrubs for woody vegetation has denuded large sections of the reaches of both herbaceous and woody vegetation.</td></tr>
<tr><td>EIS discussion</td><td>EIS Category: Low
The EIS of the three drainage lines in the Motse River catchment was assessed to be low due to the degraded nature of the drainage lines and the limited presence of areas of residual intact riparian habitat. This level of degradation has resulted in the drainage lines effectively functioning as drainage conduits for stormwater and overland flow and the drainage lines perform very little hydrological functioning. Due to their state of degradation the drainage lines are unable to provide any cultural or social benefits due to the effective absence of any harvestable resources or livestock grazing resources.</td><td>REC, RMO & BAS Category</td><td>REC Category D
RMO: Maintain
BAS: D (Maintain)
Due to their low EIS twinned with the largely modified PES score, the current state of the drainage lines should be maintained. In the context of the development of the accesses to the pipeline, measures to ensure that no direct impact of riparian / instream habitat or pollution of the downgradient drainage lines must be implemented.</td></tr>
<tr><td colspan="4">Watercourse drivers and receptors discussion (hydraulic regime, geomorphological processes, water quality and habitat and biota):</td></tr>
<tr><td colspan="4">The south-eastern part of the 2F alignment is located in the catchment of the Motse River, a tributary of the Olifants River. The catchment of the river and its tributaries (adjacent to which certain of the access points are located) comprise of a mix of areas of peri-human settlement interspersed with vacant areas used for informal agricultural practices, and most of the catchment except for hills and rocky outcrops has been significantly transformed from a natural state. The drainage lines at access points 1-10 and 1-13 drain catchments that extend up to the quaternary catchment divide in the hilly terrain to the west of the pipeline. Under natural circumstances the predominance of rocky terrain and shallow soils are expected to limit infiltration and during rainfall periods would be expected to carry a reasonably large volume of runoff, a characteristic which has been significantly exacerbated by landuse change.
The drainage lines in the vicinity of the pipeline and access points are characterised by a single thread channel that is relatively incised, and characterised by accelerated bank erosion along most of the length of the reach. Under reference conditions the drainage lines may have been semi--seasonal in nature, but flows are present only for short durations following flow events.
The significant levels of degradation in the drainage lines and their immediate surrounds, especially the occurrence of chronic gully and sheet erosion which has resulted in the removal of topsoil over large areas, along with the ever constant grazing and browsing intensity of livestock, especially goats, has resulted in there being little to no herbaceous vegetation present in the riparian zones of the drainage lines, with woody vegetation consisting of smaller shrubs that have yet to be felled or the woody (indigenous) encroacher species D. cinerea. As a result little to no natural biotic assemblage is likely to be present in these reaches, with a slightly more natural assemblage in areas of slightly less impact away from human settlements. Water quality (when water is present as surface flows in the drainage lines) is expected to be poor and highly turbid, although the filtering effect of the alluvial substrate present in the channel beds may assist in the polishing of water quality to some degree.</td></tr>
<tr><td>Extent of modification anticipated</td><td colspan="3">The access roads at all three access sites are unlikely to directly (physically) impact the drainage lines, with the accesses at access points 1-08 and 1-10 being located a distance away from the drainage line and the likely track to be used at access point 13 not traversing the riparian zone of the drainage line. However due to the relative proximity of the accesses indirect impacts are possible and mitigation measures stipulated in the report must be adhered to in the construction and development of the accesses.</td></tr>
<tr><td colspan="4">Impact Assessment Outcome & Business Case:</td></tr>
<tr><td>VERY LOW</td><td colspan="3">The application of the Zutari impact assessment methodology has assessed the level of impact significance posed by the development of the accesses on respective drainage lines to be low before mitigation and very low after implementation of mitigation measures. This is due to the location of the accesses away from the freshwater ecosystems, thus being highly unlikely to result in a direct impact. Nonetheless the importance of ensuring that mitigation measures are implemented and adhered to is not diminished.</td></tr>
</table>

Table 7: Summary of the assessment of the non-perennial drainage lines located in the Rapholo (Monametsi) River catchment in the central part of the 2D alignment associated with accesses 1-17, 2-6, 2-8 and 2-9).

<table>
<tr><td colspan="2">Ecological & socio-cultural service provision graph:
 
</td><td rowspan="2"> 
Photograph notes: Top left: Channel bed and banks of the drainage line near access point 1-17, showing excessive bank erosion; Top right: The same drainage line upstream of the road and access point illustrating very limited residual vegetation cover in the riparian zone; Bottom left: The drainage line at access point 2-08 with the only remnant vegetation being herbaceous shrub species which are not browsed by livestock ; Bottom right: The reach of the drainage line downstream of the road at access point 2-06 showing limited woody vegetation and housing in the immediate catchment of the reach.</td></tr>
<tr><td>Ecoservice provision</td><td>All services – Low or Very Low
The drainage lines assessed in the central part of the 2F alignment have been collectively assessed to provision no more than a low degree of ecological goods and service provision, with only two services associated with a low degree of service provision – the others being rated as very low. This is largely due to the highly degraded (seriously modified) state of the drainage lines. As such the ability of the drainage lines to provision services is of such a low level that for most metrics demand significantly exceeds supply. The existing riparian vegetation (habitat) represents a significant deviation from reference conditions, with the natural heterogeneity in terms of structure and species composition having been replaced by a few species. Due to their seriously modified state the drainage lines accordingly act as effective flow conduits in the landscape with very few if any hydrological regulating services provisioned.</td></tr>
<tr><td>PES/ discussion</td><td colspan="2">Riparian IHI PES Category: E
The PES of the drainage line reaches is seriously modified. The removal of riparian vegetation through a variety of factors including removal (felling) of woody vegetation, chronic livestock overgrazing and erosion has resulted in a situation where either no vegetation remains, or the riparian zone is characterised by very limited or no woody vegetation with unpalatable shrubs dominant. In most of the reaches assessed this has left substrate significantly exposed and resulted in the erosion of significant volumes of topsoil. The drainage lines are subject to significant changes in flood peaks from a natural hydrological state which have resulted in significant bank erosion and incision, especially in reaches downstream of the existing district road crossing. The catchments of the drainage lines have been largely modified</td></tr>
</table>

<table>
<tr><td></td><td colspan="3">through extensive peri-urban human settlement and by expansive areas degraded natural habitat, thus contributing to a highly altered hydrology where there is little to no infiltration and the spate flows have been greatly increased in volume over a shorter duration.</td></tr>
<tr><td>EIS discussion</td><td>EIS Category of all drainage lines: Low
The EIS of all drainage lines associated with accesses 1-17, 2-06,2-08 and 2-09 was assessed to be low due to the highly degraded nature of the drainage lines and the effective absence of any areas of intact residual riparian habitat. This level of degradation has resulted in the drainage lines effectively functioning as drainage conduits for stormwater and overland flow and the drainage lines perform very little hydrological functioning. Due to their state of degradation the drainage lines are unable to provide any cultural or social benefits due to the effective absence of any harvestable resources or livestock grazing resources.</td><td>REC, RMO & BAS Category</td><td>REC Category: D
RMO: Improve
BAS: E (Maintain)
Any PES score of lower than D is considered unacceptable (Categories E and F are considered ecologically unacceptable (Malan and Day, 2012) and therefore, should a freshwater ecosystem fall into one of these PES categories, an REC class D is allocated by default, as the minimum acceptable PES category). The PES category of the drainage line reaches at the access points should theoretically be improved by a class through rehabilitation. However in reality the drainage lines are in such a state of degradation with contributing landuse factors of such a nature that it would be practically impossible to improve the PES class, and the BAS for these systems would be to maintain the PES and prevent further degradation. In the context of the development of the accesses to the pipeline, measures to ensure that no direct impact of riparian / instream habitat or pollution of the downgradient drainage lines must be implemented.</td></tr>
<tr><td colspan="4">Watercourse drivers and receptors discussion (hydraulic regime, geomorphological processes, water quality and habitat and biota):</td></tr>
<tr><td colspan="4">The accesses 1-17, 2-06, 2-08 and 2-09 are located in the upper part of the catchment of the Rapholo (Monametsi) River. Two linear ridges constrain and direct drainage in the Rapholo River catchment in a north-westerly direction, with the culmination of drainage in this relatively small catchment being the Rapholo River that confluences with the Olifants River west of the village of Bogalatladi. The southern part of the upper catchment in which the afore-mentioned accesses are located is comprised of a mix of areas of peri-human settlement and large, degraded vacant areas used for informal agricultural practices, and most of the catchment except for hills and rocky outcrops has been significantly transformed from a natural state. The drainage lines all drain catchments that all extend up to the quaternary catchment divide in the hilly terrain to the south of the pipeline. Under natural circumstances the predominance of rocky terrain and shallow soils are expected to limit infiltration and during rainfall periods would be expected to carry a reasonably large volume of runoff, a characteristic which has been significantly exacerbated by landuse change.
The drainage lines in the vicinity of the pipeline and access points are characterised by a single thread channel that is highly incised, and characterised by accelerated bank erosion along most of the length of the reach. Under reference conditions the drainage lines may have been semi--seasonal in nature, but flows are present only for short durations following flow events.
The significant levels of degradation in the drainage lines and their immediate surrounds, especially the occurrence of chronic gully and sheet erosion which has resulted in the removal of topsoil over large areas, along with the ever constant grazing and browsing intensity of livestock, especially goats, and the felling of woody vegetation has resulted in there being little to no herbaceous or woody vegetation present in the riparian zone. As a result little to natural biotic assemblage is likely to be present in these reaches, with a slightly more natural assemblage in areas of slightly less impact away from human settlements. Water quality (when water is present as surface flows in the drainage lines) is expected to be poor and highly turbid, although the filtering effect of the alluvial substrate present in the channel beds may assist in the polishing of water quality to some degree. .</td></tr>
<tr><td>Extent of modification anticipated</td><td colspan="3">The access roads at all access sites are either directly off the existing road where the pipeline is aligned parallel to it, or located some distance away from the drainage line and are unlikely to directly (physically) impact the drainage lines. However due to the proximity of the accesses to the drainage lines or being located in their catchment indirect impacts are possible and mitigation measures stipulated in the report must be adhered to in the construction and development of the accesses. The northern re-aligned section is not located close to any freshwater ecosystem and no notable impact of developing a pipeline along this alignment has been identified.</td></tr>
<tr><td colspan="4">Impact Assessment Outcome & Business Case:</td></tr>
<tr><td>VERY LOW</td><td colspan="3">The application of the Zutari impact assessment methodology has assessed the level of impact significance posed by the development of the accesses and the realigned pipeline section on respective drainage lines the drainage line to be low before mitigation and very low after mitigation measures. This is due to the location of the accesses away from the freshwater ecosystems, thus being highly unlikely to result in a direct impact. Nonetheless the importance of ensuring that mitigation measures are implemented and adhered to is not diminished.</td></tr>
</table>

Table 8: Summary of the assessment of the non-perennial drainage lines located in the Rapholo (Monametsi) River catchment in the north-western central part of the 2F alignment associated with the proposed pipeline deviation and accesses 2-13,and 2-22).

<table>
<tr><td colspan="2">Ecological & socio-cultural service provision graph:
 
</td><td rowspan="2"> 
Photograph notes: Top left: Channel bed and banks of the drainage line along the deviation and near access point 2-19, showing excessive bank erosion and extremely limited residual vegetation in the riparian zone; Top right: The same drainage line showing excessive bank erosion that is undercutting the bank on which two Balanites maughamii trees are located; Bottom left: Another drainage line along the deviation showing extreme levels of vegetation denudation; Bottom right: Some residual woody riparian vegetation along a drainage line in the far eastern part of the deviation alignment.</td></tr>
<tr><td>Ecoservice provision</td><td>All services – Low or Very Low
The drainage lines assessed in the central part of the 2F alignment have been collectively assessed to provision no more than a low degree of ecological goods and service provision, with only two services associated with a low degree of service provision – the others being rated as very low. This is largely due to the highly degraded (largely modified) state of the drainage lines. As such the ability of the drainage lines to provision services is of such a low level that for most metrics demand significantly exceeds supply. The existing riparian vegetation (habitat) represents a significant deviation from reference conditions, with the natural heterogeneity in terms of structure and species composition having been destroyed, especially with the removal of woody vegetation. Due to their largely modified state the drainage lines accordingly act as effective flow conduits in the landscape with very few if any hydrological regulating services provisioned.</td></tr>
<tr><td>PES/ discussion</td><td colspan="2">Riparian IHI PES Category: E
The PES of the drainage line reaches is seriously modified. The removal of riparian vegetation through a variety of factors including removal (felling) of woody vegetation, chronic livestock overgrazing and erosion has resulted in a situation where either no vegetation remains, or the riparian zone is characterised by very limited or no woody vegetation. In most of the reaches assessed this has left substrate significantly exposed and the erosion of significant volumes of topsoil, with chronic bank erosion noted at all of the drainage lines along the deviation. The extremely high level of degradation appears to be related to their location, as they are surrounded by peri-urban settlements, thus being easily accessible to livestock and to the community who depend heavily on natural resource utilisation for sustaining livelihoods. The drainage lines are subject to significant changes in flood peaks from a reference condition, which have resulted in significant bank erosion and incision. The catchments of the drainage lines</td></tr>
</table>

<table>
<tr><td></td><td colspan="3">have been largely modified through extensive peri-urban human settlement and by expansive areas degraded natural habitat, thus contributing to a highly altered hydrology where there is little to no infiltration and the spate flows have been greatly increased in volume over a shorter duration.</td></tr>
<tr><td>EIS discussion</td><td>EIS Category of all drainage lines: Low
The EIS of all drainage lines crossed by the deviation was assessed to be low due to the highly degraded nature of the drainage lines and the effective absence of any areas of intact residual riparian habitat. This level of degradation has resulted in the drainage lines effectively functioning as drainage conduits for stormwater and overland flow and the drainage lines perform very little hydrological functioning. Due to their state of degradation the drainage lines are unable to provide any cultural or social benefits due to the effective absence of any harvestable resources or livestock grazing resources.</td><td>REC, RMO & BAS Category</td><td>REC Category: D
RMO: Improve
BAS: E (Maintain)
Any PES score of lower than D is considered unacceptable (Categories E and F are considered ecologically unacceptable (Malan and Day, 2012) and therefore, should a freshwater ecosystem fall into one of these PES categories, an REC class D is allocated by default, as the minimum acceptable PES category). The PES category of the drainage line reaches along the deviation and at the access points should theoretically be improved by a class through rehabilitation. However in reality the drainage lines are in such a state of degradation with contributing landuse factors of such a nature that this would be practically impossible to improve the PES class and the BAS for these systems would be to maintain the PES and prevent further degradation. In the context of the development of the accesses to the pipeline, measures to ensure that no direct impact of riparian / instream habitat or pollution of the downgradient drainage lines must be implemented.</td></tr>
<tr><td colspan="4">Watercourse drivers and receptors discussion (hydraulic regime, geomorphological processes, water quality and habitat and biota):</td></tr>
<tr><td colspan="4">The deviation is located in the lower half part of the catchment of the Rapholo (Monametsi) River. Two linear ridges constrain and direct drainage within the Rapholo River catchment in a north-westerly direction, with the culmination of drainage in this relatively small catchment being the Rapholo River that confluences with the Olifants River west of the village of Bogalatladi. The deviation is located on the southern side of the valley and thus all drainage crossed by the deviation is generally northwards. As detailed above the southern part of the lower catchment in which the deviation is aligned is comprised mostly areas of peri-human settlement and large, degraded vacant areas used for informal agricultural practices, and most of the catchment except for hills and rocky outcrops has been significantly transformed from a natural state. The drainage lines all drain catchments that extend up to the quaternary catchment divide in the hilly terrain to the south and west of the deviation, with the drainage line located to the east of access 2-16 draining a relatively large catchment of >600ha in size. Under natural circumstances the predominance of rocky terrain and shallow soils are expected to limit infiltration and during rainfall periods would be expected to carry a reasonably large volume of runoff, but these natural runoff characteristics have been significantly exacerbated by landuse change.
The drainage lines in the vicinity of the deviation crossings are characterised by a single thread channel that is typically highly incised, and characterised by chronic accelerated bank erosion along most of the length of the reach. The larger drainage line located to the east of access point 2-16 is located in a steeply incised valley setting, with steep, unvegetated and unconsolidated slopes sloping down to the drainage line. Under reference conditions the drainage lines may have been semi--seasonal in nature, but flows are present only for short durations following flow events.
The significant levels of degradation in the drainage lines and their immediate surrounds, especially the occurrence of chronic gully and sheet erosion which has resulted in the removal of topsoil over large areas, along with the ever constant grazing and browsing intensity of livestock, especially goats, and removal of woody vegetation has resulted in there being little to no herbaceous or woody vegetation present in the riparian zone, As a result little to natural biotic assemblage is likely to be present in these reaches, with a slightly more natural assemblage in areas of slightly less impact away from human settlements. Water quality (when water is present as surface flows in the drainage lines) is expected to be poor and highly turbid, although the filtering effect of the alluvial substrate present in the channel beds may assist in the polishing of water quality to some degree. .</td></tr>
<tr><td>Extent of modification anticipated</td><td colspan="3">The access roads and points in the north-western part of the 2F alignment located some distance away from the drainage lines and are unlikely to directly (physically) impact the drainage lines. However due to the proximity of the accesses to the drainage lines or being located in their catchment indirect impacts are possible and mitigation measures stipulated in the report must be adhered to in the construction and development of the accesses.
The proposed deviation is proposed to cross four (4) drainage lines. No construction methodology relating to how these drainage lines may be crossed has been provided for assessment, but given the severe incision of the drainage line and steep slopes surrounding the drainage line located east of access point 2-16, open trenching may be difficult. Open trenching could be associated with mobilisation of large volumes of sediment and could potentially be associated with an exacerbating impact on the already highly degraded nature of the drainage lines.</td></tr>
<tr><td colspan="4">Impact Assessment Outcome & Business Case:</td></tr>
<tr><td>VERY LOW</td><td colspan="3">The application of the Zutari impact assessment methodology has assessed the level of impact significance posed by the development of the accesses to be low before mitigation and very low after mitigation measures. This is due to the location of the accesses away from the freshwater ecosystems, thus being highly unlikely to result in a direct impact. Nonetheless the importance of ensuring that mitigation measures are implemented and adhered to is not diminished.
The impact assessment has assessed the impact significance of the four pipeline deviation drainage line crossings to be of moderate impact significance prior to mitigation. Provided that a non-invasive method (ideally horizontal directional drilling) is implemented this impact significance can be reduced to an acceptable level.</td></tr>
</table>

5 LEGISLATIVE REQUIREMENTS

The following legislative requirements and relevant provincial guidelines were taken into consideration during the assessment. A detailed description of these legislative requirements is presented in Appendix B:

- Constitution of the Republic of South Africa, 1996[9];
- The National Environmental Management Act, 1998 (Act No. 107 of 1998) as amended;
- NEMA Environmental Impact Assessment Regulations, 2014, (GNR 982 in GG 38282 of 4 December 2014) as amended;
- The National Water Act, 1998 (Act No. 36 of 1998) as amended; and
- GN 4167 as published in GG 49833 of 08 December 2023 as it relates to the NWA.

5.1 Legislative Zones of Regulation

Certain articles of legislation related to the above Acts and legislation impose potential zones of regulation on freshwater ecosystems in both a national and provincial context. The ZoRs are not necessarily development exclusion zones, rather areas in which Environmental (EIA related) and WUA legislative tools have been introduced for the protection and sustainable use of freshwater resources by requiring that certain types of activities within a freshwater ecosystem, or within a certain distance of a freshwater ecosystem require authorisation. The definition and motivation for a regulated zone of activity for the protection of freshwater ecosystems can be summarised as follows:

Table 9: Articles of Legislation and the relevant zones of regulation applicable to each article.

Regulatory authorisation required	Zone of applicability
Listed activities in terms of the NEMA EIA Regulations, as amended[10]. **Department of Forestry, Fisheries and the Environment.**	**Activities of Listing Notice 1 (GN 327) of the NEMA EIA regulations (as amended):** **Activity 12** *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;*

[9] 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.

[10] Note – only listing notice activities that are associated with a zone of regulation are detailed in this table. This does not exclude the applicability of other potentially applicable activities that relate to the freshwater environment (e.g., Listing Notice 1 Activity 19) or any other applicable listing notice activity to the proposed development.

Regulatory authorisation required	Zone of applicability
	*c) if no development setback exists, within **32 metres of a watercourse**, measured from the edge of a watercourse.* ***Activity 48:*** *The expansion of—* *(i) infrastructure or structures where the physical footprint is expanded by 100 square metres or more; or* *(ii) dams or weirs, where the dam or weir, including infrastructure and water surface area, is expanded by 100 square metres or more;* *where such expansion 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;* **Activities of Listing Notice 3 (GN 324) of the NEMA EIA regulations (as amended) applicable to Limpopo, outside of urban areas.** ***Activity 14**:* *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—;* ***a) within a watercourse;*** *b) in front of a development setback;* *if no development setback exists, within **32 metres of a watercourse**, measured from the edge of a watercourse* *(f) Limpopo -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.* ***Activity 23:*** *The expansion of—* *(i) infrastructure or structures where the physical footprint is expanded by 10 square metres or more; or* *(ii) dams or weirs, where the dam or weir, including infrastructure and water surface area, is expanded by 10 square metres or more;* *where such expansion 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;* *(f) Limpopo -i. Outside urban areas:* *(ee) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.*

The applicable zones of regulation for the proposed development can be summarised as follows:

- 32 m Zone of Regulation (NEMA EIA Regulations).

The zones of regulation as stipulated above are depicted in Figure 13 below.

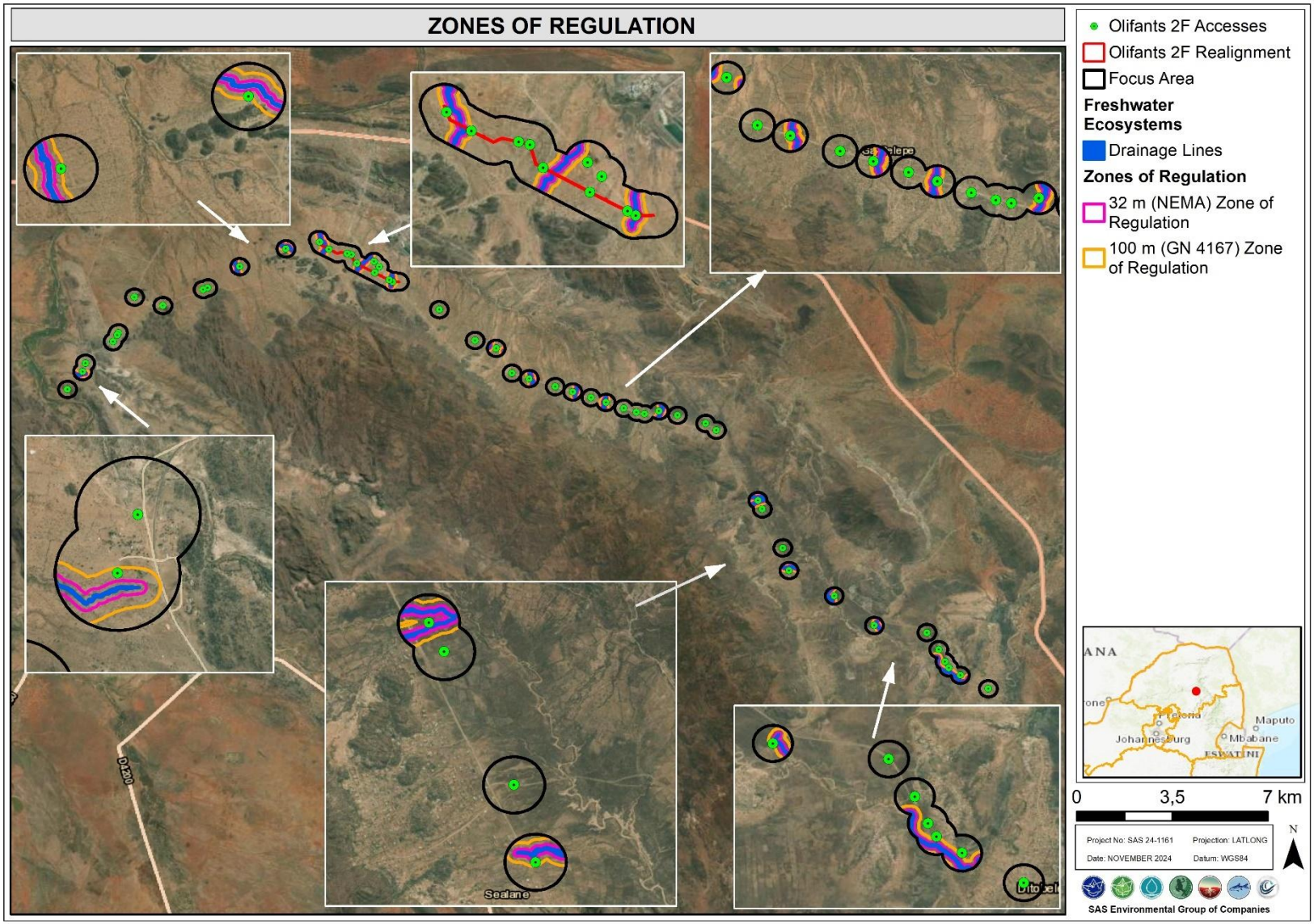


Figure 13: GN 4167 Freshwater-related Zones of Regulation associated with the focus area.

6 FRESHWATER SENSITIVITY VERIFICATION

The protocol for the assessment of freshwater and aquatic biodiversity prepared in support of the DFFE (previously the 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 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.

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 to be 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 screening tool allocation.

As part of the process of the background information gathering, the screening tool was applied to the wider 2F alignment. According to the screening tool, the wider alignment is located within an area of low aquatic/ freshwater biodiversity significance, (Figure 11).

Based on the site verification undertaken by SAS and the findings thereof presented in this report, the designation of low sensitivity to freshwater features in the wider area by the DFFE Screening Tool has been confirmed in part and disputed in part through the findings of the freshwater assessment:

- All freshwater ecosystems have been confirmed to be associated with high sensitivity and thus in these areas, the sensitivity designation is disputed; and
- The designation of low sensitivity to the remainder of the wider area is supported.

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. Such a reporting approach has accordingly been compiled.

Please refer to the site sensitivity verification report contained in Appendix E.

7 IMPACT ASSESSMENT

This section presents the significance of potential impacts on the ecology of the freshwater ecosystems utilising the Zutari Impact Assessment methodology. The methodology allows impacts to be assessed before and after application of mitigation measures and as such indicates the required mitigatory measures needed to minimise the perceived impacts.

7.1 Impact assessment analysis

7.1.1 Consideration of impacts and application of mitigation measures

The points below summarise the considerations taken when applying the Impact Assessment:

- The freshwater receptors as assessed using the impact rating methodology are the freshwater ecosystems located within the focus area and a predetermined radius of potential impact therein. It should be noted that no freshwater ecosystems have been identified within a sufficiently close radius to be impacted by the pipeline deviation alignment;
- No direct impacts to the freshwater ecosystems are anticipated, as although the exact alignment of access roads to be developed / upgraded has not been provided, an assessment of the likely access alignment has indicated that no drainage lines are likely to be traversed;
- All identified freshwater ecosystems in the focus area flow periodically in response to precipitation; thus it is strongly recommended that construction activities be scheduled for the dry season as much as practically possible, to ensure that indirect impacts (such as overland flow diversion and sedimentation of drainage systems) is minimised as much as possible;
- No decommissioning impacts have been assessed as it is deemed unlikely that access roads would be removed or that the pipeline as an entirety would be physically removed and the servitude completely rehabilitated;
- In applying the post mitigation assessment, it was assumed that the mitigation hierarchy as advocated by the DEA *et al.* (2013) would be followed, i.e. the impacts would first be avoided, minimised if avoidance is not feasible, rehabilitated as necessary and offset if required; and
- Most impacts are considered to be easily detectable, with the exception of potential contamination of surface and groundwater which will require some effort. Assessing these potential impacts falls outside of the scope of this freshwater ecosystem study.

7.2 Impact Assessment discussion of anticipated ecological impacts

There are four key ecological impacts on freshwater ecosystems that could occur as a result of the proposed development, namely,

- Loss of freshwater ecosystem habitat and ecological structure;
- Changes to the sociocultural and service provision;
- Impacts on the hydrology and sediment balance of the freshwater ecosystems; and
- Impacts on water quality.

Various activities and development aspects may lead to these impacts, however, provided that the mitigation hierarchy is followed, some impacts can be avoided or adequately minimised where avoidance is not feasible. The mitigation measures provided in this report have been developed with the mitigation hierarchy in mind, and the implementation and strict adherence to these measures will assist in minimising the significance of impacts on the receiving environment.

A summary of the Impact Assessment applied to the construction and operation of the Phase 2F infrastructure development, is provided in the table below.

Table 10: Summary of the results of the impact assessment matrix applied to the freshwater ecosystems associated with the construction and operation of the proposed project.

Impact	Pre-mitigation:						Recommended mitigation	Post-mitigation:					
	Duration	Extent	Intensity	Consequence	Probability	Significance		Duration	Extent	Intensity	Consequence	Probability	Significance
Construction of the pipeline deviation - potential sedimentation of downgradient drainage lines due to site clearing poor stockpile control related to pipeline excavation and poor stormwater management	Short-term	Local	Moderate negative	Slightly Detrimental	Fairly Likely	Low - negative	•It is imperative that construction occurs during the drier winter months when the lowest chance of rainfall and resultant stormwater will be present; •Vegetation clearing must be limited to the pipeline construction servitude and as much indigenous vegetation as possible must be retained (if applicable); •Implementation of construction-phase stormwater controls - e.g. use of silt curtains, berms etc., as part of a multi-phase Stormwater Management Plan (SWMP) for the development; •In order to prevent soil stockpiles from becoming unstable and producing extremely large volumes of silt that could be transported by stormwater, thereby creating excess siltation in downgradient freshwater ecosystems, stockpiles may not exceed a 2 m height and must be covered with a suitable geotextile (e.g. Geotextile or hessian sheeting). This measure will also prevent contamination by hydrocarbons/fuel and to prevent alien invasive encroachment until the excavation trench can be backfilled;	Short-term	Site-specific	Low Negative	Negligible	Unlikely	Very low - negative
Construction of the pipeline deviation - potential pollution of downgradient drainage lines due to poor cement mixing / batching practices and poor management of hazardous materials such as paint, hydrocarbons	Short-term	Local	Moderate negative	Slightly Detrimental	Unlikely	Very low - negative	•Mobile Machinery must be equipped with drip trays to prevent pollutant spillage on site; •Contractor laydown areas and equipment/material/vehicular storage are to remain at least 100 m outside of all delineated freshwater ecosystems and the precise location must be informed by an Environmental Control Officer in line with creating the least disturbance; •Storage of hazardous materials in a bunded contained space; •Immediate remediation of hazardous material spills. •Mixing of cement must only be undertaken within the construction camp and may not be mixed on bare soils; •Mixing of cement is also to be strictly undertaken within a lined, bound or bunded portable mixer. Ready mix concrete must preferably be used; •A batter board or other suitable platform/mixing tray is to be provided onto which any mixed concrete can be deposited whilst it awaits placing; •Cement bags must be disposed of in the demarcated hazardous waste receptacles; •Liquid cement spillage outside of the demarcated area must be promptly removed and taken to a suitably licenced waste disposal site.	Short-term	Site-specific	Low Negative	Negligible	Unlikely	Very low - negative

Impact	Pre-mitigation:						Recommended mitigation	Post-mitigation:					
	Duration	Extent	Intensity	Consequence	Probability	Significance		Duration	Extent	Intensity	Consequence	Probability	Significance
Construction of the pipeline deviation - potential sedimentation of downgradient drainage lines due to poorly executed reinstatement and rehabilitation that could lead to erosion of soils	Short-term	Local	Moderate negative	Slightly Detrimental	Fairly Likely	Low - negative	•The topsoil layer of the soil stockpile must be separated from the lower layers and protected from moisture loss and alien vegetation encroachment, using a geotextile such as hessian sheeting, for use during the rehabilitation phase of the river banks; •Backfilled soil must be suitably loosened on completion of construction activities and revegetated to prevent erosion;	Short-term	Site-specific	Low Negative	Negligible	Unlikely	Very low - negative
Construction of the pipeline deviation - direct impacts on riparian habitat related to crossings of four drainage lines that would further degrade the drainage lines through substrate disturbance related to open trenching	Short-term	Local	High negative	Moderately Detrimental	Very Likely	Moderate negative	•As the key mitigation measure related to the pipeline crossings of the four drainage lines, it is very strongly recommended that horizontal directional drilling be utilised as the pipeline construction method. This is due to the highly incised nature of certain of the drainage lines and the very steep valley slopes of the areas surrounding certain of the drainage lines which would render the risk of erosion, slumping of excavated substrate and thus sedimentation of the downgradient riparian area highly likely; •Should horizontal directional drilling not be technically feasible, a detailed pipeline crossing method statement for each of the four drainage line crossings that details mitigation measures and construction techniques must be compiled and be approved by a freshwater specialist; •A construction right of way must be established to which all construction activities (footprint) must be restricted; this construction right of way must be clearly demarcated; •Establish a formal construction waste control system that is properly controlled and enforced. •It is imperative that construction occurs during the drier winter months when the lowest chance of rainfall and resultant stormwater will be present.	Short-term	Site-specific	Low Negative	Negligible	Unlikely	Very low - negative

Impact	Pre-mitigation:						Recommended mitigation	Post-mitigation:					
	Duration	Extent	Intensity	Consequence	Probability	Significance		Duration	Extent	Intensity	Consequence	Probability	Significance
Access road construction - potential slumping of / dumping of construction waste and excavated material into downgradient drainage lines	Short-term	Local	Moderate negative	Slightly Detrimental	Fairly Likely	Low - negative	•A construction right of way must be established to which all construction activities (footprint) must be restricted; this construction right of way must be clearly demarcated; •Establish a formal construction waste control system that is properly controlled and enforced. •It is imperative that construction occurs during the drier winter months when the lowest chance of rainfall and resultant stormwater will be present; •Vegetation clearing must be limited to the access road construction servitude and as much indigenous vegetation as possible must be retained (where applicable); •Implementation of construction-phase stormwater controls - e.g. use of silt curtains, berms etc., as part of a multi-phase SWMP for the development; •Stockpiles may not exceed a 2 m height and must be covered with a suitable geotextile (e.g. Geotextile or hessian sheeting) to prevent contamination by hydrocarbons/fuel and to prevent alien invasive encroachment until the excavation trench can be backfilled; •All stockpiling of excavated / construction material must be located on the upgradient side of the road construction right of way and not on the downgradient side.	Short-term	Site-specific	Low Negative	Negligible	Unlikely	Very low - negative

Impact	Pre-mitigation:						Recommended mitigation	Post-mitigation:					
	Duration	Extent	Intensity	Consequence	Probability	Significance		Duration	Extent	Intensity	Consequence	Probability	Significance
Access road construction - potential pollution of downgradient drainage lines by sediment and other pollutants such as paint / bitumen and cement	Short-term	Local	Moderate negative	Slightly Detrimental	Fairly Likely	Low - negative	•Mobile Machinery must be equipped with drip trays to prevent pollutant spillage on site; •Contractor laydown areas and equipment/material/vehicular storage are to remain at least 100 m outside of all delineated freshwater ecosystems and the precise location must be informed by an Environmental Control Officer in line with creating the least disturbance; •Storage of hazardous materials in a bunded contained space; •Immediate remediation of hazardous material spills. •Mixing of cement must only be undertaken within the construction camp and may not be mixed on bare soils; •Mixing of cement is also to be strictly undertaken within a lined, bound or bunded portable mixer. Ready mix concrete must preferably be used; •A batter board or other suitable platform/mixing tray is to be provided onto which any mixed concrete can be deposited whilst it awaits placing; •A washout area[11] must be designated within the part of the development site that is located outside of a 100m buffer of the delineated riparian zone boundary; •Cement bags must be disposed of in the demarcated hazardous waste receptacles; •Liquid cement spillage outside of the demarcated area must be promptly removed and taken to a suitably licenced waste disposal site.	Short-term	Site-specific	Low Negative	Negligible	Unlikely	Very low – negative
Proliferation of AIPs in the construction footprint of all project components that could encroach into adjacent freshwater ecosystems	Long-term	Local	Moderate negative	Slightly detrimental	Fairly Likely	Low negative	•All existing and emergent alien invasive vegetation must be removed. All such material must be disposed of at a registered garden refuse site and may not be burned or mulched on site.	Short-term	Site-specific	Low Negative	Negligible	Unlikely	Very low – negative

[11] Concrete washouts are performed at the end of each workday to prevent concrete from hardening inside the trucks, wheelbarrows, and chutes that handle concrete. The area in which this is done is known as a washout area Usually, water is injected into chutes and tools to remove the concrete mixture, with the resulting mess being placed inside a special bin for disposal.

Impact	Pre-mitigation:						Recommended mitigation	Post-mitigation:					
	Duration	Extent	Intensity	Consequence	Probability	Significance		Duration	Extent	Intensity	Consequence	Probability	Significance
Operation -potential alteration of hydrology and geomorphology of adjacent / downgradient drainage lines due to poor operational stormwater management and rehabilitation and thus potential development of erosion in the pipeline deviation servitude	Long-term	Local	Moderate negative	Moderately detrimental	Fairly Likely	Low negative	•The use of stone pitching to reduce velocity of stormwater is strongly recommended; •Rehabilitation and revegetation must by timed to occur at the end of the dry season to limit the potential for sediment runoff during rehabilitation activities and to allow newly planted vegetation to be assisted by rainfall; and •Revegetation and protection of the soils in the pipeline servitude must occur, especially in sloping areas more prone to erosion. Hydroseeding may be required for this purpose; •It is strongly recommended that the reinstated areas be fenced or that a barricade of trimmed thorny branches be placed to prevent livestock from accessing these areas off for a period (at least 6 months) following reinstatement to prevent livestock from accessing the rehabilitated areas thereby allowing vegetation to become established.	Long-term	Site Specific	Low negative	Slightly detrimental	Unlikely	Very low – negative
Operation - potential alteration of the hydrology of downgradient drainage lines due to stormwater discharge from access roads	Long-term	Local	Low negative	Moderately detrimental	Fairly Likely	Low negative	•Design measures such as flow breakers to slow the velocity of stormwater must be included in the design of the road at the drainage line crossing point; •The principles of SUDs must be incorporated into stormwater discharge off the access roads; •Any developing erosion at stormwater discharge points must be immediately rehabilitated.	Long-term	Local	Low negative	Moderately detrimental	Unlikely	Low – Negative
Operation - potential pollution of downgradient drainage lines due to spills and other road / pipeline maintenance activities, such as emergency excavations which could result in sediment transport into downgradient areas	Long-term	Local	Low negative	Moderately detrimental	Unlikely	Low negative	•In the event of the need for emergency excavations, all construction-related mitigation measures must be implemented and adhered to; •An operational monitoring programme that checks for development of erosion within the pipeline servitude must be implemented and adhered to; •All vehicles and machinery involved in operational maintenance must be in good working order and must not be leaking. •All spills of potential pollutants on the road surface must be immediately remediated.	Long-term	Site Specific	Low negative	Slightly detrimental	Unlikely	Very Low – negative
Proliferation of AIPs and poor operational control of AIPs in the project footprint that could encroach into adjacent freshwater ecosystems	Long-term	Local	Moderate negative	Moderately detrimental	Fairly Likely	Low negative	AIP proliferation is likely to occur within the pipeline servitude and the road reserve of the access roads and as such AIP control must be regularly implemented throughout the operational phase as part of an Alien Plant Control Management Plan.	Long-term	Site Specific	Low negative	Slightly detrimental	Unlikely	Very Low – negative

All activities associated with the construction and operation of the proposed infrastructure have been assessed to be associated with a “low” or “very low” degree of impact significance to the freshwater environment after the application of mitigation measures. Key to this is the use of horizontal directional drilling for the four drainage line crossings related to the 2F alignment deviation. The use of horizontal directional drilling will prevent the need to directly undertake excavations and trenching within the riparian zones of the drainage lines and their immediate surrounds, which in the case of the drainage line located east of access 2-16 is characterised by very steep unconsolidated slopes. Although very limited intact riparian habitat remains to be physically modified, the combination of slope and unconsolidated substate renders the risk of slumping and erosion of large volumes of substate down the slope and into the drainage lines very high, which would represent an important impact of high significance on the reach and the downstream drainage system. If this method is deemed not technically feasible then a detailed crossing method statement for each crossing needs to be compiled and approved by a freshwater specialist.

The low impact significance associated with the construction of the proposed road accesses and the remainder of the pipeline deviation is a result of no proposed infrastructure footprint being located within any freshwater ecosystem that would result in direct impacts on the receiving freshwater environment, with only indirect impacts being likely. Such indirect impacts are able to be mitigated to a very low impact significance provided the suite of mitigation measures specified in this report are implemented and adhered to.

Assuming that strict enforcement of cogent, well-developed mitigation measures takes place, the significance of impacts arising from the development of the infrastructure are able to be minimised, assuming that a high level of mitigation takes place. Additional “good practice” mitigation measures applicable to a project of this nature are provided in Appendix H of this report.

7.3 Cumulative and Residual Impacts

Cumulative impacts: Freshwater ecosystems within the region are under continued threat due to a variety of factors including urban and mining expansion in the surrounding landscape, as well as due to poor landuse practices. In the context of the wider Phase 2F alignment freshwater ecosystems have been highly degraded where located within areas of peri-urban settlement. If the proposed development were to further impact freshwater ecosystems along the Phase 2F alignment in the focus area, this would result in a cumulative impact. However the risk of such an impact materialising has been assessed to be low, and very low after the

application of mitigation measures. In this context no cumulative impact is likely to result as a result of the proposed development.

Residual impacts arise from activities of which the effects persist long after the activity has ceased due to the self-perpetuating nature of such impacts (e.g. erosion). Residual impacts may cease with human remediation or when the trajectory of ecosystem imbalance caused by such an impact is complete. Residual impacts could also result from the change in runoff and interflow characteristics from the catchment of the drainage lines in the case of open excavations and disturbances associated with the pipeline deviation and accesses. However due to the ability to adequately mitigate impacts to acceptable levels such residual impacts are deemed unlikely to occur.

8 CONCLUSION AND RECOMMENDATIONS

SAS was appointed by the ZNJV to conduct a freshwater ecological assessment as part of the EA process in terms of the Environmental Impact Regulations of 2014 (as amended) for the OMMP-BRWSP: Proposed Phase 2F Re-alignment and associated infrastructure in the Sekhukhune District Municipality and within the Greater Tubatse Local Municipality in the Limpopo Province.

The assessment was conducted on various non-perennial drainage line located within the focus area. The results of the detailed assessment of freshwater ecosystems located in the focus area are summarised in the table below:

Table 11: Summary of results of the field assessment as discussed in Section 4.

Freshwater Ecosystem Grouping	Present Ecological State (PES) / Ecostatus	Ecoservices	Ecological Importance and Sensitivity (EIS)	Recommended Ecological Category / Recommended Management Objective / Best Attainable State
Drainage Lines associated with the proposed accesses 108,1-10 and 1-13 in the Motse River catchment	Riparian IHI PES Category: D	Low or Very Low	Low	REC Category: D BAS Category: D RMO: Maintain
Drainage Lines in the Rapholo River catchment in the central part of the 2D alignment associated with accesses 1-17, 2-6, 2-8 and 2-9	Riparian IHI PES Category: E	Low or Very Low	Low	REC Category: D BAS Category: E RMO: Maintain
Drainage lines located in the Rapholo River catchment in the north-western central part of the 2F alignment associated with the proposed pipeline deviation and accesses 2-13,and 2-22	Riparian IHI PES Category: E	Low or Very Low	Low	REC Category: D BAS Category: E RMO: Maintain

Following the freshwater ecosystem assessment, the ZNJV impact assessment matrix methodology was applied to determine the significance of impacts of the proposed development on the receiving freshwater environment.

All activities associated with the construction and operation of the proposed infrastructure have been assessed to be associated with a “low” or “very low” degree of impact significance to the freshwater environment. The low impact significance is a result of no proposed infrastructure footprint being located within any freshwater ecosystem that would result in direct impacts on the receiving freshwater environment, with only indirect impacts being likely. Such indirect impacts are able to be mitigated to a very low impact significance provided the suite of mitigation measures specified in this report are implemented and adhered to.

Freshwater Ecosystem Grouping	Present Ecological State (PES) / Ecostatus	Ecoservices	Ecological Importance and Sensitivity (EIS)	Recommended Ecological Category / Recommended Management Objective / Best Attainable State
Drainage Lines associated with the proposed accesses 108,1-10 and 1-13 in the Motse River catchment	Riparian IHI PES Category: D	Low or Very Low	Low	REC Category: D BAS Category: D RMO: Maintain
Drainage Lines in the Rapholo River catchment in the central part of the 2D alignment associated with accesses 1-17, 2-6, 2-8 and 2-9	Riparian IHI PES Category: E	Low or Very Low	Low	REC Category: D BAS Category: E RMO: Maintain
Drainage lines located in the Rapholo River catchment in the north-western central part of the 2F alignment associated with the proposed pipeline deviation and accesses 2-13,and 2-22	Riparian IHI PES Category: E	Low or Very Low	Low	REC Category: D BAS Category: E RMO: Maintain

Based on the proviso that all mitigation measures are implemented, it is the professional opinion of the freshwater ecologist that the proposed development can be granted environmental authorisation.

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APPENDIX A – Terms of Use and Indemnity

INDEMNITY AND TERMS OF USE OF THIS REPORT

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APPENDIX B – Legislation

LEGISLATIVE REQUIREMENTS

The Constitution of the Republic of South Africa, 1996	The environment and the health and well-being of people are safeguarded under the Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996) by way of section 24. Section 24(a) guarantees a right to an environment that is not harmful to human health or well-being and to environmental protection for the benefit of present and future generations. Section 24(b) directs the state to take reasonable legislative and other measures to prevent pollution, promote conservation, and secure the ecologically sustainable development and use of natural resources (including water and mineral resources) while promoting justifiable economic and social development. Section 27 guarantees every person the right of access to sufficient water, and the state is obliged to take reasonable legislative and other measures within its available resources to achieve the progressive realisation of this right. Section 27 is defined as a socio-economic right and not an environmental right. However, read with section 24 it requires of the state to ensure that water is conserved and protected and that sufficient access to the resource is provided. Water regulation in South Africa places a great emphasis on protecting the resource and on providing access to water for everyone.
National Environmental Management Act (Act No. 107 of 1998) (NEMA)	The National Environmental Management Act (NEMA) (Act 107 of 1998) and the associated Regulations as amended in 2017, states that prior to any development taking place within a wetland or riparian area, an environmental authorisation process needs to be followed. This could follow either the Basic Assessment Report (BAR) process or the Environmental Impact Assessment (EIA) process depending on the scale of the impact. Provincial regulations must also be considered.
National Environmental Management: Biodiversity Act (2004) (Act 10 of 2004) (NEMBA)	**Ecosystems that are threatened or in need of protection.** (1) (a) The Minister may, by notice in the Gazette, publish a national list of ecosystems that are threatened and in need of protection. *(b)* An MEC for environmental affairs in a province may, by notice in *the Gazette,* publish a provincial list of ecosystems in the province that are threatened and in need of protection. (2) The following categories of ecosystems may be listed in terms of subsection (1): *(a)* critically endangered ecosystems, being ecosystems that have undergone severe degradation of ecological structure, function or composition as a result of human intervention and are subject to an extremely high risk of irreversible transformation; *(b)* endangered ecosystems, being ecosystems that have undergone degradation of ecological structure, function or composition as a result of human intervention, although they are not critically endangered ecosystems; (c) vulnerable ecosystems, being ecosystems that have a high risk of undergoing significant degradation of ecological structure, function or composition as a result of human intervention, although they are not critically endangered ecosystems or endangered ecosystems; and *(d)* protected ecosystems, being ecosystems that are of high conservation value or of high national or provincial importance, although they are not listed in terms of paragraphs *(a), (b)* or (c).
The National Water Act 1998 (Act No. 36 of 1998) (NWA)	The National Water Act (NWA) (Act 36 of 1998) recognises that the entire ecosystem and not just the water itself in any given water resource constitutes the resource and as such needs to be conserved. No activity may therefore take place within a watercourse unless it is authorised by the Department of Water and Sanitation (DWS). Any area within a wetland or riparian zone is therefore excluded from development unless authorisation is obtained from the DWS in terms of Section 21 (c) & (i).
Government Notice 4167 as published in the Government Gazette 49833 of 08 December 2023 as it relates to the NWA (Act 36 of 1998) as amended	GN 4167 outlines the parameters and process of a General Authorisation (GA), which replaces the need to apply for a licence in terms of Section 40 of the NWA, provided that the water use is within the limits and conditions of the GA. The notice replaces GN 509 of 2016. The GA sets out the need to determine the regulated area of a watercourse, as well as the degree of risk posed by an activity/ies related to a particular water use. In accordance with GN 4167 of December 2023, the regulated area of a watercourse for section 21c and 21i of the NWA, 1998 is defined as: a) the outer edge of the 1 in 100-year flood line 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; b) in the absence of a determined 1 in 100-year flood line or riparian area the area within 100 m distance from the edge of a watercourse where the edge of the watercourse (excluding flood plains) is the first identifiable annual bank fill flood bench; or

	c) In respect of a wetland, a 500 m radius around the delineated boundary (extent) of any wetland, including pans. The GA only applies to the use of water in terms of Section 21(c) and (i) of the NWA where the risk class is LOW as determined through the application of the Risk Matrix as prescribed in the Notice. The GA also does not apply where other Section 21 water uses are triggered, does not apply for most sewage infrastructure and pipelines carrying hazardous materials, water uses associated with hazardous materials, water uses associated with water and wastewater treatment works, and for most mining-related water uses. The GA may be exercised as follows: i) Section 21(c) or (i) water use activities that are determined to pose a LOW Risk as determined through the application of the Risk Matrix as prescribed in the Notice can be undertaken subject to the general conditions of the GA; ii) Section 21(c) or (i) water use activities set out in Appendix D1 of the Notice can be undertaken without being subject to the requirement of a risk assessment and subject to the general conditions of the GA. Such water use activities in Appendix D1 include inter alia emergency river crossings, fence erection, solar renewable infrastructure that has no direct impact on watercourses and mini-scale hydropower developments; iii) Prescribed water use activities undertaken by certain State Owned Entities as detailed in Appendix D2 of the Notice can be undertaken without being subject to the requirement of a risk assessment and subject to the general conditions of the GA; iv) Maintenance work associated an existing lawful water use in terms of section 21(c) or (i) of the Act that has a LOW risk class as determined through the Risk Matrix can be undertaken ; v) River and stormwater management activities including maintenance of infrastructure as contained in a river management plan or similar management plan, may be conducted subject to the approval of such a plan by the relevant DWS regional office or catchment management agency; vi) Rehabilitation of wetlands or rivers where such rehabilitation activities has a LOW risk class as determined through the Risk Matrix can be conducted; and vii) Emergency work arising from an emergency situation and or incident associated with the persons' existing lawful water use entitlement can be undertaken, provided that all work is executed and reported in the manner prescribed in the Emergency protocol contained in Appendix C of the GA. A General Authorisation (GA) issued as per this notice will require the proponent to adhere with specific conditions, rehabilitation criteria and monitoring and reporting programme. Furthermore, the water user must ensure that there is a sufficient budget to complete, rehabilitate and maintain the water use as set out in this GA. Upon completion of the registration, the responsible authority will provide a certificate of registration to the water user within 30 working days of the submission. On written receipt of a registration certificate from the Department, the person will be regarded as a registered water user and can commence within the water use as contemplated in the GA.
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)	These Regulations were put in place in order to prevent the pollution of water resources and protect water resources in areas where mining activity is taking place from impacts generally associated with mining. It is recommended that the proposed project complies with Regulation GN 704 of the NWA which contains regulations on the use of water for mining and related activities aimed at the protection of water resources. GN 704 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.
Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA)	The obtaining of a New Order Mining Right (NOMR) is governed by the MPRDA. The MPRDA requires the applicant to apply to the DMR for a NOMR which triggers a process of compliance with the various applicable sections of the MPRDA. The NOMR process requires environmental authorisation in terms

	of the MPRDA Regulations and specifically requires the preparation of a Scoping Report, an EIA, an Environmental Management Programme (EMP), and a Public Participation Process (PPP).
Limpopo Environmental Management Act, 2003 (Act No. 7 of 2003) (LEMA)	The objectives of this Act are: ➢ to manage and protect the environment in the Province; ➢ to secure ecologically sustainable development and responsible use of natural resources in the Province; ➢ generally, to contribute to the progressive realisation of the fundamental rights contained in section 24 of the Constitution of the Republic of South Africa Act, 1996, and ➢ to give effect to international agreements affecting environmental management which are binding on the Province. This Act must be interpreted and applied in accordance with the national environmental management principles set out in Section 2 of the National Environmental Management Act, 1998 (Act No. 107 of 1998).

APPENDIX C – Method of Assessment

1. Desktop Study

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

1.1 National Freshwater Ecosystem Priority Areas (NFEPA, 2011)

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

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

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

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

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

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

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

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

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

Level 1: Inland systems

From the Classification System, Inland Systems are defined as aquatic ecosystems that have no existing connection to the ocean[12] (i.e. characterised by the complete absence of marine exchange and/or tidal influence) but which are inundated or saturated with water, either permanently or periodically. It is important to bear in mind, however, that certain Inland Systems may have had a historical connection to the ocean, which in some cases may have been relatively recent.

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

Level 2: Ecoregions & NFEPA Wetland Vegetation Groups

For Inland Systems, the regional spatial framework that has been included at Level 2 of the classification system is that of DWA's Level 1 Ecoregions for aquatic ecosystems (Kleynhans *et al.,* 2005). There is a total of 31 Ecoregions across South Africa, including Lesotho and Swaziland. DWA Ecoregions have most commonly been used to categorise the regional setting for national and regional water resource management applications, especially in relation to rivers.

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

Level 3: Landscape Setting

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

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

Level 4: Hydrogeomorphic Units

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

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

The above terms have been used for the primary HGM Units in the classification system to try and ensure consistency with the wetland classification terms currently in common usage in South Africa.

Similar terminology (but excluding categories for “channel”, “flat” and “valleyhead seep”) is used, for example, in the recently developed tools produced as part of the Wetland Management Series including WET-Health (Macfarlane *et al*., 2008), WET-IHI (DWAF, 2007) and WET-EcoServices (Kotze *et al*., 2009).

3. General Habitat Integrity

The general habitat integrity of each site was discussed based on the application of the Index of Habitat Integrity (Kleynhans *et al.* 2008). It is important to assess the habitat at each site in order to aid in the interpretation of the results of the community integrity assessments, by taking habitat conditions and impacts into consideration. This method describes the Present Ecological State (PES) of both the in-stream and riparian habitat at each site. The method classifies habitat integrity into one of six classes, ranging from unmodified/natural (Class A) to critically modified (Class F), as indicated in Table C8 below.

Table C3: Classification of Present State Classes in terms of Habitat Integrity [Kleynhans *et al.* 2008]

Class	Description	Score (% of total)
A	Unmodified, natural.	90 - 100
B	Largely natural with few modifications. The flow regime has been only slightly modified and pollution is limited to sediment. A small change in natural habitats may have taken place. However, the ecosystem functions are essentially unchanged.	80 - 89
C	Moderately modified. Loss and change of natural habitat and biota have occurred, but the basic ecosystem functions are still predominantly unchanged.	60 - 79
D	Largely modified. A large loss of natural habitat, biota and basic ecosystem functions has occurred.	40 – 59
E	Seriously modified. The loss of natural habitat, biota and basic ecosystem functions is extensive.	20 – 39
F	Critically / Extremely modified. Modifications have reached a critical level and the system has been modified completely with an almost complete loss of natural habitat and biota. In the worst instances, the basic ecosystem functions have been destroyed and the changes are irreversible.	0 - 19

4. Freshwater Ecosystem Function Assessment

“The importance of a water resource, in ecological social or economic terms, acts as a modifying or motivating determinant in the selection of the management class”.[13] The assessment of the ecosystem services supplied by the identified watercourses was conducted according to the guidelines as described by Kotze *et al.* (2009). An assessment was undertaken that examines and rates the following services according to their degree of importance and the degree to which the service is provided:

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

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

- Tourism and recreation; and
- Education and research.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

7. Freshwater ecosystem delineation

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

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

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

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

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

APPENDIX D – Impact Assessment Methodology

ENVIRONMENTAL IMPACT ASSESSMENT (EIA) METHODOLOGY

The Environmental Impact Assessment (EIA) Methodology assists in evaluating the overall effect of a
proposed activity on the environment. Determining of the significance of an environmental impact on
an environmental parameter is determined through a systematic analysis.

METHODOLOGY USED IN DETERMINING THE SIGNIFICANCE OF ENVIRONMENTAL IMPACTS

This section briefly outlines the proposed method for assessing the significance of the potential environmental and socio-economic impacts identified during the construction, operational and decommissioning phase.

For each predicted impact, criteria are applied to establish the significance of the impact based on likelihood (probability) and consequence, firstly in the case of no mitigation and then with the most effective mitigation measure(s) in place.

The criteria that contribute to the consequence of the impact are **INTENSITY** (the degree to which pre-development conditions are changed); the **DURATION** (length of time that the impact will continue); and the **EXTENT** (spatial scale) of the impact. The sensitivity of the receiving environment and/or sensitive receptors is incorporated into the consideration of consequence by appropriately adjusting the thresholds or scales of the intensity, duration and extent criteria, based on expert knowledge. For each impact, the specialist applies professional judgement to ascribe a numerical rating for each criterion according to the ratings provided. The consequence is then established using the formula:

Consequence = intensity x (duration + extent)

Depending on the numerical result of this calculation, the impact's consequence would be classified as one of the following:

- Extremely; highly; moderately; slightly detrimental;
- Negligible; or
- Slightly, moderately, highly or extremely beneficial.

To determine the significance of an impact, the probability (or likelihood) of that impact occurring is also taken into account. In assigning probability, the specialist must take into account the likelihood of occurrence and the degree of uncertainty and detectability of the impact. Significance is calculated according to the following formula:

Significance = consequence x probability

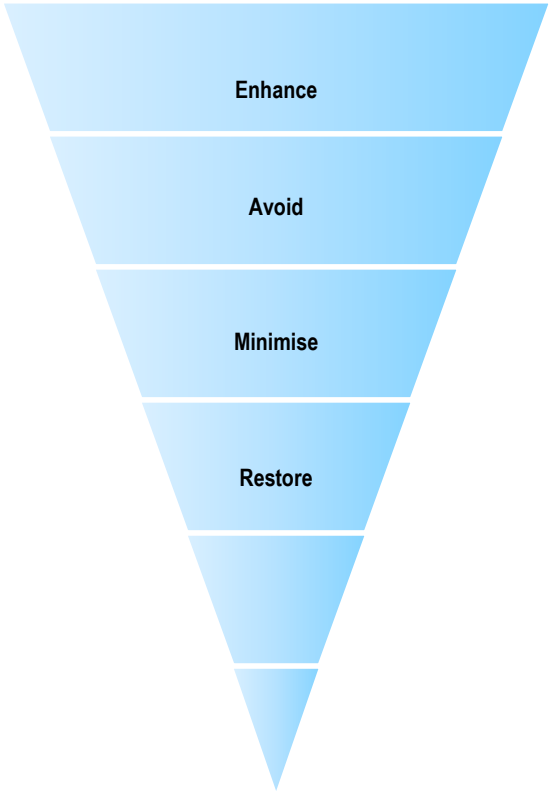
Depending on the numerical result of this calculation, the impact would fall into a significance category of one of the following:

- Very Low;
- Low (negative or positive);
- Moderate (negative or positive);
- High (negative or positive);
- Very High (negative or positive).

METHODOLOGY FOR IDENTIFICATION OF MITIGATION MEASURES

The mitigation hierarchy (Figure D1) illustrates the actions which can be undertaken to respond to negative impacts and the preference give to mitigation measures. The topmost measures are preferred, and the preference for mitigation measures decreases the further one moves down the hierarchy.

For each impact assessed, mitigation measures will be proposed to reduce and/ or avoid negative impacts and enhance positive impacts. The mitigation measures identified by the specialists will be reviewed for feasibility with the proponent and then incorporated into the Environmental Management Programme (EMPr) during the EIA Phase to ensure that they are implemented throughout the lifecycle of the proposed project. The EMPr would become a legally binding document should this project receive an Environmental Authorisation.



Impact avoidance: This step is most effective when applied at an early stage of project planning. It can be achieved by:

- Not undertaking certain projects or elements that could result in adverse impacts;
- Avoiding areas that are environmentally sensitive; and
- Putting in place preventative measures to stop adverse impacts from occurring.

Impact minimisation: This step is usually taken during impact identification and prediction to limit or reduce the degree, extent, magnitude, or duration of adverse impacts. It can be achieved by:

- Scaling down or relocating the proposal;
- Redesigning elements of the project; and
- Taking supplementary measures to manage the impacts.

Impact compensation: This step is usually applied to remedy unavoidable residual adverse impacts. It can be achieved by:

- Example, by habitat enhancement;
- Restoration of the affected site or environment to its previous state or better; and
- Replacement of the same resource values at another location (off-set), for example, by wetland engineering to provide

The mitigation described in the above diagram represents the full range of plausible and pragmatic measures that can be implemented.

APPENDIX E – Results of Field Investigation

PRESENT ECOLOGICAL STATE (PES), ECOSERVICE PROVISION AND ECOLOGICAL IMPORTANCE AND SENSITIVITY (EIS) RESULTS

Table E1: Presentation of the results of the riparian PES assessment applied to the non-perennial drainage lines in the Motse River catchment in the south-eastern part of the wider 2F alignment

RIPARIAN IHI	
Base Flows	-3.0
Zero Flows	-1.0
Moderate Floods	3.0
Large Floods	1.5
HYDROLOGY RATING	**2.2**
Substrate Exposure (marginal)	3.5
Substrate Exposure (non-marginal)	3.5
Invasive Alien Vegetation (marginal)	0.0
Invasive Alien Vegetation (non-marginal)	0.5
Erosion (marginal)	3.0
Erosion (non-marginal)	3.0
Physico-Chemical (marginal)	3.5
Physico-Chemical (non-marginal)	2.0
Marginal	3.5
Non-marginal	3.5
BANK STRUCTURE RATING	**3.5**
Longitudinal Connectivity	2.0
Lateral Connectivity	2.0
CONNECTIVITY RATING	**2.0**
RIPARIAN IHI %	**45.1**
RIPARIAN IHI EC	**D**
RIPARIAN CONFIDENCE	**2.8**

Table E2 Presentation of the results of the riparian PES assessment applied to the non-perennial drainage lines in the upper part of the Rapholo River catchment

RIPARIAN IHI	
Base Flows	-1.5
Zero Flows	-1.0
Moderate Floods	3.5
Large Floods	2.0
HYDROLOGY RATING	**2.2**
Substrate Exposure (marginal)	4.0
Substrate Exposure (non-marginal)	4.5
Invasive Alien Vegetation (marginal)	1.5
Invasive Alien Vegetation (non-marginal)	0.5
Erosion (marginal)	3.0
Erosion (non-marginal)	3.5
Physico-Chemical (marginal)	3.0
Physico-Chemical (non-marginal)	2.0
Marginal	4.0
Non-marginal	4.5
BANK STRUCTURE RATING	**4.3**
Longitudinal Connectivity	3.0
Lateral Connectivity	3.0
CONNECTIVITY RATING	**3.0**
RIPARIAN IHI %	**33.2**
RIPARIAN IHI EC	**E**
RIPARIAN CONFIDENCE	**2.8**

Table E3 Presentation of the results of the riparian PES assessment applied to the non-perennial drainage lines in the lower part of the Rapholo River catchment (including the proposed 2F deviation)

RIPARIAN IHI	
Base Flows	-1.5
Zero Flows	-1.0
Moderate Floods	3.0
Large Floods	1.5
HYDROLOGY RATING	**1.9**
Substrate Exposure (marginal)	4.0
Substrate Exposure (non-marginal)	4.5
Invasive Alien Vegetation (marginal)	1.5
Invasive Alien Vegetation (non-marginal)	0.5
Erosion (marginal)	3.0
Erosion (non-marginal)	4.5
Physico-Chemical (marginal)	2.0
Physico-Chemical (non-marginal)	2.0
Marginal	4.0
Non-marginal	4.5
BANK STRUCTURE RATING	**4.3**
Longitudinal Connectivity	4.0
Lateral Connectivity	3.0
CONNECTIVITY RATING	**3.6**
RIPARIAN IHI %	**32.6**
RIPARIAN IHI EC	**E**
RIPARIAN CONFIDENCE	**2.8**

Table E4: Presentation of the results of the Ecoservices assessment applied to the non-perennial drainage lines in the Motse River catchment in the south-eastern part of the wider 2F alignment

	ECOSYSTEM SERVICE	Supply	Demand	Importance Score	Importance
REGULATING AND SUPPORTING SERVICES	Flood attenuation	0.7	1.7	0.1	Very Low
	Stream flow regulation	-	-	#VALUE!	#VALUE!
	Sediment trapping	0.5	4.0	1.0	Low
	Erosion control	0.3	2.3	0.0	Very Low
	Phosphate assimilation	0.6	3.0	0.6	Very Low
	Nitrate assimilation	0.7	3.0	0.7	Very Low
	Toxicant assimilation	0.6	3.0	0.6	Very Low
	Carbon storage	0.0	2.7	0.0	Very Low
	Biodiversity maintenance	0.0	0.0	0.0	Very Low
PROVISIONING SERVICES	Water for human use	0.0	0.0	0.0	Very Low
	Harvestable resources	1.0	1.3	0.2	Very Low
	Food for livestock	0.0	1.0	0.0	Very Low
	Cultivated foods	2.5	0.0	1.0	Low
CULTURAL SERVICES	Tourism and Recreation	0.0	0.0	0.0	Very Low
	Education and Research	0.0	0.0	0.0	Very Low
	Cultural and Spiritual	2.0	0.0	0.5	Very Low

Table E5: Presentation of the results of the Ecoservices assessment applied to the non-perennial drainage lines in the upper part of the Rapholo River catchment

		Present State			
ECOSYSTEM SERVICE		Supply	Demand	Importance Score	Importance
REGULATING AND SUPPORTING SERVICES	Flood attenuation	1.0	1.8	0.4	Very Low
	Stream flow regulation	-	-	#VALUE!	#VALUE!
	Sediment trapping	0.4	4.0	0.9	Low
	Erosion control	0.3	2.3	0.0	Very Low
	Phosphate assimilation	0.4	3.0	0.4	Very Low
	Nitrate assimilation	0.5	3.0	0.5	Very Low
	Toxicant assimilation	0.5	3.0	0.5	Very Low
	Carbon storage	0.3	2.7	0.2	Very Low
	Biodiversity maintenance	0.0	0.0	0.0	Very Low
PROVISIONING SERVICES	Water for human use	0.0	0.0	0.0	Very Low
	Harvestable resources	0.5	1.3	0.0	Very Low
	Food for livestock	0.0	1.0	0.0	Very Low
	Cultivated foods	2.5	0.0	1.0	Low
CULTURAL SERVICES	Tourism and Recreation	0.0	0.0	0.0	Very Low
	Education and Research	0.0	0.0	0.0	Very Low
	Cultural and Spiritual	2.0	0.0	0.5	Very Low

Table E6: Presentation of the results of the Ecoservices assessment applied to the non-perennial drainage lines in the lower part of the Rapholo River catchment, including the proposed deviation

ECOSYSTEM SERVICE		Supply	Demand	Importance Score	Importance
REGULATING AND SUPPORTING SERVICES	Flood attenuation	0.5	1.8	0.0	Very Low
	Stream flow regulation	-	-	#VALUE!	#VALUE!
	Sediment trapping	0.3	4.0	0.8	Very Low
	Erosion control	0.0	2.3	0.0	Very Low
	Phosphate assimilation	0.3	3.0	0.3	Very Low
	Nitrate assimilation	0.3	3.0	0.3	Very Low
	Toxicant assimilation	0.3	3.0	0.3	Very Low
	Carbon storage	0.0	2.7	0.0	Very Low
	Biodiversity maintenance	0.7	0.0	0.0	Very Low
PROVISIONING SERVICES	Water for human use	0.0	0.0	0.0	Very Low
	Harvestable resources	0.5	1.3	0.0	Very Low
	Food for livestock	0.0	1.0	0.0	Very Low
	Cultivated foods	2.5	0.0	1.0	Low
CULTURAL SERVICES	Tourism and Recreation	0.0	0.0	0.0	Very Low
	Education and Research	0.0	0.0	0.0	Very Low
	Cultural and Spiritual	2.0	0.0	0.5	Very Low

Table E7: Presentation of the results of the EIS for the wetlands in the focus area

Ecological Importance and Sensitivity			Motse River catchment	Rapholo River catchment (upper)	Rapholo River catchment (lower)
			Score (0-4)	Score (0-4)	Score (0-4)
Biodiversity support			A (average)	A (average)	A (average)
			1.17	0.83	1.17
Presence of Red Data species			2	1	2
Populations of unique species			0.5	0.5	0.5
Migration/breeding/feeding sites			1	1	1
Landscape scale			B (average)	B (average)	B (average)
			1.4	1.3	1.3
Protection status of the wetland			0	0	0
Protection status of the vegetation type			5	5	5
Regional context of the ecological integrity			1	0.5	0.5
Size and rarity of the wetland type/s present			0.5	0.5	0.5
Diversity of habitat types			0.5	0.5	0.5
Sensitivity of the wetland			C (average)	C (average)	C (average)
			0.33	0.33	0.33
Sensitivity to changes in floods			0.5	0.5	0.5
Sensitivity to changes in low flows/dry season			0.5	0.5	0.5
Sensitivity to changes in water quality			0	0	0
Hydro-Functional Importance			Score (0-4)	Score (0-4)	Score (0-4)
Regulating & supporting benefits	**Flood attenuation**		0	0	0
	Streamflow regulation		1	0.5	0.5
	Water Quality Enhancement	1	1	1.5	1.5
		0.5	0.5	0.5	0.5
		0.5	0.5	0.5	0.5
		0.5	0.5	0.5	0.5
		0	0	0	0
	Carbon storage		0	0	0
Direct Human Benefits			Score (0-4)	Score (0-4)	Score (0-4)
Subsistence benefits	***Water for human use***		0	0	0
	Harvestable resources		0	0	0
	Cultivated foods		0	0	0
Cultural benefits	***Cultural heritage***		0	0	0
	Tourism and recreation		0	0	0
	Education and research		0	0	0

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APPENDIX F – Site Sensitivity Verification

FRESHWATER ECOSYSTEM SITE SENSITIVITY VERIFICATION REPORT FOR THE OLIFANTS MANAGEMENT MODEL PROGRAMME BULK RAW WATER STUDY PHASE (OMMP-BRWSP) – PHASE 2F, LIMPOPO PROVINCE.

Introduction

According to the "Protocols for the Assessment and Minimum Criteria for Reporting on identified Environmental Themes ("the Protocols") published in Government Gazette No. 43110 on 20 March 2020 and Government Gazette No. 43855 on 30 October 2020, the Environmental Assessment Practitioner (EAP) must verify the current use of the site in question and its environmental sensitivity as identified by the Screening Tool to determine the need for specialist inputs in relation to the themes included in the Protocols. The Protocols are allowed for in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998 (Act No. 107 of 1998) as amended ("NEMA"). The Protocols must be complied with for every new application for Environmental Authorisation that is submitted after 9 May 2020.

This document serves as the Aquatic Biodiversity (Freshwater) Site Sensitivity Verification Report for the proposed the Olifants Management Model Programme Bulk Raw Water Study Phase (OMMP-BRWSP): Proposed Phase 2F Re-alignment and associated infrastructure in the Sekhukhune District Municipality and within the Greater Tubatse Local Municipality in the Limpopo Province. Several listed activities outlined in the Listing Notice 1 and Listing Notice 3 of the EIA Regulations are expected to be triggered by the construction of the newly proposed infrastructure of Phase 2F, along with the associated access and internal roads. The proposed access points and the proposed pipeline as the elements being investigated deviation along with a 300m radius around these features are known as the "focus area".

Area of assessment

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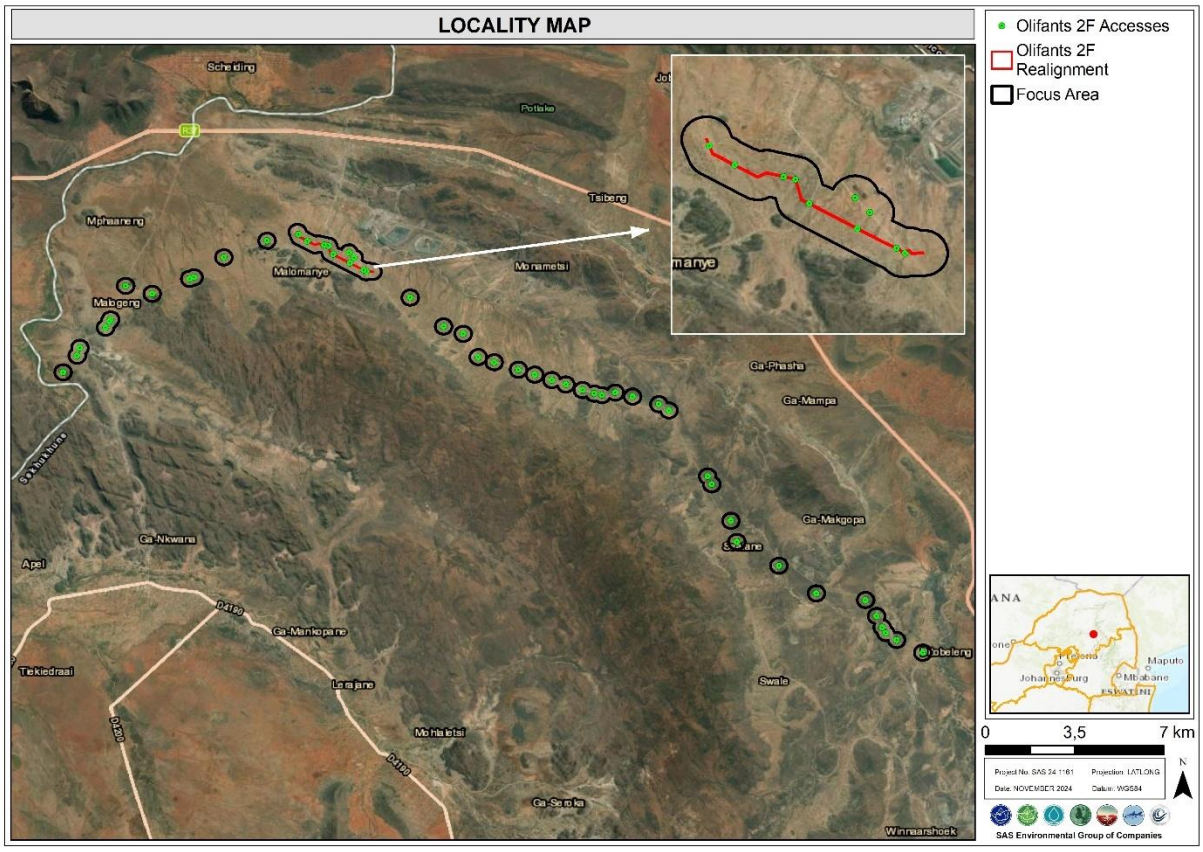

Figure F1: Digital satellite image depicting the location of the focus area within the 2F alignment in relation to the surrounding area.

This Freshwater Ecosystem site sensitivity verification report relates to a Screening Tool Report (STR) completed for the study area.

Site Verification Methodology

Site visits were conducted by the specialist to inform the specialist reports required for the proposed project.

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Aquatic Biodiversity Site Verification

The table below provides information regarding the outcome of the Screening Tool in terms of the aquatic biodiversity theme sensitivity associated with the proposed project as well as a brief summary of the outcome of the freshwater ecosystem specialist report in response.

Table I1: Aquatic Biodiversity Theme Sensitivity analysis for the proposed project.

Environmental Theme	Applicable Protocol	Response
Aquatic Biodiversity Sensitivity Rating: According to the screening tool, the focus area and wider 2F alignment are designated as areas of **low** aquatic biodiversity (freshwater) sensitivity. Requiring a Freshwater Compliance Assessment. **Actual Sensitivity: the designation of low freshwater sensitivity to the entirety of the focus area is partly disputed, as all freshwater ecosystems in the focus area have been confirmed to have a high level of sensitivity. However for the remainder of the study and investigation areas, the designation of low sensitivity is supported.**	3(b) Protocol for the assessment and reporting of environmental impacts on aquatic biodiversity (GG 45421 of 10/05/2019)	A freshwater ecosystem assessment was conducted by Scientific Aquatic Services (SAS, 2024). During the assessment it was determined that the drainage lines are high sensitivity features. A detailed study was required to support the authorisation process required in terms of the NEMA EIA Regulations as amended.

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Photographs of Confirmed areas of Freshwater *High* Sensitivity in the focus area:

Figure F2: Drainage line in the focus area close to access point 1-10

Figure F3: Drainage line in the focus area close to access point 1-13

Figure F4: Drainage line in the focus area close to access point 1-17

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Figure F5: Drainage line in the focus area close to access point 2-06

Figure F6: Drainage line in the focus area close to access point 2-08

Figure F7: Drainage line in the focus area close to access point 2-09

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Figure F8: Drainage line in the focus area close to access point 2-13 and crossed by the proposed deviation

Figure F6: Drainage line in the focus area east of access point 2-16 and crossed by the proposed deviation

Figure F7:Drainage line in the focus area close to access point 2-19 and as crossed by the proposed pipeline

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Figure F8:Drainage line in the focus area close to access point 2-22

Photographs of Confirmed areas of Freshwater *Low* Sensitivity in the study area:

Figure F9: Example of terrestrial non-freshwater habitat (*Dichrostachys cinerea* thickets) near access point 1-17

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Figure F10: Example of highly degraded area in the catchment of one of the drainage lines along the proposed deviation

APPENDIX G – General "Good Housekeeping" Mitigation Measures

General construction management and good housekeeping practices

Latent and general impacts which may affect the freshwater ecology and biodiversity, will include any activities which take place in close proximity to the proposed development that may impact on the receiving environment. Mitigation measures for these impacts are highlighted below and are relevant to the watercourse identified in this report:

Development footprint

- All development footprint areas must remain as small as possible and must not encroach into the freshwater areas unless absolutely essential and part of the proposed development. It must be ensured that the freshwater habitat is off-limits to construction vehicles and non-essential personnel;
- The boundaries of footprint areas, including contractor laydown areas, must be clearly defined and all activities must remain within defined footprint areas. Edge effects will need to be extremely carefully controlled;
- Planning of temporary roads and access routes must avoid freshwater ecosystems and be restricted to existing roads where possible;
- Appropriate sanitary facilities must be provided for the life of the construction phase and all waste removed to an appropriate waste facility;
- All hazardous chemicals as well as stockpiles must be stored on bunded surfaces and have facilities constructed to control runoff from these areas;
- All hazardous storage containers and storage areas must comply with the relevant SABS standards to prevent leakage;
- No fires must be permitted in or near the construction area; and
- Ensuring that an adequate number of waste and "spill" bins are provided will also prevent litter and ensure the proper disposal of waste and spills.

Vehicle access

- All vehicles must be regularly inspected for leaks. Re-fuelling must take place offsite on a sealed surface area to prevent ingress of hydrocarbons into the topsoil;
- In the event of a vehicle breakdown, maintenance of vehicles must take place with care and spillage must be p prevented near the surface area to prevent ingress of hydrocarbons into topsoil and subsequent habitat loss; and
- All spills should they occur, should be immediately cleaned up and treated accordingly. Contaminated soil must be bagged and disposed of in hazardous waste receptacles.

Vegetation

- Removal of the alien and weed species encountered within the wetlands must take place in order to comply with existing legislation (amendments to the regulations under the Conservation of Agricultural Resources Act, 1983 and Section 28 of the National Environmental Management Act, 1998). Removal of species should take place throughout the construction, operational, and maintenance phases; and
- Species specific and area specific eradication recommendations:
  - Care should be taken with the choice of herbicide to ensure that no additional impact and loss of indigenous plant species occurs due to the herbicide used;
  - Footprint areas must be kept as small as possible when removing alien plant species; and

- No vehicles must be allowed to drive through designated sensitive watercourse areas during the eradication of alien and weed species.

Soil

- Sheet runoff from access roads and the walk ways must be slowed down by the strategic placement of berms;
- As far as possible, all construction activities must occur in the low flow season, during the drier winter months;
- As much vegetation growth as possible (of indigenous floral species) should be encouraged to protect soil;
- No stockpiling of topsoil must take place within close proximity to the watercourse, and all stockpiles must be protected with a suitable geotextile to prevent sedimentation of the watercourse;
- All soil compacted as a result of construction activities as well as ongoing operational activities falling outside of project footprint areas must be ripped and profiled; and
- A monitoring plan for the development and the immediate zone of influence must be implemented to prevent erosion and incision.

Rehabilitation

- Construction rubble must be collected and disposed of at a suitable landfill site;
- All alien vegetation in the footprint area as well as immediate vicinity of the proposed development must be removed. Alien vegetation control must take place for a minimum period of two growing seasons after rehabilitation is completed; and
- Side slope and embankment vegetation cover must be monitored to ensure that sufficient vegetation is present to bind these soils and prevent further erosion.

APPENDIX H – Specialist information

DETAILS, EXPERTISE AND CURRICULUM VITAE OF SPECIALISTS

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

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

Stephen van Staden MSc (Environmental Management) (University of Johannesburg)

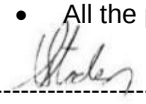
1. (a). (ii) The expertise of that specialist to compile a specialist report including a curriculum vitae

Company of Specialist:	Scientific Aquatic Services		
Name / Contact person:	Stephen van Staden		
Physical address:	29 Arterial Road West, Oriel		
Postal code:	2007	Cell:	083 415 2356
Telephone:	011 616 7893	Fax:	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.

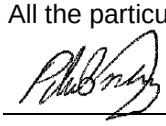


Signature of the Specialist

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

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.

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

I, Kristen Coertze, 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

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 KRISTEN COERTZE

PERSONAL DETAILS

Position in Company	Freshwater Ecologist
Joined SAS Environmental Group of Companies	2021

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Professional Scientist at South African Council for Natural Scientific Professions (Registration no 146386)
Member of the Gauteng Wetland Forum
Member of the Grassland Society of Southern Africa
Member of the South African Wetland Society
Golden Key Honorary Society

EDUCATION

Qualifications

MSc Botany (University of the Free State)	2023
BSc (Hons) Environmental Science (University of the Free State)	2019
BSc Geography and Environmental Science (University of the Free State)	2018

AREAS OF WORK EXPERIENCE

South Africa – Free State, Western Cape, Northern Cape, North West, Gauteng, Mpumalanga, Limpopo Provinces.
Central Africa – Democratic Republic of Congo.

DEVELOPMENT SECTORS OF EXPERIENCE

1. Linear developments (energy transmission, telecommunication, pipelines, roads)
2. Renewable energy (wind and solar)
3. Commercial development
4. Residential development
5. Industrial/chemical
6. Mining: Cole, chrome Platinum Group Metals (PGMs)
7. Agriculture

KEY SPECIALIST DISCIPLINES

Freshwater Assessments

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

Legislative Requirements, Processes and Assessments

- Water Use Applications (Water Use License Applications / General Authorisations)

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); USA

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

KEY SPECIALIST DISCIPLINES

Legislative Requirements, Processes and Assessments

- EIA / BA Applications
- Environmental Authorisation Amendments
- EMPr Compilation
- Environmental Compliance Monitoring (Environmental Auditing)
- Environmental Screening Assessments and Listing Notice 3 Trigger Identification / Mapping
- Strategic Environmental Assessments and Environmental Management Frameworks
- EIA / Specialist Study Peer Review

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 Assessments in support of Environmental Screening Assessments, Precinct Planning & SEA
- Wetland Construction (Compliance) Monitoring

Biodiversity Assessments

- Avifaunal Assessments
- Strategic Biodiversity Assessment

Visual Impact Assessment

- Visual Impact Assessments

GIS / Spatial Analysis

- GIS Spatial Analysis and Listing Notice 3 mapping.

forestry, fisheries
& the environment

Department:
Forestry, Fisheries and the Environment
REPUBLIC OF SOUTH AFRICA

Private Bag X447, Pretoria, 0001, Environment House, 473 Steve Biko Road, Pretoria, 0002 Tel: +27 12 399 9000, Fax: +27 86 625 1042

SPECIALIST DECLARATION FORM – AUGUST 2023

Specialist Declaration form for assessments undertaken for application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

REPORT TITLE

OLIFANTS MANAGEMENT MODEL PROGRAMME BULK RAW WATER STUDY PHASE (OMMP-BRWSP): PROPOSED PHASE 2F PIPELINE RE-ALIGNMENT AND ASSOCIATED INFRASTRUCTURE, IN THE FETAKGOMO TUBATSE AND LEPELLE NKUMPI LOCAL MUNICIPALITIES, WITHIN THE CAPRICORN AND GREATER SEKHUKHUNE DISTRICT MUNICIPALITIES, IN THE LIMPOPO PROVINCE.

Kindly note the following:

1. This form must always be used for assessment that are in support of applications that must be subjected to Basic Assessment or Scoping & Environmental Impact Reporting, where this Department is the Competent Authority.
2. This form is current as of August 2023. It is the responsibility of the Applicant / Environmental Assessment Practitioner (EAP) to ascertain whether subsequent versions of the form have been published or produced by the Competent Authority. The latest available Departmental templates are available at https://www.dffe.gov.za/documents/forms.
3. An electronic copy of the signed declaration form must be appended to all Draft and Final Reports submitted to the department for consideration.
4. The specialist must be aware of and comply with '*the Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the act, when applying for environmental authorisation - GN 320/2020)*', where applicable.

1. SPECIALIST INFORMATION

Title of Specialist Assessment	Freshwater Assessment
Specialist Company Name	Scientific Aquatic Services (Ltd) Pty
Specialist Name	Paul Da Cruz
Specialist Identity Number	7606225098083
Specialist Qualifications:	BA (Hons) (Geography and Environmental Studies) & BA (Geography)
Professional affiliation/registration:	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).
Physical address:	29 Arterial Road West, Oriel, Bedfordview, 2007
Postal address:	29 Arterial Road West, Oriel, Bedfordview, 2007
Postal address	29 Arterial Road West, Oriel, Bedfordview, 2007
Telephone	011 616 7893
Cell phone	+27 84 224 0088
E-mail	paul@sasenvgroup.co.za

2. DECLARATION BY THE SPECIALIST

I, Paul Da Cruz declare that –

- I act as the independent specialist in this application;
- I am aware of the procedures and requirements for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act (NEMA), 1998, as amended, when applying for environmental authorisation which were promulgated in Government Notice No. 320 of 20 March 2020 (i.e. "the Protocols") and in Government Notice No. 1150 of 30 October 2020.
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing –
    - any decision to be taken with respect to the application by the competent authority; and;
    - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 48 and is punishable in terms of section 24F of the NEMA Act.

Signature of the Specialist

Scientific Aquatic Services (Ltd) Pty

Name of Company:

17 Jun 2025

Date

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, _ Paul Da Cruz _____, swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

Signature of the Specialist

Scientific Aquatic Services (Ltd) Pty

Name of Company

17 June 2025

Date

Signature of the Commissioner of Oaths

2025-06-17

Date

SOUTH AFRICAN POLICE SERVICE
COMMUNITY SERVICE CENTRE/B SHIFT
2025 -06- 17
BEDFORDVIEW
SOUTH AFRICAN POLICE SERVICE