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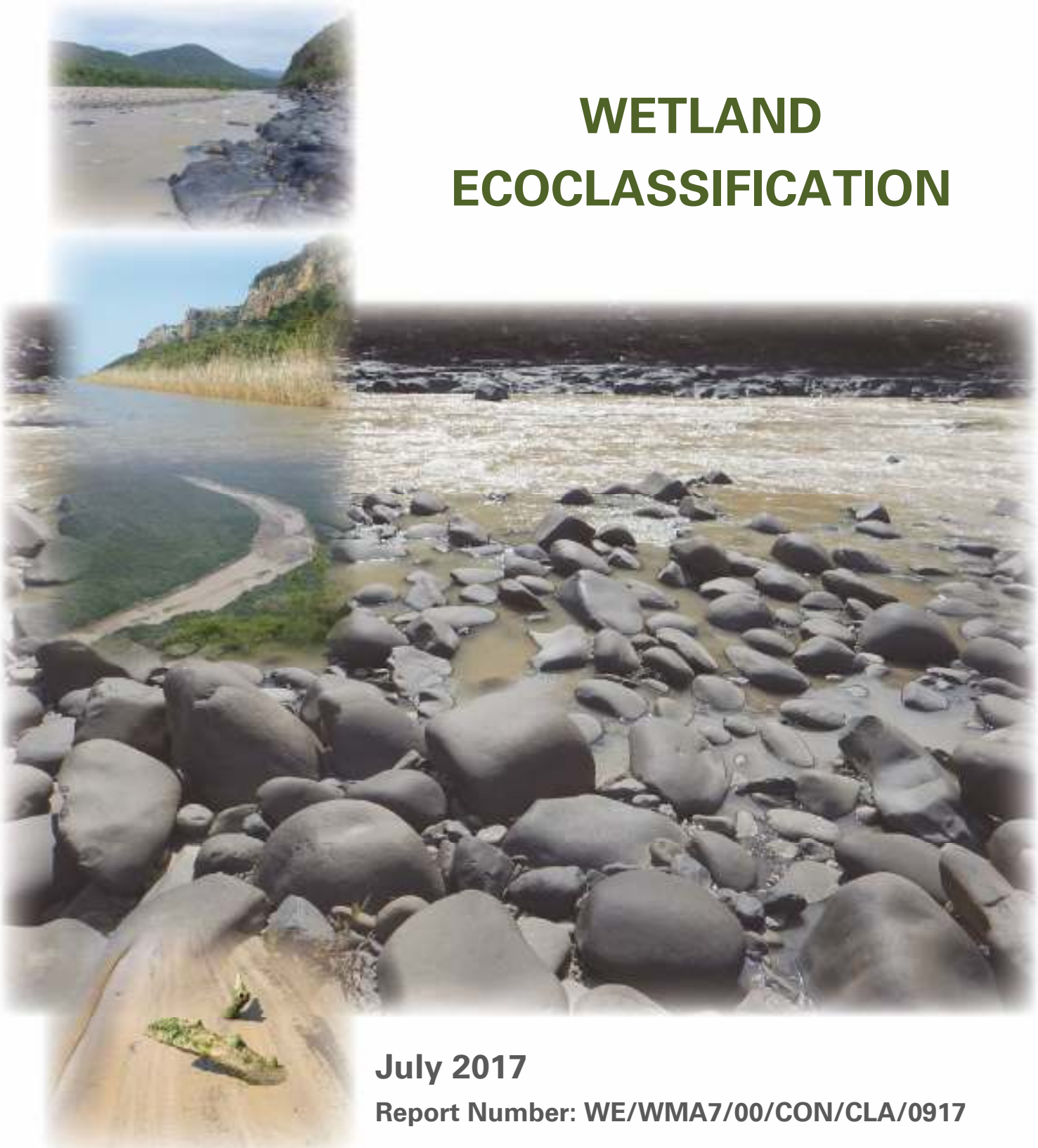
REPUBLIC OF SOUTH AFRICA

WP 11004

DETERMINATION OF WATER RESOURCE CLASSES AND RESOURCE QUALITY OBJECTIVES FOR THE WATER RESOURCES IN THE MZIMVUBU CATCHMENT



WETLAND ECOCLASSIFICATION

July 2017

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Fax: +27 (12) 323 0321

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Compiled by:
Scherman Colloty & Associates cc.
22 Somerset Street
Grahamstown
6139

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Bold indicates this report

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AUTHORS:	MacKenzie J
EDITOR:	Gowans L
REVIEWERS:	Project Management Team
LEAD CONSULTANT:	Scherman Colloty & Associates cc
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Approved for Scherman Colloty & Associates cc:

_____

Dr Patsy Scherman
Study Leader

Supported by:

_____

Lawrence Mulangaphuma
Project Manager

Recommended by:

_____

Ms Lebogang Matlala
Director: Water Resource Classification

Approved for the Department of Water and Sanitation by:

_____

Ms Ndileka Mohapi
Chief Director: Water Ecosystems

ACKNOWLEDGEMENTS

The following persons contributed to this project.

Project Management Team

Matlala, L	DWS: Water Ecosystems; Classification
Mulangaphuma, L	DWS: Water Ecosystems; Classification
Scherman, P-A	Scherman Colloty & Associates cc.
Weni, E	DWS: Eastern Cape Regional Office
Botha, H	DWS: Eastern Cape Regional Office
Weston, B	DWS: Water Ecosystems; Surface Water Reserves
Neswiswi, T	DWS: Water Ecosystems; Surface Water Reserves
Kganetsi, M	DWS: Resource Protection and Waste
Molokomme, L	DWS: Water Ecosystems; Groundwater Reserves
Muthraparsad, N	DWS: Environment and Recreation
Thompson, I	DWS: Integrated Water Resource Planning
Matume, M	DWS: Stakeholder Engagement and Coordination
Cilliers, G	DWS: Resource Quality Information Services
Majola, S	DWS: Resource Quality Information Services

AUTHORS

The following persons contributed to this report:

Author	Company
MacKenzie, J	MacKenzie Ecological & Development Services cc,

REPORT SCHEDULE

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Final report	

EXECUTIVE SUMMARY

BACKGROUND

The Chief Directorate: Water Ecosystems (CD: WE) of the Department of Water and Sanitation (DWS) initiated a study for the provision of professional services to undertake the Determination of Water Resource Classes and Resource Quality Objectives for the water resources (including wetlands) in the Mzimvubu T3 catchment. Scherman Colloty & Associates cc. was appointed as the Professional Service Provider (PSP) to undertake this study.

PURPOSE OF REPORT

The purpose of this report is to:

- provide a desktop assessment of the EcoClassification for wetlands at the sub-quaternary (SQ) scale, and
- to establish Ecological Water Requirements (EWRs) for high priority wetlands.

WETLAND ECOCLASSIFICATION

The desktop EcoClassification for wetlands was conducted for the wetland status quo report and a summary of the prioritisation (including Present Ecological State (PES)) is included here as a base for the next step, i.e. Quantifying the EWR. Summary results of the PES assessment are shown in **Figure 3.1**, while summary results of the wetland prioritisation are shown in **Table 3.1**.

QUANTIFICATION OF THE WETLAND EWR

The hydrogeomorphic (HGM) types of wetlands with High or Very High priority are shown in **Figure 4.1**. High and Very High priority wetlands form three distinct groupings of wetland HGM types. These are mainly: 1) floodplain wetlands and a few associated channelled valley bottoms and flats in the Matatiele (Kinira), Cedarville (Mzimvubu floodplain) and Ugie (Gatberg) areas; 2) higher density seep and channelled valley-bottom wetlands in zones 1 (especially quaternary T31B), 2 (especially quaternary T31D), 3 (especially quaternaries T3A–D) and 5 (especially in the Ugie and Maclear vicinity) in higher-lying areas; and 3) channelled valley-bottom wetlands (which more likely are inset or bench floodplain features) along the main channels of the Tsitsa, Thina and Mzintlava rivers, mostly towards confined valley and gorge areas in the lower reaches.

The EcoStatus was assessed, or where an assessment existed, validated for wetlands with High and Very High priority and where wetland density or extent was notable, i.e. small isolated wetlands that had High priority were too numerous to assess, e.g. seeps and valley-bottom wetlands in the Ugie vicinity. WET-Health (Version 2) was used to determine the PES for large floodplains and representative channelled valley-bottom wetlands. PES/EI/ES (Present Ecological State/Ecological Importance/Ecological Sensitivity, also referred to as PESEIS) metrics (DWS, 2014) for the riparian/wetland assessments were used as a starting point for most channelled and unchannelled valley-bottom wetlands and were verified using Google Earth ©, and seeps were evaluated in the same way using Google Earth and associated with the nearest SQ catchment.

The extent of the Mzimvubu floodplains near Cedarville that were assessed are shown in **Figure 4.3**. The vegetation component of WET-Health demonstrates an ecological category of D with a negative trajectory. The extent and nature of disturbances within the floodplains of this wetland complex are shown in **Table 4.1**. Agricultural use of the floodplains, as well as the damming of water comprise the majority of impacts.

The extent of the Matatiele floodplains that were assessed are shown **Figure 4.4**. The vegetation component of WET-Health demonstrates an ecological category of D with a negative trajectory. The extent and nature of disturbances within the floodplains of this wetland complex are shown in **Table 4.2**. Agricultural use of the floodplains is the major impact.

The extent of the Gatberg floodplains near Ugie that were assessed are shown in **Figure 4.5**. The vegetation component of WET-Health demonstrates an ecological category of B with a stable trajectory. The extent and nature of disturbances within the floodplains of this wetland complex are shown in **Table 4.3**. Commercial forestry encroachment into wetlands and some agricultural use of the floodplains comprise the majority of impacts.

A summary of high priority floodplains is shown in **Table 4.4** with some indication of a proposed Recommended Ecological Category (REC) and strategies to achieve said.

All High and Very High priority wetlands which were not floodplain wetlands were reassessed using Google Earth © and included channelled and unchannelled valley-bottom wetlands, seeps and valleyhead seeps and flats. The assessment was based the methodology of the PESEIS project. The results of EcoStatus validation are shown in **Table 4.5**. and include a proposed REC as well as strategies to promote achieving the REC.

The EWR of high priority wetlands is expressed through ecological specifications that protect the habitat. To provide these specifications, the EWRs are expressed in terms of a REC (see **Tables 4.4** and **4.5**), which is dependent on the PES, and the ecological importance denotes whether the REC is the same as the PES or an improvement, if at all possible. Where the REC is an improvement of the PES, this will involve management of land use. The most common method to achieve the REC where it is higher than the PES is to remove alien vegetation (notably *Salix fragilis* or *Acacia mearnsii*), reduce agricultural or forestry encroachment of wetlands, manage (usually reduce) grazing pressures which can promote erosion and restrict new damming activities.

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LIST OF ACRONYMS

BHN	Basic Human Needs
CD: WE	Chief Directorate: Water Ecosystems
DWA	Department Water and Sanitation (Name change applicable after April 2009)
DWAF	Department Water and Sanitation and Forestry
DWS	Department of Water and Sanitation (Name change applicable after March 2014)
EI	Ecological Importance
ES	Ecological Sensitivity
EWR	Ecological Water Requirements
FEPA	Freshwater Ecosystem Priority Area
HGM	Hydrogeomorphic Wetland
IIS	Integrated [wetland] Importance and Sensitivity
IEI	Integrated Environmental Importance
NFEPA	National Freshwater Ecosystem Priority Area
PES	Present Ecological State
PES/EI/ES	Present Ecological State/Ecological Importance/Ecological Sensitivity
PSP	Professional Service Provider
RDM	Resource Directed Measures
REC	Recommended Ecological Category
RQO	Resource Quality Objectives
RU	Resource Unit
SANBI	South African National Biodiversity Institute
SCI	Socio-Cultural Importance
SQ	Sub-quaternary
ToR	Terms of Reference
WMA	Water Management Area
WRUI	Water Resource Use Importance

GLOSSARY

Channel	An open conduit with clearly defined margins that (i) continuously or periodically contains flowing water, or (ii) forms a connecting link between two water bodies.
Channelled valley-bottom wetland	A mostly flat valley-bottom wetland dissected by and typically elevated above a channel (see channel). Dominant water inputs to these areas are typically from the channel, either as surface flow resulting from overtopping of the channel bank/s or as interflow, or from adjacent valley-side slopes (as overland flow or interflow). Water generally moves through the wetland as diffuse surface flow, although occasional, short-lived concentrated flows are possible during flooding events (SANBI, 2009).
Erosion	The weathering, transportation and deposition of the earth's surface by wind, water and other natural forces.
Flat	A near-level wetland area (i.e. with little or no relief) with little or no gradient, situated on a plain or a bench in terms of landscape setting. The primary source of water is precipitation, with the exception of flats along the coast (usually in a plain setting) where the water table (i.e. groundwater) may rise to the surface or near to the surface in areas of little or no relief because of the location near to the base level of the land surface represented by the presence of the ocean (SANBI, 2009).
Floodplain wetland	The mostly flat or gently sloping wetland area adjacent to and formed by a lowland or upland floodplain river, and subject to periodic inundation by overtopping of the channel bank (SANBI, 2009).
Hillslope 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. Water inputs are primarily from groundwater or precipitation that enters the wetland from an up-slope direction in the form of subsurface flow. Water movement through the wetland is mainly in the form of interflow, with diffuse overland flow ('sheetwash') often being significant during and after rainfall events (SANBI, 2009).
Unchannelled valley-bottom wetland	A mostly flat valley-bottom wetland area without a major channel running through it, characterised by an absence of distinct channel banks and the prevalence of diffuse flows, even during and after high rainfall events. Water inputs are typically from an upstream channel, as the flow becomes dispersed, and from adjacent slopes (if present) or groundwater. Water generally moves through the wetland in the form of diffuse surface flow and/or interflow (with some temporary containment of water in depressional areas), but the outflow can be in the form of diffuse or concentrated surface flow (SANBI, 2009).
Valleyhead seep	A gently-sloping, typically concave wetland area located on a valley floor at the head of a drainage line, with water inputs mainly from subsurface flow (although there is usually also a convergence of diffuse overland water flow in these areas during and after rainfall events). Horizontal, unidirectional (down-slope) movement of water in the form of interflow and diffuse surface flow dominates within a valleyhead seep, while water exits at the downstream end as concentrated surface flow where the valleyhead seep becomes a channel (SANBI, 2009).

Wetland	Any ecosystem that has an aquatic base or hydrological driving force and possesses both upland and aquatic characteristics. National Water Act (1998): A wetland is land which is transitional between terrestrial and aquatic systems where the water table is at or near the surface, or the land is periodically covered with shallow water, and which in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.

1 INTRODUCTION

1.1 BACKGROUND

The Chief Directorate: Water Ecosystems (CD: WE) of the Department of Water and Sanitation (DWS) initiated a study for the provision of professional services to undertake the Determination of Water Resource Classes and Resource Quality Objectives for the water resources (including wetlands) in the Mzimvubu portion of Water Management Area (WMA(7. Scherman Colloty & Associates cc. was appointed as the Professional Service Provider (PSP) to undertake this study.

As per the Terms of Reference (ToR), there is a need to undertake detailed Ecological Water Requirement (EWR) and Basic Human Needs (BHN) studies for various water resource components due to mainly:

- various water use licence applications,
- the conservation status of various resources in this catchment, and
- the associated impacts of proposed developments will have on the availability of water.

1.2 STUDY AREA

The study area comprised all wetlands within the T3 primary catchment, the distribution of which are shown in **Figure 1.1**.

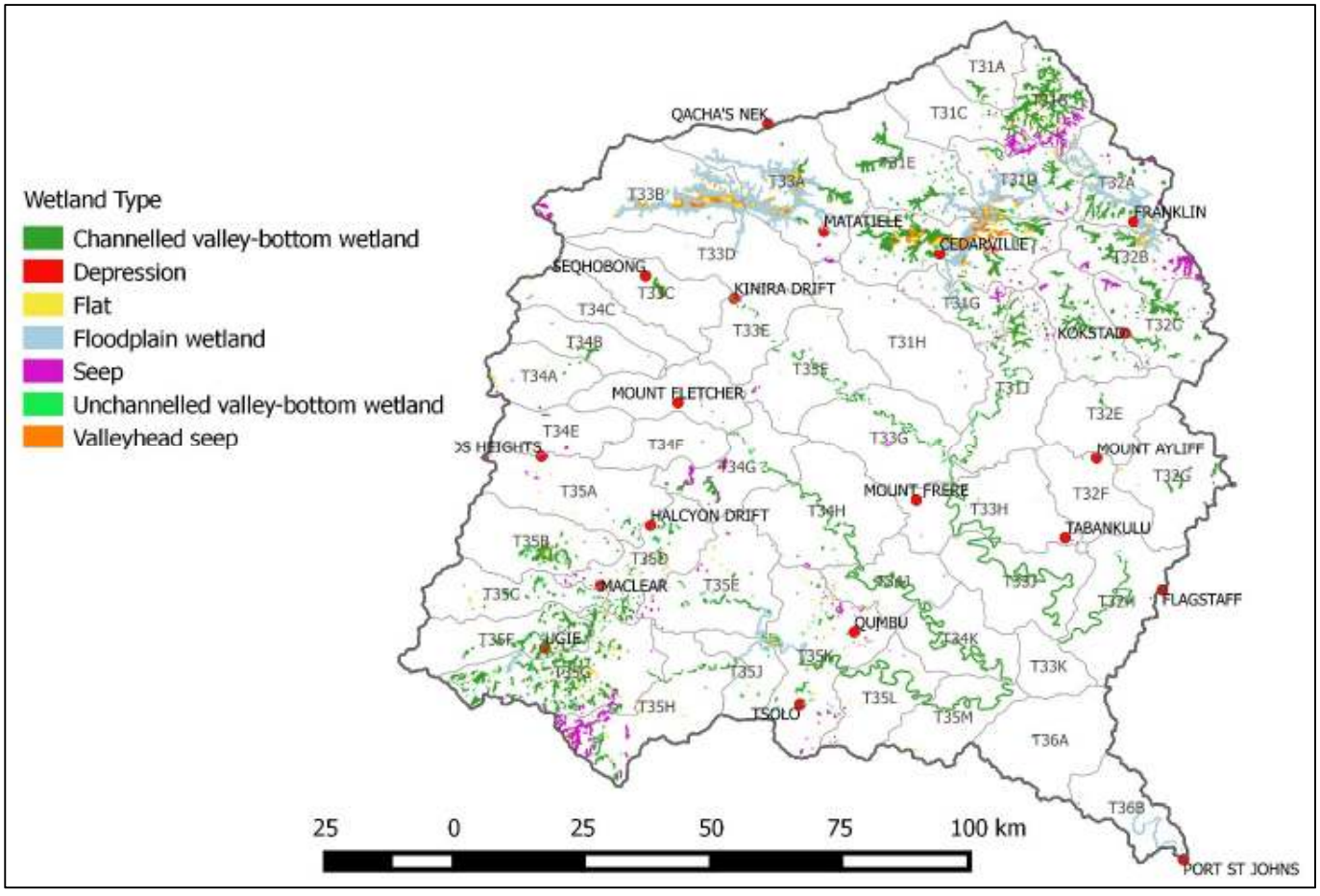

Figure 1.1 Study area: T3 primary catchment showing quaternary catchments and distribution of wetland types

1.3 PURPOSE OF THE REPORT

The purpose of this report is to:

- provide a desktop assessment of the EcoClassification for wetlands at the SQ scale, and
- to establish EWRs for high priority wetlands.

1.4 OUTLINE OF THIS REPORT

The report outline is provided below.

Chapter 1: Introduction
This chapter provides general background to the project, study area and purpose of the report.

Chapter 2: Methods and approach
This chapter outlines the methods used and approaches taken to achieve the objective.

Chapter 3: Desktop EcoClassification for wetlands
This chapter outlines a desktop assessment of the EcoClassification for wetlands at SQ scale using more updated information that has become available since 2010.

Chapter 4: Quantification of the wetland EWR
This chapter outlines the EWR for high priority wetlands. EWRs will be determined for high priority wetlands only. In most cases, these EWRs will consist of wetland-specific EcoClassification using more detailed tools such as WET-Health to provide ecological specifications were possible.

Chapter 5: Conclusion
This chapter outlines the main conclusions of the work.

Chapter 6: References
This chapter outlines references cited in the text.

2 METHODS AND APPROACH

2.1 PRESENT ECOLOGICAL STATE

The assessment of wetland PES relied on both of the riparian/wetland metrics rated in the PESEIS database (DWS, 2014): Riparian/wetland zone and zone continuity modification. Riparian/wetland zone modification relates to “modifications that indicate the potential that wetland zones may have been changed from reference [condition] in terms of structure and composition that may influence these zones regarding functioning and processes occurring within these zones”, and also refers to these zones as habitat for biota. Riparian/wetland zone continuity modification relates to “modifications that indicate the potential that riparian/wetland connectivity may have changed from the reference [condition]”. Physical fragmentation (both longitudinal and lateral) is the indicator used for wetland continuity and includes, for example, inundation by weirs and dams, physical removal for farming, mining, overgrazing etc. and the presence of roads or other human structures, (e.g. urban areas). The underlying assumption is that these two metrics incorporate wetlands within each SQ, and as such should provide a useful measure of a more detailed investigation (visual assessment by specialist using satellite imagery) of overall ecological state. Furthermore, it is assumed that although these metrics include the riparian area, they remain a more realistic assessment of PES than the “wetcon” condition values within NFEPA (National Freshwater Ecosystem Priority Area) data.

2.2 WETLAND EWR

The approach is in keeping with outlined techniques for the rapid ecological Reserve determination of inland wetlands (Rountree et al., 2013), and is to provide conditions that support the hydrological functioning of wetlands for the maintenance of a desired ecological state. These conditions will vary depending on wetland type from quantified flow volumes and distribution or inundation regimes (i.e. quantification of the Reserve) to setting of criteria for the protection of wetland condition where the hydrological requirements cannot be quantified.

For each Very High or High priority wetland, the EWR is determined according to the following steps:

1) Determine dominant wetland HGM type.
2) Determine appropriate level of RDM (Resource Directed Measures) study for wetlands according to HGM type.
3) Assess/validate EcoStatus of these priority wetlands.
4) Determine EWR (or other RDM) to achieve the REC.

2.2.1 Determine dominant wetland HGM type

The HGM wetland type dictates the method of RDM study, as there are different types of assessment methods and EWR determination approaches for different types of wetlands. For the Rapid Reserve methods for wetlands, HGM types were taken from NFEPA spatial data (Nel et al., 2011).

2.2.2 Determine appropriate level of RDM study for wetlands

Rountree et al. (DWA, 2012) provide a framework for selecting the appropriate level of RDM study for wetlands. This approach uses the type of wetland and main impact or threat categorized into Disturbance Classes to identify an appropriate level of RDM assessment. The extent of impact is

measured as the proportion of a wetland and/or its catchment that is affected by an activity. Extent is expressed as a percentage.

The RDM assessment may be either a quantitative EWR determination, a qualitative EWR determination or, in the most simple (low risk) situations, the determination of simple conditions to achieve the REC.

2.2.3 Assess/validate EcoStatus of priority wetlands

This is achieved by the validation of the PES and the determination of the REC. WET-Health (Version 2) was used to determine the PES of priority floodplains. PESEIS (DWS, 2014) metrics for the riparian/wetland assessments were used as a starting point for all other wetland HGMs and were verified for each SQ using Google Earth ©.

2.2.4 Determine EWR (or other RDM) to achieve REC

The methods for determining wetland EWR vary according to the HGM type of wetland and level of study. It may not be necessary to quantify the Reserve in the same sense that it is determined for rivers, and in some cases, may only require the setting of conditions for the maintenance of the hydrological functioning of a specific wetland.

The EWR of High priority floodplain wetlands are aligned to river processes since these wetlands are an integral component of the channel. The EWR of High priority seeps (includes hillslope and valleyhead) and channelled and unchannelled valley-bottom wetlands is expressed through ecological specifications (or EcoSpecs) that protect the habitat. To provide these specifications, the EWRs were expressed in terms of a REC, which is dependent on the PES, and the ecological importance denotes whether the REC is the same as the PES or an improvement, if at all possible.

3 DESKTOP ECOCLASSIFICATION FOR WETLANDS

The desktop EcoClassification for wetlands was conducted for the Delineation and Status Quo Report (DWS, 2017)and a summary of the prioritisation (including PES) is included here as a base for the next step: Quantifying the EWR. Summary results of the PES assessment are shown in **Figure 3.1**, while summary results of the wetland prioritisation are shown in **Table 3.1**. Columns in **Table 3.1** are as follows:

- Column 1: SQ number from the PESEIS study (DWS, 2014).
- Column 2: River name, where it exists.
- Column 3: Wetland Ecological Importance (EI) obtained from an integration of RAMSAR status, wetland Freshwater Ecosystem Priority Area (FEPA) status, provision of habitats for rare and endangered species (birds, frogs, plants), critical biodiversity areas, and wetland extent (area).
- Column 4: Wetland Ecological Sensitivity (ES) based on natural land cover data within wetlands and within a 100 m buffer around wetlands (data from NFEPA; Nel et al., 2011), as well as the extent of wetlands. The assessment was based on the assumption that smaller wetlands with less natural cover within and surrounding them will likely be more sensitive to further degradation, given current pressures.
- Column 5: Socio-Cultural Importance (SCI) based on the PESEIS study (DWS, 2014). These data are not wetland specific and have been used as a surrogate measure for surrounding wetlands within the SQ.
- Column 6: Integrated (or final) Importance and Sensitivity (IIS), which represents the maximum of the Ecological Importance (EI), Ecological Sensitivity (ES) and SCI.
- Column 7: PES obtained from both of the riparian/wetland metrics rated in the PESEIS database (DWS, 2014), some of which were updated subsequently.
- Column 8: Integrated Environmental Importance (based on a rating from 1 – 5 where 1 is Very Low and 5 is Very High): The integrated environmental importance (IEI) considers both the integrated importance and sensitivity and the PES.
- Column 9: Water Resource Use Importance (WRUI) (based on a rating from 0 – 4 where 0 is Very Low and 4 is Very High) based on the PESEIS study (DWS, 2014). These data are not wetland specific and have been used as a surrogate measure for surrounding wetlands within the SQ.
- Column 10: Wetland Priority (based on a rating from 0 – 4 where 0 is Very Low and 4 is Very High) and considers the IEI and the WRUI.

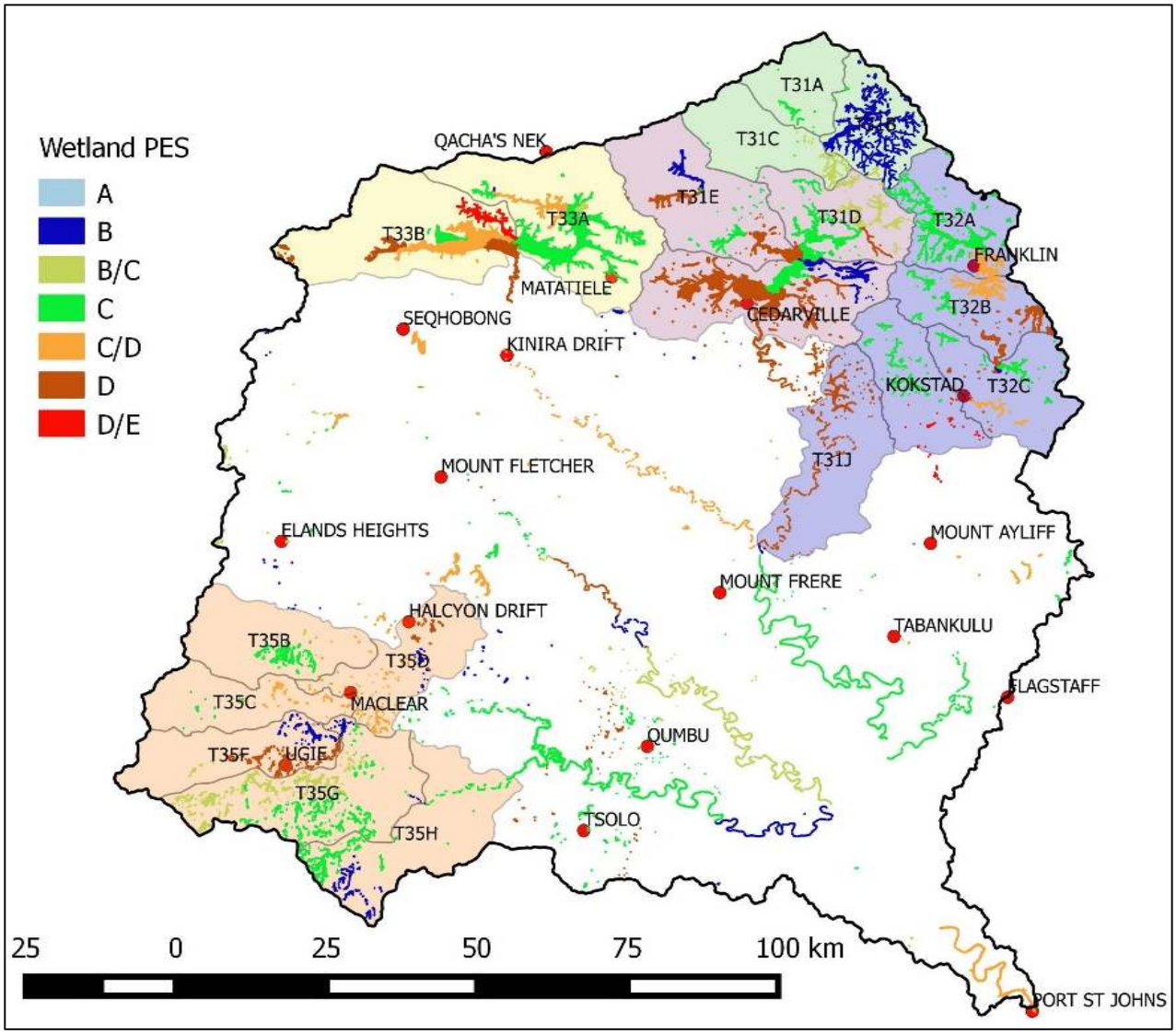

Figure 3.1 PES values assigned to wetlands within each SQ (where wetlands occurred according to the NFEPA coverage)

Table 3.1 Wetland priority, also showing wetland EI, ES, Final IIS, PES and IEI per SQ

SQ PESEIS	Name	Wetland EI	Wetland ES	SCI	IIS	PES	IEI	WRUI	PRIORITY
T31A-04712	Mzimvubu	HIGH	LOW	MODERATE	HIGH	C	3	1	2
T31B-04745	Krom	HIGH	MODERATE	LOW	HIGH	B	5	2	3
T31B-04868	Krom	VERY HIGH	MODERATE	LOW	VERY HIGH	B	5	1	2
T31B-04873		VERY HIGH	MODERATE	LOW	VERY HIGH	B	5	2	3
T31C-04796	Mngeni	HIGH	MODERATE	HIGH	HIGH	C	3	2	2
T31C-04866	Mzimvubu	MODERATE	MODERATE	MODERATE	MODERATE	B/C	3	1	2
T31C-04879	Nyongo	MODERATE	VERY HIGH	HIGH	VERY HIGH	C	5	2	3
T31D-04926	Mzimvubu	HIGH	MODERATE	LOW	HIGH	C	3	1	2
T31D-04936	Riet	VERY HIGH	MODERATE	LOW	VERY HIGH	B/C	5	2	3
T31D-05030	Riet	HIGH	LOW	LOW	HIGH	C	3	2	2
T31D-05060		HIGH	MODERATE	MODERATE	HIGH	D	3	1	2
T31D-05076	Mzimvubu	VERY HIGH	VERY LOW	LOW	VERY HIGH	C	5	2	3
T31E-04836	Tswereka	HIGH	MODERATE	HIGH	HIGH	B	5	1	2
T31E-04910	Malithasana	HIGH	MODERATE	HIGH	HIGH	D	3	1	2

SQ PESEIS	Name	Wetland EI	Wetland ES	SCI	IIS	PES	IEI	WRUI	PRIORITY
T31E-04931	Tswereka	HIGH	HIGH	HIGH	HIGH	C	3	2	2
T31E-05013	Tswereka	HIGH	MODERATE	MODERATE	HIGH	D	3	3	3
T31E-05055		VERY HIGH	MODERATE	MODERATE	VERY HIGH	C	5	2	3
T31F-05108		VERY HIGH	LOW	LOW	VERY HIGH	B	5	2	3
T31F-05111	Mzimvubu	HIGH	VERY LOW	LOW	HIGH	B	5	2	3
T31F-05112	Mzimvubu	VERY HIGH	LOW	MODERATE	VERY HIGH	C	5	2	3
T31F-05134		VERY HIGH	MODERATE	LOW	VERY HIGH	D	3	2	2
T31G-05071	Mzimvubu	VERY HIGH	MODERATE	HIGH	VERY HIGH	D	3	2	2
T31H-05177	Mvenyane	HIGH	LOW	HIGH	HIGH	B	4	1	2
T31H-05324	Mvenyane	HIGH	VERY LOW	MODERATE	HIGH	C/D	3	1	2
T31J-05257	Mzimvubu	HIGH	MODERATE	MODERATE	HIGH	D	3	2	2
T31J-05551	Mzimvubu	HIGH	VERY LOW	MODERATE	HIGH	D	3	2	2
T31J-05582	Ngwekazana	HIGH	LOW	MODERATE	HIGH	D	3	1	2
T31J-05588	Mzimvubu	HIGH	MODERATE	MODERATE	HIGH	D	3	2	2
T32A-04907	Mzintlanga	VERY HIGH	MODERATE	LOW	VERY HIGH	C	5	2	3
T32A-04965	Mzintlava	VERY HIGH	MODERATE	MODERATE	VERY HIGH	C	5	2	3
T32B-05103	Mzintlava	VERY HIGH	MODERATE	MODERATE	VERY HIGH	C/D	3	2	2
T32B-05116		VERY HIGH	HIGH	MODERATE	VERY HIGH	C	5	3	4
T32B-05184	Mzintlava	VERY HIGH	MODERATE	MODERATE	VERY HIGH	D	3	2	2
T32C-05219	Mill Stream	HIGH	MODERATE	LOW	HIGH	C	3	2	2
T32C-05243	aManzamnyama	VERY HIGH	MODERATE	MODERATE	VERY HIGH	C	5	2	3
T32C-05273	Mzintlava	HIGH	HIGH	LOW	HIGH	D	3	3	3
T32C-05313	Mzintlava	HIGH	MODERATE	MODERATE	HIGH	B	5	3	4
T32C-05378		HIGH	MODERATE	MODERATE	HIGH	C/D	3	2	2
T32D-05172	Droewig	VERY HIGH	MODERATE	LOW	VERY HIGH	C	5	2	3
T32D-05352	Mzintlava	HIGH	MODERATE	LOW	HIGH	D	3	3	3
T32D-05373	Mzintlava	HIGH	MODERATE	LOW	HIGH	D/E	3	3	3
T32F-05464	Mzintlava	HIGH	LOW	HIGH	HIGH	D	3	3	3
T32G-05536	Mzintlavana	HIGH	LOW	HIGH	HIGH	C/D	3	2	2
T32G-05609	Mbandana	HIGH	LOW	MODERATE	HIGH	C	3	1	2
T32H-05842	Mzintlava	HIGH	LOW	MODERATE	HIGH	C	3	3	3
T33A-04887	Mafube	HIGH	HIGH	MODERATE	HIGH	C	3	1	2
T33A-04892	Kinira	HIGH	VERY LOW	MODERATE	HIGH	C	3	1	2
T33A-04898	Makomorin	HIGH	LOW	MODERATE	HIGH	B	5	1	2
T33A-04903	Kinira	HIGH	MODERATE	HIGH	HIGH	C/D	3	2	2
T33A-04928		HIGH	MODERATE	MODERATE	HIGH	B/C	4	2	3
T33A-04983	Mafube	HIGH	MODERATE	MODERATE	HIGH	C	3	2	2
T33A-04990	Kinira	HIGH	LOW	HIGH	HIGH	C	3	3	3
T33A-04991		HIGH	VERY LOW	HIGH	HIGH	C	3	3	3
T33A-05011	Kinira	HIGH	LOW	MODERATE	HIGH	C	3	2	2
T33B-04912	Seeta	HIGH	VERY LOW	MODERATE	HIGH	C	3	2	2
T33B-04939	Mabele	HIGH	LOW	LOW	HIGH	C/D	3	1	2
T33B-04956	Mosenene	HIGH	LOW	HIGH	HIGH	D/E	3	2	2
T33B-05005	Jordan	VERY HIGH	VERY LOW	MODERATE	VERY HIGH	D	3	1	2
T33B-05051	Mabele	HIGH	VERY LOW	MODERATE	HIGH	C/D	3	1	2
T33B-05066	Mabele	HIGH	VERY LOW	LOW	HIGH	D	3	1	2
T33B-05072		HIGH	VERY LOW	HIGH	HIGH	C/D	3	1	2
T33C-05131	Morulane	HIGH	LOW	HIGH	HIGH	C/D	3	2	2

SQ PESEIS	Name	Wetland EI	Wetland ES	SCI	IIS	PES	IEI	WRUI	PRIORITY
T33D-05063	Kinira	VERY HIGH	VERY LOW	HIGH	VERY HIGH	D	3	2	2
T33D-05106	Pabatlong	HIGH	VERY HIGH	HIGH	VERY HIGH	C/D	3	2	2
T33D-05150	Kinira	HIGH	LOW	MODERATE	HIGH	C/D	3	2	2
T33E-05213	Kinira	HIGH	MODERATE	HIGH	HIGH	C/D	3	2	2
T33E-05367	Somabadi	MODERATE	VERY HIGH	HIGH	VERY HIGH	C/D	3	1	2
T33F-05285	Rolo	MODERATE	VERY LOW	HIGH	HIGH	D	3	2	2
T33F-05326	Kinira	HIGH	VERY LOW	MODERATE	HIGH	C/D	3	2	2
T33F-05398	Kinira	HIGH	VERY LOW	MODERATE	HIGH	C/D	3	2	2
T33F-05439	Ncome	MODERATE	VERY LOW	HIGH	HIGH	C/D	3	2	2
T33G-05395	Kinira	HIGH	LOW	HIGH	HIGH	C/D	3	2	2
T33G-05587	Cabazi	MODERATE	HIGH	HIGH	HIGH	C/D	3	1	2
T33G-05659	Mzimvubu	MODERATE	MODERATE	LOW	MODERATE	B	4	2	3
T33H-05638	Mnceba	MODERATE	VERY HIGH	MODERATE	VERY HIGH	C	5	1	2
T33H-05680	Mzimvubu	MODERATE	LOW	HIGH	HIGH	C	3	1	2
T33H-05803	Caba	HIGH	MODERATE	HIGH	HIGH	C/D	3	1	2
T33H-05821	Mzimvubu	MODERATE	MODERATE	LOW	MODERATE	C	3	1	2
T33J-05834	Mzimvubu	MODERATE	LOW	MODERATE	MODERATE	C	3	1	2
T34A-05394	Vuvu	HIGH	HIGH	LOW	HIGH	B/C	4	1	2
T34A-05404	Thina	HIGH	VERY LOW	LOW	HIGH	C	3	1	2
T34A-05408	Khohlong	HIGH	VERY LOW	HIGH	HIGH	C	3	1	2
T34A-05415	Thina	HIGH	VERY LOW	HIGH	HIGH	B/C	4	1	2
T34B-05269	Nxotshana	HIGH	VERY LOW	MODERATE	HIGH	B/C	4	1	2
T34B-05275	Phiri-e-ntso	HIGH	VERY LOW	HIGH	HIGH	B/C	4	1	2
T34B-05351	Thina	HIGH	VERY LOW	HIGH	HIGH	C/D	3	1	2
T34B-05356	Thina	HIGH	LOW	MODERATE	HIGH	C/D	3	1	2
T34B-05385	Thina	HIGH	VERY LOW	LOW	HIGH	C/D	3	1	2
T34C-05168	Tinana	HIGH	VERY LOW	LOW	HIGH	B	5	1	2
T34C-05292	Tinana	MODERATE	LOW	HIGH	HIGH	C	3	1	2
T34D-05412	Thina	HIGH	LOW	HIGH	HIGH	C	3	1	2
T34D-05460	Thina	HIGH	LOW	MODERATE	HIGH	D	3	2	2
T34E-05495	Bradgate se Loop	HIGH	VERY LOW	MODERATE	HIGH	B/C	4	0	2
T34E-05503	Luzi	HIGH	VERY LOW	LOW	HIGH	C	3	0	1
T34E-05507	Luzi	HIGH	LOW	MODERATE	HIGH	C	3	1	2
T34F-05512	Luzi	HIGH	VERY LOW	HIGH	HIGH	C	3	1	2
T34G-05543	Thina	HIGH	LOW	MODERATE	HIGH	C	3	2	2
T34G-05634	Nxaxa	VERY HIGH	LOW	HIGH	VERY HIGH	C/D	3	1	2
T34G-05667	Thina	MODERATE	LOW	LOW	MODERATE	B/C	3	2	2
T34H-05598	Thina	HIGH	MODERATE	HIGH	HIGH	D	3	2	2
T34H-05772	Thina	HIGH	LOW	MODERATE	HIGH	B	5	2	3
T34H-05826	Ngcothi	HIGH	LOW	MODERATE	HIGH	B/C	4	2	3
T34K-05835	Thina	HIGH	MODERATE	HIGH	HIGH	B/C	4	2	3
T35A-05596	Tsitsana	HIGH	VERY LOW	MODERATE	HIGH	B/C	4	1	2
T35A-05648	Tsitsa	HIGH	LOW	LOW	HIGH	B	5	1	2
T35A-05750	Tsitsa	HIGH	VERY LOW	MODERATE	HIGH	C/D	3	2	2
T35B-05709	Pot	HIGH	VERY LOW	MODERATE	HIGH	B/C	4	1	2
T35B-05798	Pot	HIGH	LOW	MODERATE	HIGH	C/D	3	2	2
T35B-05815	Little Pot	VERY HIGH	LOW	MODERATE	VERY HIGH	C	5	1	2
T35C-05858	Mooi	HIGH	VERY LOW	MODERATE	HIGH	C	3	1	2

SQ PESEIS	Name	Wetland EI	Wetland ES	SCI	IIS	PES	IEI	WRUI	PRIORITY
T35C-05874	Mooi	VERY HIGH	MODERATE	MODERATE	VERY HIGH	C/D	3	3	3
T35C-05930	Klein-Mooi	HIGH	VERY LOW	MODERATE	HIGH	C	3	1	2
T35D-05721	Tsitsa	HIGH	LOW	HIGH	HIGH	D	3	2	2
T35D-05844	Mooi	HIGH	MODERATE	LOW	HIGH	B	5	2	3
T35E-05780	Gqukunqa	MODERATE	VERY LOW	MODERATE	MODERATE	B	4	1	2
T35E-05908	Tsitsa	HIGH	MODERATE	MODERATE	HIGH	C	3	4	4
T35E-05977	Tsitsa	MODERATE	HIGH	MODERATE	HIGH	C	3	4	4
T35F-05973	Kuntombizininzi	VERY HIGH	MODERATE	MODERATE	VERY HIGH	B	5	3	4
T35F-05999	Inxu	HIGH	LOW	MODERATE	HIGH	B/C	4	2	3
T35F-06020	Inxu	VERY HIGH	LOW	MODERATE	VERY HIGH	D	3	3	3
T35G-06002	Inxu	HIGH	LOW	LOW	HIGH	C	3	3	3
T35G-06021	Inxu	HIGH	VERY LOW	MODERATE	HIGH	C	3	3	3
T35G-06069	Gatberg	VERY HIGH	LOW	MODERATE	VERY HIGH	B/C	5	3	4
T35G-06074	Gatberg	HIGH	VERY LOW	MODERATE	HIGH	B/C	4	3	4
T35G-06099	Gatberg	VERY HIGH	LOW	MODERATE	VERY HIGH	B/C	5	2	3
T35G-06100		MODERATE	VERY LOW	MODERATE	MODERATE	C	3	2	2
T35G-06108	Inxu	HIGH	LOW	MODERATE	HIGH	B	5	3	4
T35G-06118	Gatberg	VERY HIGH	MODERATE	MODERATE	VERY HIGH	B/C	5	3	4
T35G-06133		HIGH	LOW	MODERATE	HIGH	C	3	3	3
T35G-06135	Gqaqala	VERY HIGH	MODERATE	MODERATE	VERY HIGH	C	5	3	4
T35G-06148		HIGH	VERY HIGH	LOW	VERY HIGH	A	5	3	4
T35G-06169	Gqaqala	HIGH	LOW	MODERATE	HIGH	C	3	1	2
T35G-06179		HIGH	LOW	MODERATE	HIGH	C	3	1	2
T35H-06024	Inxu	MODERATE	LOW	MODERATE	MODERATE	C	3	2	2
T35H-06053	Inxu	MODERATE	MODERATE	MODERATE	MODERATE	C	3	2	2
T35H-06186	Umnga	HIGH	HIGH	MODERATE	HIGH	C	3	2	2
T35H-06240	KuNgindi	VERY HIGH	MODERATE	MODERATE	VERY HIGH	C	5	2	3
T35H-06282	Umnga	HIGH	MODERATE	MODERATE	HIGH	B	5	1	2
T35J-06106	Ncolosi	MODERATE	MODERATE	MODERATE	MODERATE	D	2	2	2
T35K-05897	Culunca	MODERATE	HIGH	MODERATE	HIGH	D	3	2	2
T35K-05904	Tyira	MODERATE	HIGH	MODERATE	HIGH	D	3	2	2
T35K-06037	Tsitsa	MODERATE	VERY HIGH	MODERATE	VERY HIGH	C	5	4	4
T35K-06167	Xokonxa	HIGH	MODERATE	MODERATE	HIGH	C	3	3	3
T35L-05976	Tsitsa	VERY HIGH	HIGH	HIGH	VERY HIGH	C	5	4	4
T35L-06190	Tsitsa	HIGH	LOW	MODERATE	HIGH	B	5	4	4
T35L-06226	Ngcolora	HIGH	HIGH	MODERATE	HIGH	D	3	2	2
T35M-06187	Tsitsa	MODERATE	MODERATE	MODERATE	MODERATE	B	4	4	4
T35M-06275	Ruze	HIGH	MODERATE	MODERATE	HIGH	B	5	1	2
T36A-06250	Mzimvubu	MODERATE	LOW	MODERATE	MODERATE	C	3	4	4
T36B-06391	Mzimvubu	VERY HIGH	MODERATE	HIGH	VERY HIGH	C/D	3	4	4

4 QUANTIFICATION OF THE WETLAND EWR

It is important to note that wetland EWRs are only considered for those wetlands with a High or Very High priority. As the calculation of priority includes ecological aspects only as a *contribution* to the calculation, many ecologically important wetlands do not necessarily score High for priority.

4.1 DETERMINATION OF THE DOMINANT HGM TYPE

The HGM types of wetlands with High or Very High priority are shown in **Figure 4.1**. HGM types were taken from NFEPA spatial data (Nel et al., 2011). High and Very High priority wetlands form three distinct groupings of wetland HGM types. These are mainly: 1) floodplain wetlands and a few associated channelled valley bottoms and flats in the Matatiele (Kinira), Cedarville (Mzimvubu floodplain) and Ugie (Gatberg) areas; 2) higher density seep and channelled valley-bottom wetlands in zones 1 (especially quaternary T31B), 2 (especially quaternary T31D), 3 (especially quaternaries T3A-D) and 5 (especially in the Ugie and Maclear vicinity) in higher lying areas; and 3) channelled valley-bottom wetlands (which more likely are inset or bench floodplain features) along the main channels of the Tsitsa, Thina and Mzintlava rivers, mostly towards confined valley and gorge areas in the lower reaches.

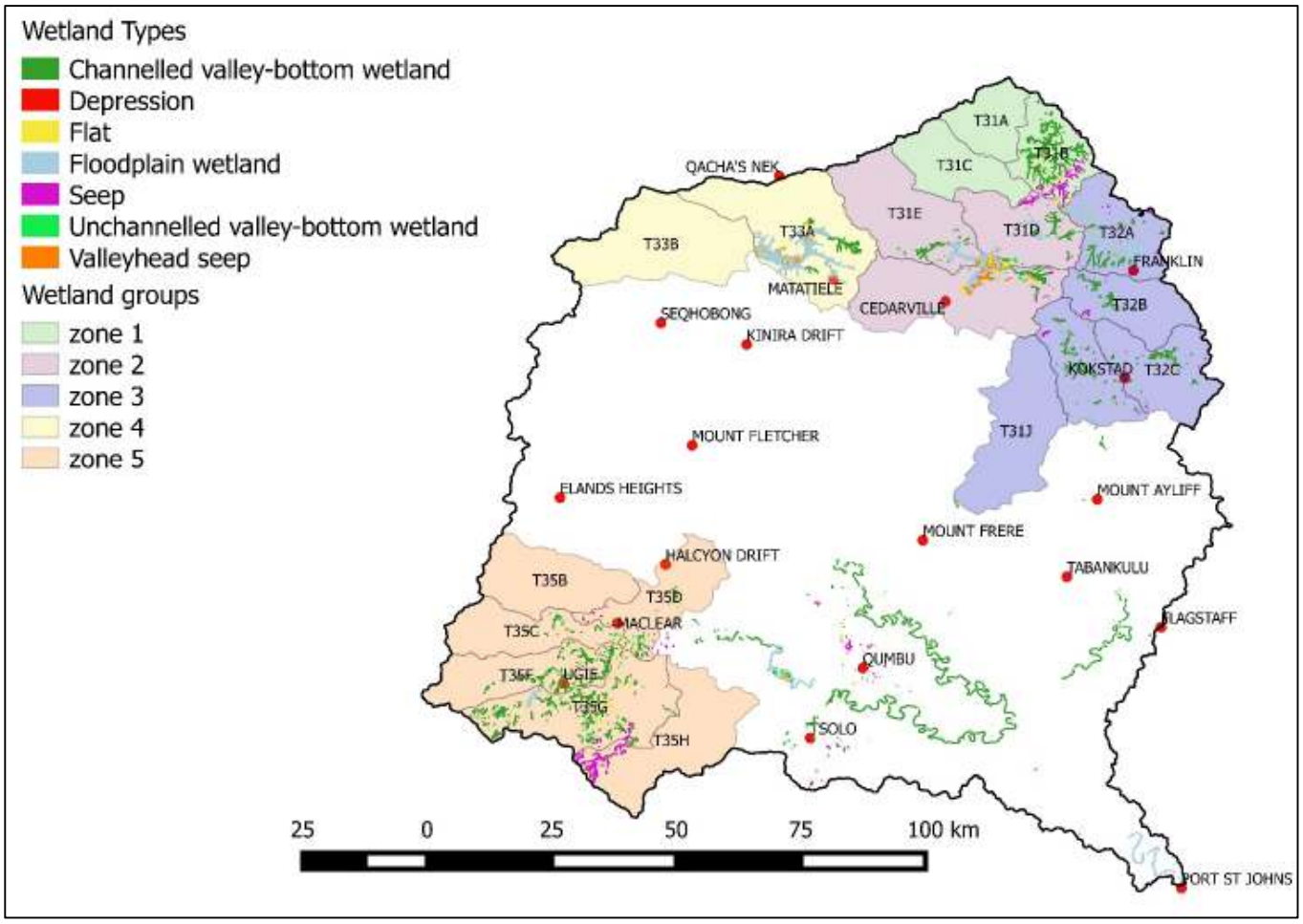

Figure 4.1 Wetland HGM types of High and Very High priority wetlands only

4.2 DETERMINE APPROPRIATE LEVEL OF RDM

The characteristics of the various levels of RDM assessments (according to published methods) associated with wetland type and level of Reserve study are shown in **Figure 4.2**.

High priority floodplains feature in the catchment, particularly in and around Cedarville, Matatiele and Ugie (**Figure 4.1**). Procedures outlined in DWA (2012; **Figure 4.2**) for the desktop Reserve of floodplains involve the traditional river-based hydrology and hydraulic approaches, "with some adaptation", since floodplains would (hydraulically) function similarly to rivers, although the overbank features are unique and this makes these wetland types more complex than river studies. There is no prescribed method for intermediate and comprehensive Reserve studies, while a desktop Reserve would utilise the current desktop (hydrological) model. Since no river EWR sites can be used to infer flow requirements for these floodplains, it was decided to take the EcoStatus approach whereby the vegetation component of WET-Health (MacFarlane et al., 2007) was used to score the PES and REC. Conservation and maintenance of the REC would then be a compromise of flow requirements, and as such the aim of the EWR would then be to maintain the REC, and quantification of land-use cover within each floodplain system would lend itself to the quantification of ecological specifications for this purpose.

The same approach was taken for high priority channelled and unchannelled valley-bottom and seep wetlands where validated PESEIS metrics (DWS, 2014) are used to determine and update PES and REC.

	RQO's only		Reserve Study			
	Generic RQO's/conditions	*EcoStatus and specific RQO's*	*Desktop Reserve*	*Rapid Reserve*	*Intermediate Reserve*	*Comprehensive Reserve*
Amount of data collection	*increasing cost, time and complexity* →					
	Low	Low	Low	Moderate	High	Very high
No. of site visits required	0	1	0	1	2	2 to 3
Type of wetland:	**Description/Citation of method:**					
Seepage wetlands	Standard conditions/RQO's	EcoStatus and RQOs				
Pans	Standard conditions/RQO's	EcoStatus and RQOs	Fluvius, 2007 (summarised in Rountree, 2012)	Rountree *et al.*, 2012	(not yet developed)	
Wetland Flats	Standard conditions/RQO's	EcoStatus and RQOs	*Undertake Groundwater Reserve and monitor wetlands as indicator of groundwater resource condition (similarly for other wetlands that are primarily groundwater fed).*			
Lakes	Standard conditions/RQO's	EcoStatus and RQOs			DWAF, 1999	DWAF, 1999
Unchannelled Valley Bottoms	Standard conditions/RQO's	EcoStatus and RQOs	Use current desktop model	Rountree *et al.*, 2012	(not yet developed)	
Channelled Valley Bottoms	Standard conditions/RQO's	EcoStatus and RQOs	Use current desktop model	Rountree *et al.*, 2012	No formal publication, but refer to approaches used on Nyl floodplain by Birkhead *et al.* (2007).	
Floodplains	Standard conditions/RQO's	EcoStatus and RQOs	Use current desktop model	Rountree *et al.*, 2012	No formal publication, but refer to approaches used at EWR site 7 on the large Wilge Floodplain (DWA, 2010).	

Figure 4.2 Characteristics of the various levels of RDM assessments (published methods) according to wetland type and level of Reserve study (DWA, 2012)

4.3 ASSESS/VALIDATE ECOSTATUS OF PRIORITY WETLANDS

The EcoStatus was assessed, or where an assessment existed, was validated for wetlands with High and Very High priority, and instances where wetland density or extent was notable. Note that small isolated wetlands of High priority, e.g. seeps and valley-bottom wetlands in the Ugie vicinity, were not assessed due to their high numbers but low density. WET-Health (MacFarlane et al., 2007) was used to determine the PES for large floodplains and representative channelled valley-bottom wetlands (WET-Health spreadsheets and Google Earth kml shapes are available in electronic format). PESEIS (DWS, 2014) metrics for the riparian/wetland assessments were used as a starting point for most channelled and unchannelled valley-bottom wetlands and were verified using Google Earth ©, and seeps were evaluated in the same way using Google Earth and associated with the nearest SQ.

4.3.1 Mzimvubu floodplains

The extent of the Mzimvubu floodplains near Cedarville that were assessed are shown in **Figure 4.3**. The vegetation component of WET-Health demonstrates an ecological category of D with a negative trajectory. The extent and nature of disturbances within the floodplains of this wetland complex are shown in **Table 4.1**. Agricultural use of the floodplains, as well as the damming of water comprise the majority of impacts.

Table 4.1 Extent of disturbance within the Mzimvubu floodplains

Disturbance class	Extent (%) of HGM		
	Floodplain 1	Floodplain 2	Floodplain 3
Infrastructure	3	3	2
Shallow flooding by dams	3	5	15
Agricultural activities / crop lands	15	25	25
Perennial pastures	15	15	15
Canals / trenching / furrows	2	2	2
Old / abandoned lands	5	5	10
Dense alien vegetation patches.	3	3	3

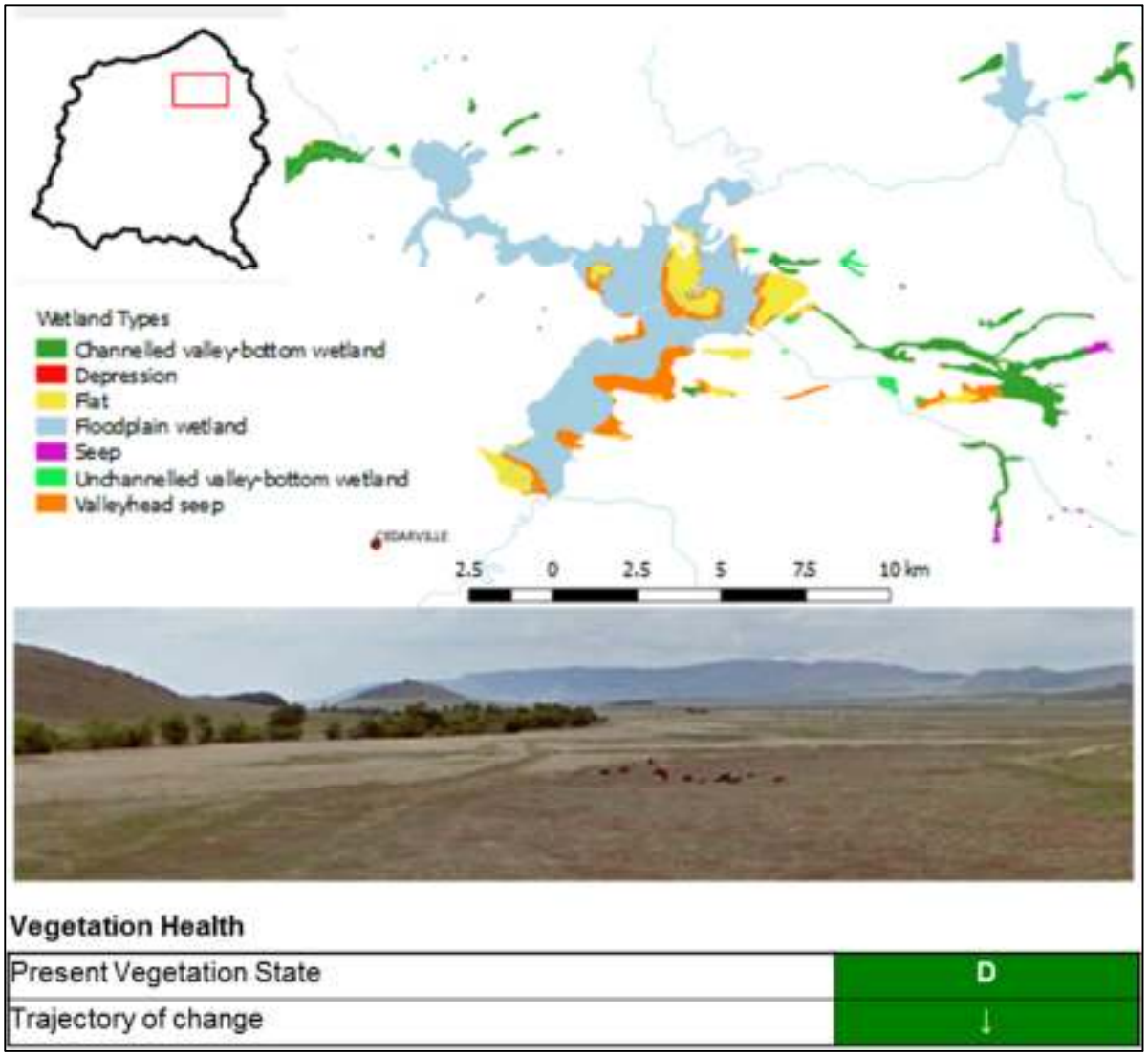

Figure 4.3 Mzimvubu floodplains that were assessed with WET-Health Level 2 using Google Earth ©

4.3.2 Matatiele floodplains

The extent of the Matatiele floodplains that were assessed are shown **Figure 4.4**. The vegetation component of WET-Health demonstrates an ecological category of D with a negative trajectory. The extent and nature of disturbances within the floodplains of this wetland complex are shown in **Table 4.2**. Agricultural use of the floodplains is the major impact.

Table 4.2 Extent of disturbance within the Matatiele floodplains

Disturbance class	Extent (%) of HGM	
	Floodplain 1	Floodplain 2
Infrastructure	2	8
Shallow flooding by dams	2	5
Agricultural activities / crop lands	35	25
Perennial pastures	15	10
Canals / trenching / furrows	2	2
Old / abandoned lands	10	5
Dense alien vegetation patches.	3	3

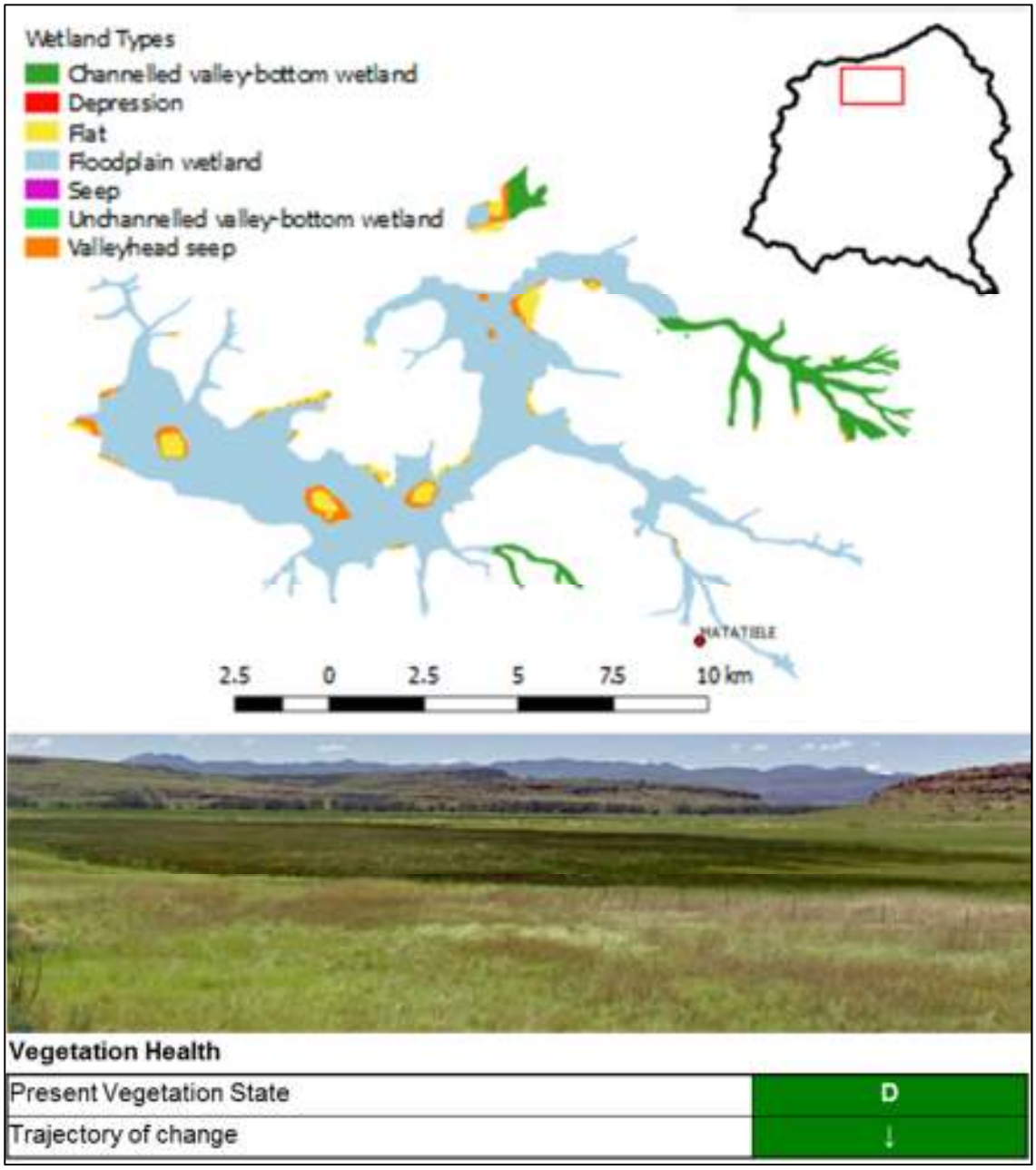

Figure 4.4 Mataiele floodplains that were assessed with WET-Health Level 2 using Google Earth ©.

4.3.3 Gatberg floodplains

The extent of the Gatberg floodplains near Ugie that were assessed are shown in **Figure 4.5**. The vegetation component of WET-Health demonstrates an ecological category of B with a stable trajectory. The extent and nature of disturbances within the floodplains of this wetland complex are shown in **Table 4.3**. Commercial forestry encroachment into wetlands and some agricultural use of the floodplains comprise the majority of impacts.

Table 4.3 Extent of disturbance within the Gatberg floodplains

Disturbance class	Extent (%) of HGM	
	Floodplain 1	Floodplain 2
Infrastructure	1	1
Shallow flooding by dams	0	0
Agricultural activities / crop lands	0	5
Perennial pastures	2	2
Canals / trenching / furrows	1	1
Old / abandoned lands	0	2
Dense alien vegetation patches.	0	1
Commercial plantations / forestry	10	10

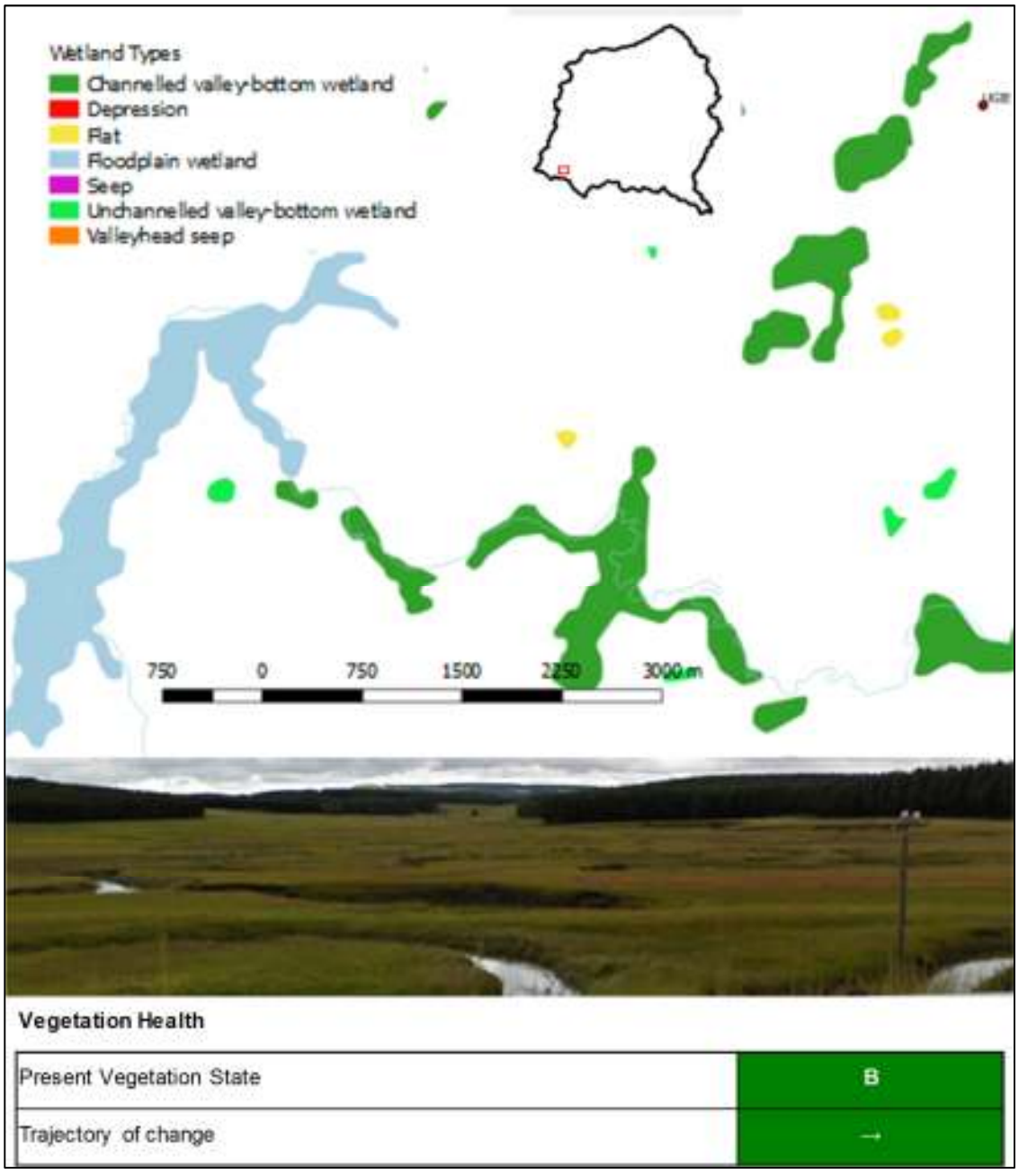

Figure 4.5 Gatberg floodplains that were assessed with WET-Health Level 2 using Google Earth ©

A summary of high priority floodplains is shown in **Table 4.4** with some indication of a proposed REC and strategies to achieve said.

Table 4.4 Validated PES and REC for floodplain wetlands with High or Very High priority

Note: some SQs contain other wetland HGMs as well, e.g. the Gatberg (T35G-06099) also has channelled valley-bottom wetlands (see below).

Name	HGM	Includes SQs	Size (Ha)	Present vegetation state	Trajectory of change	REC	How to achieve REC
Mzimvubu floodplain	1) Floodplain, 2) Floodplain, 3) Floodplain	T31F-05112, T31F-05108, T31F-05111, T31D-05076, T31E-05013	2678	D	↓	C	1) Remove alien trees along the active channel; 2) restrict, reduce and manage agricultural activities within wetland; 3) no additional dams within wetland area.
Matatiele floodplain	1) Floodplain, 2) Floodplain	T33A-04990, T33A-04991, T33A-05011	4837	D	↓	C	1) Remove alien trees along the active channel and wattle stands; 2) restrict, reduce and manage agricultural activities within wetland, especially floodplain manipulation; 3) no additional dams within wetland area; 4) restrict urban sprawl.
Gatberg floodplain	1) Floodplain, 2) Floodplain	T35G-06099,T35G-06133,T35G-06118	198	B	→	B	1) Continue current management regime; 2) prevent additional forestry within wetlands; 3) restrict agricultural encroachment.

4.3.4 Valley-bottom and seep wetlands

All High and Very High priority wetlands which were not floodplain wetlands were reassessed using Google Earth© and included channelled and unchannelled valley-bottom wetlands, seeps and valleyhead seeps and flats. The assessment was based the methodology of the PESEIS project, i.e. the rating of wetland modification as well as habitat continuity modification, but focussed on the wetland components within each SQ. It should be noted that while the PESEIS project focussed directly on the delineated SQ (i.e. a section of river channel), this assessment focussed on all wetland components within the SQ catchment, i.e. included wetlands not necessarily directly linked to the delineated SQ. It should also be noted that some SQ delineations are applicable to more than one wetland HGM and may therefore be represented more than once but in a different context, e.g. the Gatberg (T35G-06099) is associated with both channelled valley-bottom wetlands as well as floodplain wetlands. The results of EcoStatus validation are shown in **Table 4.5**. and include a proposed REC as well as strategies to promote achieving the REC. An REC which was an improvement on the PES was only suggested where PES was worse than a category D or where management towards improvement is practically achievable.

Table 4.5 Validated PES and REC for non-floodplain wetlands with High or Very High priority

Note: some SQs contain other wetland HGMs as well, e.g. the Gatberg (T35G-06099) also has extensive floodplain wetlands (see above).

SQ PESEIS	Name	SQ [Wetland] PES	Validated PES	Reason for updated PES	REC	Strategy to achieve the REC	Integrated Environmental Importance (IEI)	Wetland priority
T31B-04745	Krom	B	C	Several large dams in SQ and dense alien vegetation in places; severe agriculture in lower portions.	B/C	Remove alien vegetation; restrict and manage agricultural encroachment.	5	3
T31B-04873		B	C	Several large and small dams; some alien vegetation; some agricultural encroachment.	B/C	Remove alien vegetation;, restrict and manage agricultural encroachment; disallow additional dams.	5	3
T31C-04879	Nyongo	C	C	No change.	C	No viable options for improvement.	5	3
T31D-04936	Riet	B/C	C/D	Extensive agricultural encroachment into wetland areas; several dams in SQ; some alien vegetation.	C	Restrict and manage agricultural encroachment within wetlands.	5	3
T31E-05013	Tswereka	D	D	No change.	C	Restrict and manage agricultural encroachment within wetlands; remove alien vegetation.	3	3
T31E-05055		C	C	No change.	B/C	Restrict and manage agricultural encroachment within wetlands.	5	3
T31F-05108		B	D	Several dams along channel; severe agricultural encroachment into wetlands.	C/D	Restrict and manage agricultural encroachment within wetlands.	5	3

SQ PESEIS	Name	SQ [Wetland] PES	Validated PES	Reason for updated PES	REC	Strategy to achieve the REC	Integrated Environmental Importance (IEI)	Wetland priority
T31F-05111	Mzimvubu	B	B	No change.	B	No viable options for improvement.	5	3
T32A-04907	Mzintlanga	C	D	Several dams along channel; severe agricultural encroachment into wetlands.	C/D	Restrict and manage agricultural encroachment within wetlands.	5	3
T32A-04965	Mzintlava	C	C	No change.	C	No viable options for improvement.	5	3
T32B-05116		C	C	No change.	B/C	Remove alien vegetation; restrict and manage agricultural encroachment.	5	4
T32C-05243	aManzamnyama	C	D	Extensive agricultural encroachment and erosion.	C	Restrict and manage agricultural encroachment within wetlands.	5	3
T32C-05273	Mzintlava	D	D	No change.	D	No viable options for improvement.	3	3
T32C-05313	Mzintlava	B	B/C	Agricultural encroachment into wetland areas.	B	Restrict and manage agricultural encroachment within wetlands.	5	4
T32D-05172	Droewig	C	C	No change.	B/C	Remove alien vegetation; restrict and manage agricultural and forestry encroachment.	5	3
T32D-05352	Mzintlava	D	D	No change.	D	No viable options for improvement.	3	3
T32D-05373	Mzintlava	D/E	D/E	No change.	D	Remove alien vegetation; restrict agricultural encroachment.	3	3
T32F-05464	Mzintlava	D	D	No change.	D	No viable options for improvement.	3	3

SQ PESEIS	Name	SQ [Wetland] PES	Validated PES	Reason for updated PES	REC	Strategy to achieve the REC	Integrated Environmental Importance (IEI)	Wetland priority
T32H-05842	Mzintlava	C	C	No change.	C	No viable options for improvement.	3	3
T33A-04928		B/C	D	Wetlands in the lower portion of SQ; severe agricultural encroachment and erosion.	C/D	Restrict and manage agricultural encroachment within wetlands.	4	3
T33G-05659	Mzimvubu	B	B	No change.	B	No viable options for improvement.	4	3
T34H-05772	Thina	B	B	No change.	B	No viable options for improvement.	5	3
T34H-05826	Ngcothi	B/C	B/C	No change.	B	Removal of alien vegetation.	4	3
T34K-05835	Thina	B/C	B/C	No change.	B/C	No viable options for improvement.	4	3
T35C-05874	Mooi	C/D	D	Agricultural encroachment into wetland areas; alien vegetation.	C	Remove alien vegetation; restrict and manage agricultural encroachment into wetland areas.	3	3
T35D-05844	Mooi	B	B	No change.	B	No viable options for improvement.	5	3
T35E-05908	Tsitsa	C	C	No change.	B/C	Could address erosion in lower section of SQ, but not easy.	3	4
T35E-05977	Tsitsa	C	C	No change.	B/C	Remove alien vegetation along the active stream.	3	4
T35F-05973	Kuntombizininzi	B	B	No change.	B	No viable options for improvement.	5	4
T35F-05999	Inxu	B/C	B/C	No change.	B	Remove alien vegetation along the active stream.	4	3
T35F-06020	Inxu	D	D	No change.	C/D	Remove alien vegetation along the active stream.	3	3

SQ PESEIS	Name	SQ [Wetland] PES	Validated PES	Reason for updated PES	REC	Strategy to achieve the REC	Integrated Environmental Importance (IEI)	Wetland priority
T35G-06002	Inxu	C	C	No change.	C	No viable options for improvement.	3	3
T35G-06021	Inxu	C	C	No change.	C	No viable options for improvement.	3	3
T35G-06069	Gatberg	B/C	B	Forestry encroachment minimal.	B	No viable options for improvement.	5	4
T35G-06074	Gatberg	B/C	B/C	No change.	B	Restrict and manage agricultural encroachment within wetlands.	4	4
T35G-06099	Gatberg	B/C	B	Other than dam and the end of the SQ; wetland integrity high.	B	No viable options for improvement.	5	3
T35G-06108	Inxu	B	B	No change.	B	No viable options for improvement.	5	4
T35G-06135	Gqaqala	C	C	No change.	B	Restrict and manage agricultural encroachment within wetlands.	5	4
T35G-06148		A	B	Starts in a small farm dam.	B	No viable options for improvement.	5	4
T35H-06240	KuNgindi	C	C	No change.	B/C	Remove alien vegetation; restrict and manage agricultural encroachment into wetland areas.	5	3
T35K-06037	Tsitsa	C	C	No change.	B/C	Restrict and manage agricultural encroachment within wetlands.	5	4
T35K-06167	Xokonxa	C	C	No change.	B/C	Remove alien vegetation; restrict and manage agricultural encroachment.	3	3

SQ PESEIS	Name	SQ [Wetland] PES	Validated PES	Reason for updated PES	REC	Strategy to achieve the REC	Integrated Environmental Importance (IEI)	Wetland priority
T35L-05976	Tsitsa	C	C	No change.	C	No viable options for improvement.	5	4
T35L-06190	Tsitsa	B	B	No change.	B	No viable options for improvement.	5	4
T35M-06187	Tsitsa	B	B	No change.	B	No viable options for improvement.	4	4
T36A-06250	Mzimvubu	C	C	No change.	C	No viable options for improvement.	3	4

4.4 DETERMINATION OF THE EWR

4.4.1 Floodplains

The EWR of high priority floodplain wetlands may be a quantitative flow regime, mostly related to specific flood events that are required for floodplain inundation and sediment and nutrient dynamics, and can be extrapolated to up- or downstream similar floodplains utilising procedures outlined as part of the river process, but this option is low confidence and only possible where EWR river sites also include, or are close to, floodplains. Instead, the EWR for floodplains in this assessment has made use of an aerial estimation of impacts within respective floodplains (using the vegetation component of WET-Health) to quantify a PES. Based on the impacts and what's practically achievable, a REC has been proposed and the maintenance of this REC forms the EWR of the floodplain (see **Tables 4.1** to **4.4** for impact estimations and REC strategies).

4.4.2 Valley bottoms and seeps

The EWR of high priority channelled and unchannelled valley-bottom and seep wetlands is expressed through ecological specifications (or ecospecs) that protect the habitat. To provide these specifications, the EWRs are expressed in terms of a REC (see **Table 4.5**), which is dependent on the PES, and the ecological importance denotes whether the REC is the same as the PES or an improvement, if at all possible. Where the REC is an improvement of the PES, this will involve management of land use. The most common method to achieve the REC where it is higher than the PES is to remove alien vegetation (notably *Salix fragilis* or *Acacia mearnsii*), reduce agricultural encroachment of wetlands and manage (usually reduce) grazing pressures which can promote erosion.

5 CONCLUSION

The desktop EcoClassification of wetlands was summarised at the SQ level and formed the basis of a preliminary prioritisation (**Table 3.1**). Of the 186 SQs in T3, 53 had High or Vey High ecologically important wetlands and 53 had a High or Very High priority due to high water resource demand, but it should be noted that in many cases ecologically important wetlands did not have high priority because demand on water resources was not high, or wetlands that were only moderately ecologically important had a high priority rating because of high water resources demand. As such, many ecologically important wetlands do not feature in this assessment. Another important consideration is to note that although the wetlands are represented by 186 SQs, there are many more than 186 wetland HGMs, and although some are directly related to the linear SQ delineation frequently used, many more are not. While these have been considered here, their results are nevertheless summarised according to the standard SQ delineations.

High and Very High priority wetlands formed three distinct groupings of wetland HGM types (**Figure 4.1**). These are mainly: 1) floodplain wetlands and a few associated channelled valley bottoms in the Matatiele (Kinira), Cedarville (Mzimvubu floodplain) Ugie (Gatberg) areas; 2) higher density seep and channelled valley-bottom wetlands in zones 1 (especially quaternary T31B), 2 (especially quaternary T31D), 3 (especially quaternaries T3A-D) and 5 (especially in the Ugie and Maclear vicinity) in higher lying areas; and 3) channelled valley-bottom wetlands (which more likely are inset or bench floodplain features) along the main channels of the Tsitsa, Thina and Mzintlava rivers, mostly towards confined valley and gorge areas. The latter group (3) are usually assessed for EWR when the riparian zone is assessed at EWR sites for rivers due to their direct association with the river and its functions. The EWR for such channelled valley-bottom wetlands (or inset and flood bench riparian features) will therefore be a quantitative flow regime, mostly related to specific flood events that are required for wetland/feature inundation and sediment and nutrient dynamics. Such a flow regime could be adjusted for extrapolation to upstream and downstream similar such wetland features (as per procedures used in the determination of the EWR for rivers).

The EWR of high priority floodplains, channelled and unchannelled valley-bottom, and seep wetlands is expressed through ecological specifications that protect the habitat. To provide these specifications, the EWRs are expressed in terms of a REC (see **Table 4.5**), which is dependent on the PES and the ecological importance, which denotes whether the REC is the same as the PES or an improvement, if at all possible. Where the REC is an improvement of the PES, this will involve management of land use. The most common method to achieve the REC where it is higher than the PES is to remove alien vegetation (notably *Salix fragilis* or *Acacia mearnsii*), reduce agricultural encroachment of wetlands and manage (usually reduce) grazing pressures which can promote erosion.

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