DETERMINATION OF WATER RESOURCE CLASSES, RESERVE AND RESOURCE QUALITY OBJECTIVES STUDY FOR SECONDARY CATCHMENTS A5 – A9 WITHIN THE LIMPOPO WATER MANAGEMENT AREA (WMA 1) AND SECONDARY CATCHMENT B9 IN THE OLIFANTS WATER MANAGEMENT AREA (WMA 2)

EVALUATION OF RESOURCE UNIT REPORT

FINAL

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Private Bag X313
Pretoria, 0001
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Tel: (012) 336 7500 / +27 12 336 7500
Fax: (012) 336 6731 / +27 12 336 6731

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Prepared by:

> Myra Consulting (Pty) Ltd in association with Southern Waters, Anchor Research & Monitoring and Delta-H Groundwater Systems (Pty) Ltd.

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Authors:	A. Singh, J. MacKenzie, M. Holland, J.N. Rossouw, C. Todd, M. Ross, B. van der Waal, K Reinecke
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Professional Service Provider: Myra Consulting (Pty) Ltd
Approved for the PSP by:

…….. ……..
Adhishri Singh Date
Project Manager

Department of Water and Sanitation: Chief Directorate: Water Ecosystems Management

Supported by: Recommended by:

…….. .....……
Signature Signature

…….. ……..
Project Manager Scientific Manager

Approved for the Department of Water and Sanitation by:

…….. ……..
Signature Date

……..
Director

DOCUMENT INDEX

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Bold type indicates this report.

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03	WEM/WMA01&02/00/CON/RDM/0322	Delineation and Status Quo Report
04	WEM/WMA01&02/00/CON/RDM/0422	Linking the value and condition of the Water Resources Report
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14	WEM/WMA01&02/00/CON/RDM/0325	Draft Resource Quality Objectives and Confidence Report
15	WEM/WMA01&02/00/CON/RDM/0425	Monitoring Programme to support RQOs and Reserve Implementation Report
16	WEM/WMA01&02/00/CON/RDM/0525	Water Resources Classes, Reserve and RQOs Gazette Template
17	WEM/WMA01&02/00/CON/RDM/0625	Project Close-Out Report

ACRONYMS

ACRONYMS	DESCRIPTION
ASPT	Average Score Per Taxon
CD	Chief Directorate
DO	Dissolved Oxygen
DWA	Department of Water Affairs
DWAF	Department of Water Affairs and Forestry
DWS	Department of Water and Sanitation
EC	Electrical Conductivity
EI	Ecological Importance
EIS	Ecological Importance and Sensitivity
ES	Ecological Sensitivity
EWR	Ecological Water Requirement
FRAI	Fish Response Assessment Index
FSC	Full Supply Capacity
GDP	Gross Domestic Product
GEP	Groundwater Exploitation Potential
GRU	Groundwater Resource Units
GW	Groundwater
GWBF/EWR	Groundwater Baseflow/Ecological Water Requirements
GWBF/RE	Groundwater Baseflow/Recharge
Ha	Hectares
HDAM	Hydrological Drought Analysis Model
HGM	Hydrogeomorphic
IAP	Invasive Alien Plants
IEI	Integrated Environmental Importance
IR	Irreplaceable
IS	Importance Score
IUA	Integrated Unit of analysis
MAR	Mean Annual Runoff
MCB	Macro Channel Bank
MCM	Million Cubic Metres
MIRAI	Macroinvertebrate Response Assessment Index
N/A	Not applicable
NEC	Nest Ecological Category
NH_3-N	Ammonia
PES	Present Ecological Status
PESEIS	Present Ecological State Ecological Importance and Sensitivity

ACRONYMS	DESCRIPTION
PO_4-P	Orthophosphates
Pr	Priority
QUAT	Quaternary
RDM	Resource Directed Measures
REC	Recommended Ecological Category
RHP	River Health Programme
RQOs	Resource Quality Objectives
RRU	River Resource Unit
RU	Resource Unit
RUPT	Resource Unit Prioritisation Tool
SANLC	South African National Landcover
SARCOF	South African Regional Climate Outlook Forum
SASS5	South African Scoring System version 5
SAWS	South African Weather Service
SCI	Socio-cultural Importance
SOF	System Operating Forum
SQ	Sub-quaternary
STCCs	Short Term Characteristic Curves
SWSA-GW	Strategic Water Source Area - Groundwater
TDS	Total Dissolved Salts
TEC	Target Ecological Category
TIN	Total Inorganic Nitrogen
VU	Vulnerable
WEM	Water Ecosystems Management
WMA	Water Management Area
WRUI	Water Resource Use Importance

EXECUTIVE SUMMARY

Introduction and approach to prioritising resource units and selecting appropriate sub-components and indicators for developing RQOs

Resource Quality Objectives (RQOs) are important management objectives against which monitoring data will be assessed and will indicate whether the Water Resource Class is being maintained. The development of Resource Quality Objectives (RQOs) is a seven-step process. Step 1 of the process is to delineate the Integrated Units of Analysis (IUA) and define the Resource Units (RUs) and Step 2, to establish a vision for the catchment was undertaken during the Classification phase of the project.

Due to the large number of RUs within the study area, a rationalisation process was necessary, using the RUPT to identify resource units which would be important to be monitored to ensure the protection of the water resource in accordance with the defined Water Resource Class of each IUA. This was the objective of Step 3 of the RQO process.

The study area comprising secondary catchments A5 to A9 in the Limpopo WMA and secondary catchment B9 in the Olifants WMA have been delineated into twelve IUAs. Figure E 1 shows the 12 delineated IUAs and the delineated and prioritised resource units for the rivers, groundwater, and wetlands.

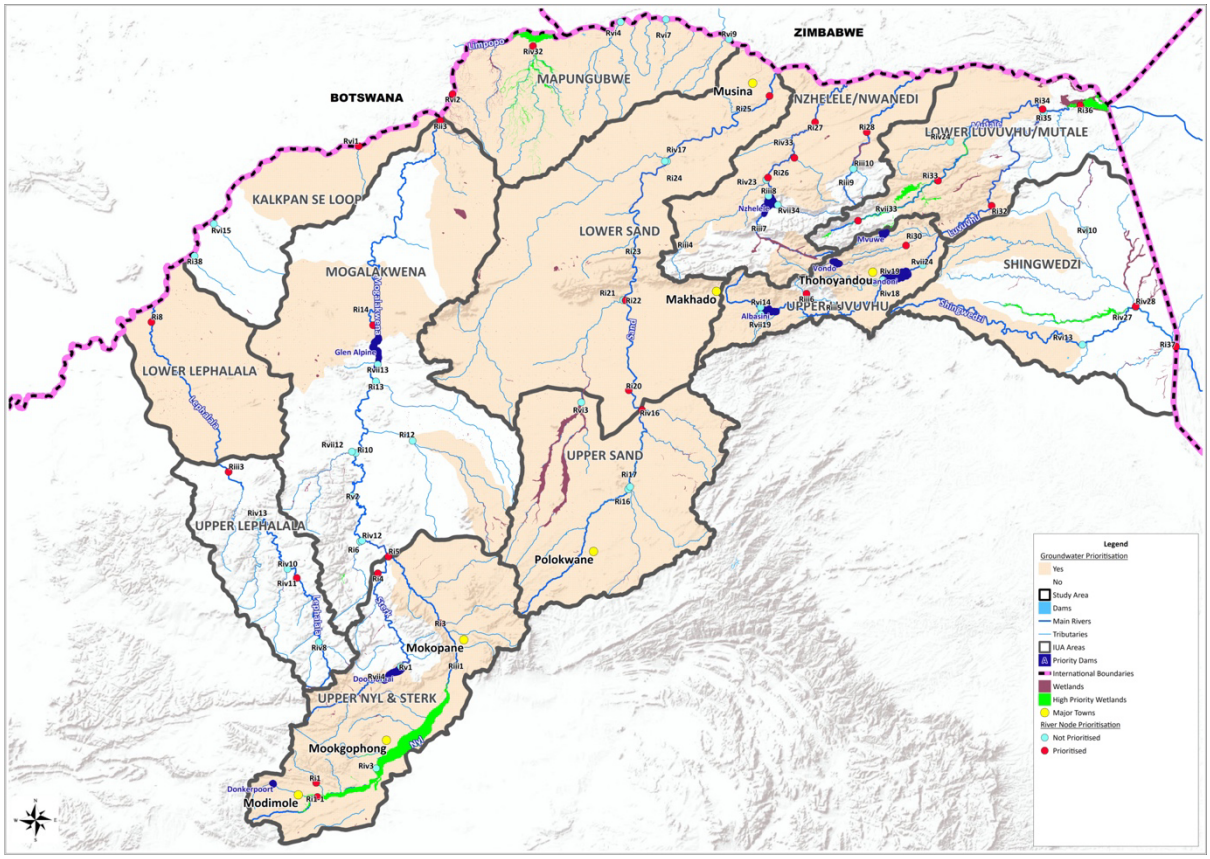

Figure E 1. Map of the delineated IUAs and river, groundwater, and wetland resource units

During Step 4 of the RQO process, the priority resource units were evaluated, using the Resource Unit Evaluation Tool or a modification of the Tool to establish the sub-components and indicators that may be important to either users or the environment and which should be protected to support the resource dependent activities and/or maintain the integrity and ecological functioning of the water resource.

Outcomes of the resource unit prioritisation and selection of sub-components and indicators process

Rivers

The prioritisation of the river resource units were based on (i) position of the resource unit within an IUA; (ii) importance of the resource unit to users; (iii) threats posed to users by current or planned future activities in the resource unit, (iv) the ecological importance of the resource unit; (v) threats faced by the ecological component of the resource unit; (vi) resource units where management actions should be prioritised; and (vii) practical considerations of determining and monitoring RQOs.

A total of seventy-five river RUs were delineated across the study area. Thirty of the RU were prioritised as high priority that would go forward as important resource units for developing and monitoring the RQOs. Sub-components and indicators were selected to represent each of the high priority river RUs. For nineteen of the high priority RUs, baseline data exists, and continued monitoring will need to be undertaken to ensure the target ecological categories are met. For these RU, narrative and numerical RQOs will be set, where possible. For eleven of the RUs, no baseline data exists and for these sites it would be important to set up a baseline monitoring programme. After a few years of collecting monitoring data, it would be possible to develop the Numerical RQOs for each site. Table E 1 provides the sub-components and indicators that would be important to be measured for the high priority river RUs.

Twenty-four RUs were rated medium priority. Over time, a baseline monitoring programme should be established for these RUs after which RQOs can be developed. Table E 2 provides the sub-components and indicators that would be important to be measured for the medium priority river RUs. The monitoring of the high and medium priority RUs will provide good coverage for management of the area.

The PES, EI and ES are recommended to be assessed at each review of the PESEIS Desktop Spreadsheet Model to determine if there are any changes to the river condition for those RUs at a low priority.

Table E 1. Priority River Resource Units and selected Sub-components and Indicators

IUA		Upper Lephalala		Lower Lephalala Kalkpan se Loop		Upper Nyl/Sterk					Mogalakwena		Mapungubwe		Upper Sand	Lower Sand			Nzhelele/Nwanedi				Upper Luvuvhu		Lower Luvuvhu/Mutale					Shingwedzi	
Resource Unit		RRU-Riv11	RRU-Riii3	RRU-Ri8	RRU-Rvi1	RRU-Ri4	RRU-Ri1	RRU-Ri1-1	RRU-Ri3	RRU-Ri5	RRU-Ri14	RRU-Rii3	RRU-Rvi2	Riv32	RRU-Riv16	RRU-Ri20	RRU-Ri22	RRU-Ri25	RRU-Ri26	RRU-Riv33	RRU-Ri27	RRU-Ri28	RRU-Riii6	RRU-Ri30	RRU-Ri32	RRU-Rvii33	RRU-Ri33	RRU-Ri34	RRU-Ri36	RRU-Riv28	RRU-Ri37
Sub-component	Indicator																														
Low flow	Maintenance low flow	X		X	X		X			X	X	X		X		X		X			X	X	X	X		X	X	X		X
High flow	Maintenance high flow	X		X	X		X			X	X			X		X		X			X	X	X	X		X	X	X		X
	Discharge		X			X		X	X				X		X	X	X		X	X						X				X	
Geomorphology	IHI score															X														X	
	GAI Score	X					X			X	X							X			X	X	X	X	X		X	X	X		X
	Bed erosion	X		X	X		X			X	X	X		X		X		X			X	X	X	X	X		X	X	X		X
	Bank erosion	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X		X
	Flood bench	X	X	X		X	X	X	X	X	X	X	X		X	X		X	X	X	X	X	X	X	X	X	X	X	X	X		X
	Sediment size	X	X	X		X	X	X	X	X	X	X	X		X	X		X	X	X	X	X	X	X	X	X	X	X	X	X		X
	Pool depth	X	X	X		X	X	X	X	X	X	X	X		X			X	X	X	X	X	X	X	X	X	X	X	X	X		X
	Embeddedness	X	X	X		X	X	X	X	X	X	X	X		X			X	X	X	X	X	X	X	X	X	X	X	X	X		X
Salts	Electrical conductivity (EC)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

IUA		Upper Lephalala		Lower Lephalala Kalkpan se Loop		Upper Nyl/Sterk					Mogalakwena		Mapungubwe		Upper Sand	Lower Sand			Nzhelele/Nwanedi				Upper Luvuvhu		Lower Luvuvhu/Mutale					Shingwedzi	
Resource Unit		RRU-Riv11	RRU-Riii3	RRU-Ri8	RRU-Rvi1	RRU-Ri4	RRU-Ri1	RRU-Ri1-1	RRU-Ri3	RRU-Ri5	RRU-Ri14	RRU-Ri3	RRU-Rvi2	Riv32	RRU-Riv16	RRU-Ri20	RRU-Ri22	RRU-Ri25	RRU-Ri26	RRU-Riv33	RRU-Ri27	RRU-Ri28	RRU-Riii6	RRU-Ri30	RRU-Ri32	RRU-Rvii33	RRU-Ri33	RRU-Ri34	RRU-Ri36	RRU-Riv28	RRU-Ri37
Sub-component	Indicator																														
Nutrients	Total Inorganic nitrogen (TIN)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Orthophosphate (PO_4-P)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
System variables	Dissolved oxygen	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	pH	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Water temperature	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	TSS																									X		X		X	
Toxins	Ammonia (NH3-N)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Atrazine	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Endosulfan	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Pathogens	Escherichia coli (E coli)	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

IUA		Upper Lephalala		Lower Lephalala Kalkpan se Loop		Upper Nyl/Sterk					Mogalakwena		Mapungubwe		Upper Sand	Lower Sand			Nzhelele/Nwanedi				Upper Luvuvhu		Lower Luvuvhu/Mutale					Shingwedzi	
Resource Unit		RRU-Riv11	RRU-Riii3	RRU-Ri8	RRU-Rvi1	RRU-Ri4	RRU-Ri1	RRU-Ri1-1	RRU-Ri3	RRU-Ri5	RRU-Ri14	RRU-Ri3	RRU-Rvi2	Riv32	RRU-Riv16	RRU-Ri20	RRU-Ri22	RRU-Ri25	RRU-Ri26	RRU-Riv33	RRU-Ri27	RRU-Ri28	RRU-Riii6	RRU-Ri30	RRU-Ri32	RRU-Rvii33	RRU-Ri33	RRU-Ri34	RRU-Ri36	RRU-Riv28	RRU-Ri37
Sub-component	Indicator																														
	Faecal coliforms	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Riparian Vegetation - Aquatic zone	Key species	X																									X				
Riparian vegetation - Marginal zone	Dominant vegetation	X			X		X			X	X	X												X	X		X	X			
	Key species	X			X		X			X	X	X												X	X		X	X			
	Alien plant species	X			X		X			X	X	X												X	X		X	X			
	Terrestrial woody cover	X			X		X			X	X	X												X	X		X	X			
	Indigenous woody	X			X		X			X	X													X	X		X	X			
	Non-woody cover	X			X		X			X	X													X	X		X	X			
	Reed cover	X			X		X			X	X	X												X	X		X				
Riparian Vegetation - Marginal Zone (bed)	Dominant vegetation			X												X		X			X	X	X						X		X
	Key species			X												X					X	X	X						X		

IUA		Upper Lephalala		Lower Lephalala Kalkpan se Loop		Upper Nyl/Sterk					Mogalakwena		Mapungubwe		Upper Sand	Lower Sand			Nzhelele/Nwanedi				Upper Luvuvhu		Lower Luvuvhu/Mutale						Shingwedzi	
Resource Unit		RRU-Riv11	RRU-Riii3	RRU-Ri8	RRU-Rvi1	RRU-Ri4	RRU-Ri1	RRU-Ri1-1	RRU-Ri3	RRU-Ri5	RRU-Ri14	RRU-Rii3	RRU-Rvi2	Riv32	RRU-Riv16	RRU-Ri20	RRU-Ri22	RRU-Ri25	RRU-Ri26	RRU-Riv33	RRU-Ri27	RRU-Ri28	RRU-Riii6	RRU-Ri30	RRU-Ri32	RRU-Rvii33	RRU-Ri33	RRU-Ri34	RRU-Ri36	RRU-Riv28	RRU-Ri37
Sub-component	Indicator																															
	Alien plant species			X												X		X			X	X	X						X		X
	Non-woody cover																				X											
	Terrestrial woody cover			X												X		X			X	X	X						X		X
	Reed cover			X												X		X			X	X	X						X		X
Riparian Vegetation - Non-marginal zone (lower - flood benches)	Dominant vegetation	X			X					X	X			X		X					X	X		X	X		X	X			
	Key species	X			X					X	X			X		X					X	X		X	X		X	X			
	Alien plant species	X			X					X	X			X		X					X	X		X	X		X	X			
	Terrestrial woody cover	X			X					X	X			X		X					X	X		X	X		X	X			
	Indigenous woody cover	X			X					X	X													X	X		X	X			
	Non-woody cover	X			X					X	X					X					X			X	X		X	X			

IUA		Upper Lephalala		Lower Lephalala Kalkpan se Loop		Upper Nyl/Sterk					Mogalakwena		Mapungubwe		Upper Sand	Lower Sand			Nzhelele/Nwanedi				Upper Luvuvhu		Lower Luvuvhu/Mutale					Shingwedzi	
Resource Unit		RRU-Riv11	RRU-Riii3	RRU-Ri8	RRU-Rvi1	RRU-Ri4	RRU-Ri1	RRU-Ri1-1	RRU-Ri3	RRU-Ri5	RRU-Ri14	RRU-Ri3	RRU-Rvi2	Riv32	RRU-Riv16	RRU-Ri20	RRU-Ri22	RRU-Ri25	RRU-Ri26	RRU-Riv33	RRU-Ri27	RRU-Ri28	RRU-Riii6	RRU-Ri30	RRU-Ri32	RRU-Rvii33	RRU-Ri33	RRU-Ri34	RRU-Ri36	RRU-Riv28	RRU-Ri37
Sub-component	Indicator																														
Riparian vegetation - Non-marginal zone (upper - banks)	Dominant vegetation	X		X	X		X			X	X	X		X		X		X			X	X	X	X		X	X	X		X
	Alien plant species	X		X	X		X			X	X	X		X		X		X			X	X	X	X		X	X	X		X
Riparian Zone	PES	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Species richness	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Threatened riparian species										X			X							X	X		X	X			X			
	Endemic riparian species	X					X			X	X					X						X	X	X	X	X		X			
Fish	FRAI score	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Overall fish health	X		X	X		X			X	X			X		X		X			X	X	X	X	X		X	X	X		X
	Species diversity	X		X	X		X			X	X			X		X		X			X	X	X	X	X		X	X	X		X
	Key species	X		X	X		X			X	X			X		X		X			X	X	X	X	X		X	X	X		X

IUA		Upper Lephalala		Lower Lephalala Kalkpan se Loop		Upper Nyl/Sterk					Mogalakwena		Mapungubwe		Upper Sand	Lower Sand			Nzhelele/Nwanedi				Upper Luvuvhu		Lower Luvuvhu/Mutale					Shingwedzi	
Resource Unit		RRU-Riv11	RRU-Riii3	RRU-Ri8	RRU-Rvi1	RRU-Ri4	RRU-Ri1	RRU-Ri1-1	RRU-Ri3	RRU-Ri5	RRU-Ri14	RRU-Rii3	RRU-Rvi2	Riv32	RRU-Riv16	RRU-Ri20	RRU-Ri22	RRU-Ri25	RRU-Ri26	RRU-Riv33	RRU-Ri27	RRU-Ri28	RRU-Riii6	RRU-Ri30	RRU-Ri32	RRU-Rvii33	RRU-Ri33	RRU-Ri34	RRU-Ri36	RRU-Riv28	RRU-Ri37
Sub-component	Indicator																														
Macroinvertebrates	MIRAI Category and Score	X	X			X	X	X	X	X	X		X		X		X		X	X	X	X	X	X	X	X	X	X		X	
	SASS5 Total Score and ASPT	X	X			X	X	X	X	X	X		X		X		X		X	X	X	X	X	X	X	X	X	X		X	
	Key taxa and abundance	X		X	X		X			X	X			X		X		X			X	X	X	X	X		X	X	X		X
	Taxon dominance	X		X	X		X			X	X			X		X		X			X	X	X	X	X		X	X	X		X

Table E 2.Sub-components and indicators proposed for the medium priority river resource units

IUA		Upper Lephalala IUA		Kalkpan se Loop IUA		Upper Nyl/Sterk IUA				Mogalakwena IUA		Mapungubwe IUA			Upper Sand IUA		Lower Sand IUA	Nzhelele and Nwanedi IUA				Upper Luvuvhu IUA			Shingwedzi River IUA
Resource Unit		RRU-Riv8	RRU-Riv13	RRU-Ri38	RRU-Rvi15	RRU-Rvii4	RRU-Rv1	RRU-Riv3	RRU-Riii1	RRU-Ri6	RRU-Ri13	RRU-Rvi4	RRU-Rvi7	RRU-Rvi9	RRU-Ri16	RRU-Ri17	RRU-Ri23	RRU-Riii7	RRU-Rvii34	RRU-Riii9	RRU-Riii10	RRU-Rvii19	RRU-Riii5	RRU-Riv18	RRU-Rvi13
Sub-component	Indicator																								
Water Quantity	Discharge	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Riparian zone	PES	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Species richness	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Fish	FRAI	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Macroinvertebrates	MIRAI Category and Score	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	SASS5 Total Score and ASPT	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Dams

Priority dams were selected on their overall ranking of importance. The importance of the dam was based on (i) the anticipated level of impact of current and future use/ activities in the upstream catchments on the inflows to the dam, (ii) the importance of releases for EWRs downstream of the dam, (iii) on importance of the dam for in-dam activities and releases of water for downstream use (irrigation, domestic, mining and industries), (iv) the dams which have a negative impact on the quality of the dependent activities both in dam as well as the releases for the downstream users. The priority dams are listed in Table E 3.

In determining the choice of components, sub-components and indicators for developing dam RQOs, consideration was given to the purpose of the dam, current and future pressures on the dam, importance of the dam to downstream use and for recreational activities.

A generic list of sub-components and indicators which forms the basis for customising components for specific priority Dam RUs is provided in Table E 4.

Table E 3. Prioritised dams

IUA	Dam Name	River / Watercourse	Quaternary Catchment	MAR at Dam site	Capacity (million m3)	Purpose / Use
Nyl/Sterk	Donkerpoort	Little Nyl	A61A	5.3	2.4	Municipal Use & Industries
Nyl/Sterk	Doorndraai	Sterk	A61H	38.1	46.5	Municipal Use & Industrial Use
Mogalakwena	Glen Alpine	Mogalakwena	A62J	204	18.9	Irrigation
Nzhelele-Nwanedi	Nzhelele	Nzhelele	A80C	73.4	51.2	Irrigation
Upper Luvuvhu	Albasini	Luvuvhu	A91B	14.56	25.2	Irrigation, Domestic & Industrial Use
Upper Luvuvhu	Vondo	Mutshindudi	A91G	132.75	30.45	Irrigation
Upper Luvuvhu	Nandoni	Luvuvhu	A91F	30.8	164	Irrigation, Domestic, Industrial & Recreational Use
Upper Luvuvhu	Mvuwe	Mbwedi	A91G	132.75	11	Irrigation, Domestic & Industrial Use

Table E 4. Selected sub-components and indicators for priority dam resource units

Component	Subcomponent	Reason for selection	Indicator
Quantity	Dam releases	Dam storage levels determine the water allocations that can be supplied to each user sector with EWR a priority user	Percentage storage level based on decisions made at the start of the hydrological year as part of the annual operating analysis
Quality	Nutrients	The system must be maintained at concentrations where they do not impact negatively on the ecosystem, on	Total Phosphates (mg/l) Chlorophyll a (µg/l)

Component	Subcomponent	Reason for selection	Indicator
		agriculture and are acceptable for municipal treatments	
	Salts	Salt levels must be maintained at concentrations where they do not impact negatively on the ecosystem, on agriculture and are acceptable for municipal treatments	Electrical Conductivity (EC) (mS/m) Total dissolved salts (TDS) (mg/l)
	Pathogens	The system must be maintained in a state that is safe for contact recreation	Escherichia coli, Faecal coliforms
Biota	Fish	Fish abundance must be maintained at a level that fulfils ecosystem services roles of recreational angling and subsistence harvesting.	Maintain a stable catch per unit effort relative to previous surveys undertaken under similar seasons and conditions.
		Fish health to be maintained in a state that allows for consumption and recreational angling.	Overall health of individuals Parasite burden and bacterial infections impacting <1% of the fish population
Aquatic alien vegetation	Nutrients	There is a direct link of aquatic alien vegetation abundance and vigour to nutrients with the water column	Total Phosphates (mg/l) Chlorophyll a (µg/l)
	Extent of alien vegetation	Invasive aquatic alien plant species hace the potential to cover dams, causing fish kills and potentially unhealthy conditions for humans	% aerial cover of alien vegetation (% of dam surface area)

Wetlands

Since wetlands are numerous and scattered throughout the study area, and limited resources prevent detailed assessment of all of them it was necessary to identify high-priority wetlands or wetland groups. Only the highest priority wetlands are therefore earmarked for further analysis in the process. These high-priority areas were selected based on ecological, socio-cultural and water resource use importance and are often areas of high ecological importance where water resources are stressed or may be stressed in future.

The results of wetland prioritisation are geographically shown in Figure E 2 at the sub-quaternary (SQ). scale and are also tabulated in **Error! Reference source not found.**. SQs with Very High priority comprised 9.7% of SQs and 37.7% of SQs had a High priority leaving just over 52% of SQs with a Moderate or Low priority.

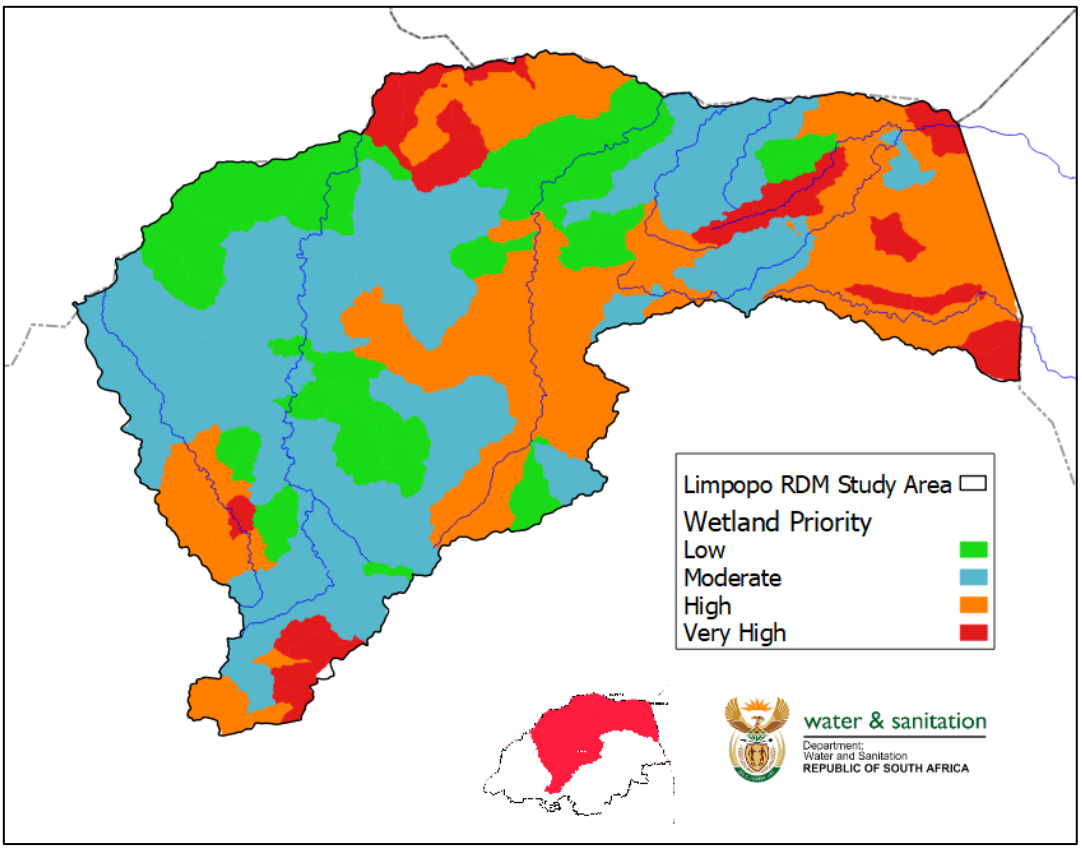

Figure E 2. Wetland priority per SQ.

Table E 5. Summary of infield verification of high priority wetlands.

High Priority Wetland	PES Score	PES Category	EI	ES	REC	Reason for REC	TEC	How to achieve the TEC
Luvuvhu Floodplain (Makuleke)	80	B/C	Very High	High	B	Very High EI supports half category increase	B	Reduce AIP; manage elephant impact
Nyl River Floodplain	65	C	Very High	High	B/C	Very High EI supports half category increase	B/C	Reduce AIP & artificial water storage; manage grazing & trampling pressure
Wonderkrater	80	B/C	Very High	Moderate	B	Very High EI supports half category increase	B	Reduce AIP; manage grazing & trampling pressure
Nyl Pans	57	D	High	High	C/D	High EI supports half category increase	C/D	Improve water quality
Maloutswa Floodplain	66	C	Very High	High	B/C	Very High EI supports half category increase	C	Maintain PES
Kolope Wetlands	90	A/B	Very High	Low	A/B	Maintain PES as already near natural	A/B	Maintain PES

High Priority Wetland	PES Score	PES Category	EI	ES	REC	Reason for REC	TEC	How to achieve the TEC
Lake Fundudzi	78	B/C	Very High	High	B	Very High EI supports half category increase	B	Reduce AIP
Mutale Wetlands	62	C/D	Very High	High	C	Very High EI supports half category increase	C	Reduce AIP & sand mining
Mokamole (tributary of the Mogalakwena)	80	B/C	High	High	B	High EI supports half category increase	B/C	Maintain PES
Malahlapanga	78	B/C	Very High	Moderate	B	Very High EI supports half category increase	B/C	Maintain PES
Bububu wetlands (tributary of the Shingwedzi)	97	A	Very High	Moderate	A	Maintain PES as already natural	A	Maintain PES

Components, sub-components and indicators were selected to represent each of the high priority wetlands. These are listed in Table E-6 and will be used to derive narrative and where possible numeric RQOs for each wetland / wetland complex.

Table E-6. Selected sub-components and indicators for the high priority wetlands

SQs	Component	Subcomponent	Indicator
Luvuvhu Floodplain (Makuleke) - river & floodplain complex with pans (3648 Ha)			
	Water quantity	Water Inputs	Hydrology (EWR)
			Depth to ground water on the floodplain
		Water distribution and retention patterns	Flooding by damming with the wetland
			Pan water level regime
	Habitat	Wetland vegetation structure / composition	Extent of natural wooded land within the wetland complex (land cover classes 1-4, 2020)
			Extent of herbaceous wetlands (land cover classes 22-23, 2020)
		Habitat fragmentation with the wetland delineation	Extent of alien invasive plants within the wetland / complex
			Aerial extent of developments within the wetland complex (includes mines and quarries, SANLC classes 68-72, built-up areas, infrastructure, canals, furrows and trenching , SANLC classes 47-67)
			Land cover classes denoted to cultivated areas within the wetland complex (classes 32-46 & 73, 2020)
	Biota	Waterbird species	Migratory species diversity dependent on wetland complex
			Wetland / floodplain birds (species diversity / abundance)
		Mammals	Mammal species diversity (wetland-dependent)
			Elephant abundance
			Hippo abundance (VU)
		Reptiles	Crocodile abundance
			Reptile species diversity (wetland-dependent)

SQs	Component	Subcomponent	Indicator
		Fish	Species diversity in the Luvuvhu River and perennial pans
		Amphibians	Frogs and toads (species diversity)
		Wetland plants	Endangered / unique species diversity
		Taxon richness	Number of wetland-dependent species
	Water quality	Sediments	Sediment deposition / scour balance
		Water chemistry	Water quality (effluent) to comply with effluent standards.
Nyl River floodplain (19378 Ha)			
	Water quantity	Water Inputs	Hydrology (EWR)
			Stream permanency
			Seasonality
		Water distribution and retention patterns	Flooding by damming within the wetland
	Habitat	Wetland vegetation structure / composition	Extent of natural grassland within the wetland complex (land cover classes 12-13; SANLC, 2020)
			Extent of natural wooded land within the wetland complex (land cover classes 1-4; SANLC, 2020)
			Extent of herbaceous wetlands (land cover classes 22-23; SANLC, 2020)
		Habitat fragmentation within the wetland delineation	Extent of alien invasive plants within the wetland / complex
			Extent of planted forest within the wetland complex (land cover classes 5-7; SANLC, 2020)
			Aerial extent of developments within the wetland complex (includes mines and quarries, SANLC classes 68-72, built-up areas, infrastructure, canals, furrows and trenching , SANLC classes 47-67)
			Land cover classes denoted to cultivated areas within the wetland complex (classes 32-46 & 73; SANLC, 2020)
	Biota	Waterbirds	Wetland is within 500m of a threatened waterbird point locality.
			Wetland / floodplain birds (species diversity / abundance)
		Mammals	Mammal species diversity (wetland-dependent)
		Reptiles	Reptile species diversity (wetland-dependent)
		Fish	Species diversity in the wetland (may be only during flooding)
		Amphibians	Frogs and toads (species diversity)
		Wetland plants	Endangered / unique species diversity
		Taxon richness	Number of wetland-dependent species
	Water quality	Sediments	Sediment deposition / scour balance
		Water chemistry	Water quality (effluent) to comply with effluent standards.
Wonderkrater depressional wetland (655ha)			
	Water quantity	Water Inputs	Depth to ground water (Spring)
	Habitat	Wetland vegetation structure / composition	Extent of natural grassland within the wetland complex (land cover classes 12-13; SANLC, 2020)
			Extent of natural wooded land within the wetland complex (land cover classes 1-4; SANLC, 2020)
			Extent of herbaceous wetlands (land cover classes 22-23; SANLC, 2020)
		Habitat fragmentation within the wetland delineation	Extent of alien invasive plants within the wetland / complex
			Extent of planted forest within the wetland complex (land cover classes 5-7; SANLC, 2020)
			Aerial extent of developments within the wetland complex (includes mines and quarries, SANLC

SQs	Component	Subcomponent	Indicator
			classes 68-72, built-up areas, infrastructure, canals, furrows and trenching , SANLC classes 47-67)
			Land cover classes denoted to cultivated areas within the wetland complex (classes 32-46 & 73; SANLC, 2020)
			Erosion / incision
	Biota	Wetland plants	Endangered / unique species diversity
		Taxon richness	Number of wetland-dependent species
Nyl Pans (valley bottom with a channel with depressional / lakes; 2096 Ha)			
	Water quantity	Water Inputs	Hydrology (EWR)
			Stream permanency
			Seasonality
	Habitat	Wetland vegetation structure / composition	Extent of natural grassland within the wetland complex (land cover classes 12-13; SANLC, 2020)
			Extent of natural wooded land within the wetland complex (land cover classes 1-4; SANLC, 2020)
			Extent of herbaceous wetlands (land cover classes 22-23; SANLC, 2020)
		Habitat fragmentation within the wetland delineation	Extent of alien invasive plants within the wetland / complex
			Extent of planted forest within the wetland complex (land cover classes 5-7; SANLC, 2020)
			Aerial extent of developments within the wetland complex (includes mines and quarries, SANLC classes 68-72, built-up areas, infrastructure, canals, furrows and trenching , SANLC classes 47-67)
			Land cover classes denoted to cultivated areas within the wetland complex (classes 32-46 & 73; SANLC, 2020)
		Lake area	Extent of natural open water (wet & dry season)
	Biota	Waterbird species	Wetland / floodplain birds (species diversity)
		Wetland plants	Endangered / unique species diversity
		Taxon richness	Number of wetland-dependent species
	Water Quality	Water chemistry	Water quality (effluent) to comply with effluent standards.
Maloutswa Floodplain (3888 Ha)			
	Water quantity	Water Inputs	Hydrology (EWR)
			Stream permanency
			Seasonality
		Water distribution and retention patterns	Flooding by damming within the wetland
	Habitat	Wetland vegetation structure / composition	Extent of natural grassland within the wetland complex (land cover classes 12-13; SANLC, 2020)
			Extent of natural wooded land within the wetland complex (land cover classes 1-4; SANLC, 2020)
			Extent of herbaceous wetlands (land cover classes 22-23; SANLC, 2020)
		Habitat fragmentation within the wetland delineation	Extent of alien invasive plants within the wetland / complex
			Extent of planted forest within the wetland complex (land cover classes 5-7; SANLC, 2020)
			Aerial extent of developments within the wetland complex (includes mines and quarries, SANLC classes 68-72, built-up areas, infrastructure, canals, furrows and trenching , SANLC classes 47-67)
			Land cover classes denoted to cultivated areas within the wetland complex (classes 32-46 & 73; SANLC, 2020)
			Erosion / incision
	Biota	Waterbirds	Wetland / floodplain birds (species diversity)

SQs	Component	Subcomponent	Indicator
		Mammals	Mammal species diversity (wetland-dependent)
		Wetland plants	Endangered / unique species diversity
		Taxon richness	Number of wetland-dependent species
	Water quality	Sediments	Sediment deposition / scour balance
		Water chemistry	Water quality (effluent) to comply with effluent standards.
Kolope Wetlands (Riverine; 27511 Ha)			
	Water quantity	Water Inputs	Hydrology (EWR)
		Water distribution and retention patterns	Flooding by damming within the wetland
	Habitat	Wetland vegetation structure / composition	Extent of natural grassland within the wetland complex (land cover classes 12-13; SANLC, 2020)
			Extent of natural wooded land within the wetland complex (land cover classes 1-4; SANLC, 2020)
			Extent of herbaceous wetlands (land cover classes 22-23; SANLC, 2020)
		Habitat fragmentation within the wetland delineation	Extent of alien invasive plants within the wetland / complex
			Extent of planted forest within the wetland complex (land cover classes 5-7; SANLC, 2020)
			Aerial extent of developments within the wetland complex (includes mines and quarries, SANLC classes 68-72, built-up areas, infrastructure, canals, furrows and trenching, SANLC classes 47-67)
			Land cover classes denoted to cultivated areas within the wetland complex (classes 32-46 & 73; SANLC, 2020)
	Biota	Taxon richness	Number of wetland-dependent species
Lake Fundudzi (depressional; 517 Ha)			
	Water quantity	Water Inputs	Hydrology (EWR)
		Water distribution and retention patterns	Lake water level regime
	Habitat	Wetland vegetation structure / composition	Extent of natural grassland within the wetland complex (land cover classes 12-13; SANLC, 2020)
			Extent of natural wooded land within the wetland complex (land cover classes 1-4; SANLC, 2020)
			Extent of herbaceous wetlands (land cover classes 22-23; SANLC, 2020)
		Habitat fragmentation within the wetland delineation	Extent of alien invasive plants within the wetland / complex
			Extent of planted forest within the wetland complex (land cover classes 5-7; SANLC, 2020)
			Aerial extent of developments within the wetland complex (includes mines and quarries, SANLC classes 68-72, built-up areas, infrastructure, canals, furrows and trenching, SANLC classes 47-67)
			Land cover classes denoted to cultivated areas within the wetland complex (classes 32-46 & 73; SANLC, 2020)
		Lake area	Extent of natural open water (wet & dry season)
	Biota	Taxon richness	Number of wetland-dependent species
	Water quality	Sediments	Sediment deposition / scour balance
		Water chemistry	Water quality (effluent) to comply with effluent standards.
Mutale Wetlands (Valley bottom with and without channel; 3513 Ha)			
	Water quantity	Water Inputs	Hydrology (EWR)
		Water distribution and retention patterns	Flooding by damming within the wetland
	Habitat	Wetland vegetation structure / composition	Extent of natural grassland within the wetland complex (land cover classes 12-13; SANLC, 2020)

SQs	Component	Subcomponent	Indicator
			Extent of natural wooded land within the wetland complex (land cover classes 1-4; SANLC, 2020)
			Extent of herbaceous wetlands (land cover classes 22-23; SANLC, 2020)
		Habitat fragmentation within the wetland delineation	Extent of alien invasive plants within the wetland / complex
			Extent of planted forest within the wetland complex (land cover classes 5-7; SANLC, 2020)
			Aerial extent of developments within the wetland complex (includes mines and quarries, SANLC classes 68-72, built-up areas, infrastructure, canals, furrows and trenching , SANLC classes 47-67)
			Land cover classes denoted to cultivated areas within the wetland complex (classes 32-46 & 73; SANLC, 2020)
			Extent of sand mining
	Biota	Taxon richness	Number of wetland-dependent species
	Water quality	Water chemistry	Water quality (effluent) to comply with effluent standards.
Mokamole (tributary of the Mogalakwena; Valley bottom with a channel; 464 Ha)			
	Water quantity	Water Inputs	Hydrology (EWR)
		Water distribution and retention patterns	Flooding by damming within the wetland
	Habitat	Wetland vegetation structure / composition	Extent of natural grassland within the wetland complex (land cover classes 12-13; SANLC, 2020)
			Extent of natural wooded land within the wetland complex (land cover classes 1-4; SANLC, 2020)
			Extent of herbaceous wetlands (land cover classes 22-23; SANLC, 2020)
		Habitat fragmentation within the wetland delineation	Extent of alien invasive plants within the wetland / complex
			Extent of planted forest within the wetland complex (land cover classes 5-7; SANLC, 2020)
			Aerial extent of developments within the wetland complex (includes mines and quarries, SANLC classes 68-72, built-up areas, infrastructure, canals, furrows and trenching, SANLC classes 47-67)
			Land cover classes denoted to cultivated areas within the wetland complex (classes 32-46 & 73; SANLC, 2020)
	Biota	Taxon richness	Number of wetland-dependent species
Peat domes in KNP - Malahlapanga (47 Ha)			
	Water quantity	Water Inputs	Depth to ground water (springs)
	Habitat	Wetland vegetation structure / composition	Extent of natural grassland within the wetland complex (land cover classes 12-13; SANLC, 2020)
			Extent of natural wooded land within the wetland complex (land cover classes 1-4; SANLC, 2020)
			Extent of herbaceous wetlands (land cover classes 22-23; SANLC, 2020)
		Habitat fragmentation within the wetland delineation	Extent of alien invasive plants within the wetland / complex
			Aerial extent of developments within the wetland complex (includes mines and quarries, SANLC classes 68-72, built-up areas, infrastructure, canals, furrows, and trenching, SANLC classes 47-67)
			Land cover classes denoted to cultivated areas within the wetland complex (classes 32-46 & 73; SANLC, 2020)
	Biota	Mammals	Elephant density

SQs	Component	Subcomponent	Indicator
			Buffalo density
		Taxon richness	Number of wetland-dependent species
Bububu wetlands (tributary of the Shingwedzi); Riverine with sodic; 6533 Ha)			
	Water quantity	Water Inputs	Hydrology (EWR)
	Habitat	Wetland vegetation structure / composition	Extent of natural grassland within the wetland complex (land cover classes 12-13; SANLC, 2020)
			Extent of natural wooded land within the wetland complex (land cover classes 1-4; SANLC, 2020)
			Extent of herbaceous wetlands (land cover classes 22-23; SANLC, 2020)
		Habitat fragmentation within the wetland delineation	Extent of alien invasive plants within the wetland / complex
			Aerial extent of developments within the wetland complex (includes mines and quarries, SANLC classes 68-72, built-up areas, infrastructure, canals, furrows and trenching , SANLC classes 47-67)
			Land cover classes denoted to cultivated areas within the wetland complex (classes 32-46 & 73; SANLC, 2020)
	Water quality	Sediments	Sediment deposition / scour balance

Groundwater

A total of 43 quaternary catchments are prioritised, based on the priority ranking approach followed. Manual selection of some quaternary catchments where done based on the availability of baseline data as well as the overall significance of groundwater. The reason for the prioritisation of an area and the existence of baseline data informs the type of RQOs to be developed. In cases where there is insufficient baseline data on which to establish an RQO, narrative RQOs can be developed along with monitoring recommendations to establish the baseline and implement more detailed RQOs in future. Where there are no quaternary catchments prioritised for the development of RQOs it is recommended that best practice wellfield/groundwater management guidelines are implemented.

The sub-components and indicators selected for the groundwater priority RU are indicated in Table E-7.

Table E-7. Sub-components and indicators selected for the high priority groundwater resource units

Description	GRU	Quat	Description (of prioritised resource units)	Quantity			Quality	
Middle Lephalala	A50-2	A50G	Low to Moderate groundwater use to support rural water supply and groundwater schemes.	Abstraction (Available Yield)			Salts, Nutrients	
Lower Lephalala	A50-3	A50H	Moderate groundwater use to support economic activities (agriculture), rural water supply and groundwater schemes.	Abstraction (Available Yield)			Salts, Nutrients	
Kalkpan	A50-4	A63C	Low to Moderate groundwater use to rural water supply. GW could play a role in supporting spring seepages.	Abstraction (Available Yield)	Discharge	Low flow in river		
Nyl River Valley	A61-1	A61A	High groundwater use to support groundwater schemes and Modimolle wellfield. GW play a moderate role in supporting baseflow.	Abstraction (Available Yield)	Discharge			
		A61B	Low to Moderate groundwater use to support rural water supply. GW play a moderate role in supporting baseflow (and wetlands).	Abstraction (Available Yield)	Discharge	Low flow in river		
		A61C	Low to Moderate groundwater use to support rural water supply. GW play a moderate role in supporting baseflow (and Nylsvley).	Abstraction (Available Yield)	Discharge			
		A61D	Low to Moderate groundwater use to support groundwater schemes and Mookgophong wellfield. GW play a moderate role in supporting baseflow (and wetlands).	Abstraction (Available Yield)	Discharge		Salts, Nutrients	Pathogens
		A61E	Moderate groundwater use to support groundwater schemes/wellfields and rural water supply. GW play a moderate role in supporting baseflow (and wetlands).	Abstraction (Available Yield)	Discharge		Salts, Nutrients	Pathogens
Sterk	A61-2	A61H	Low to Moderate groundwater use to support groundwater schemes/wellfields and rural water supply. GW could play a moderate role in supporting baseflow (and wetlands).	Abstraction (Available Yield)	Discharge			
Upper Mogalakwena	A61-3	A61F	Low to Moderate groundwater use to support groundwater schemes/Mokopane wellfields and rural water supply. GW play a role in supporting baseflow.	Abstraction (Available Yield)	Discharge		Salts, Nutrients	Pathogens
		A61G	Moderate groundwater use to support groundwater schemes, Mogalakwena Mine wellfields and rural water supply. GW play a moderate role in supporting baseflow.	Abstraction (Available Yield)	Discharge		Salts, Nutrients	
Matlala	A62-2	A62E	Low to Moderate groundwater use to support economic activities (agriculture) and rural water supply. GW	Abstraction (Available Yield)	Discharge			

Description	GRU	Quat	Description (of prioritised resource units)	Quantity			Quality	
			could play a role in supporting baseflow (and wetlands).					
Lower Mogalakwena	A63-1	A63A	High groundwater use to support economic activities (agriculture).	Abstraction (Available Yield)			Salts, Nutrients	
		A63D	Moderate groundwater use to support economic activities (agriculture) (Alldays) and groundwater schemes and rural water supply.	Abstraction (Available Yield)			Salts, Nutrients	
Limpopo Tributaries	A63/71-3	A63E	High groundwater use to support economic activities (agriculture). Hosts Mapungubwe and Venetia Mine. GW could play a role in supporting wetlands.	Abstraction (Available Yield)	Discharge		Salts, Nutrients	
		A71L	High groundwater use to support economic activities (mining). Schroda/Greefswald Wellfields. Hosts Mapungubwe.	Abstraction (Available Yield)	Discharge		Salts, Nutrients	
Upper Sand	A71-1	A71A	High groundwater use to support economic activities. Hosts Polokwane (i.e., Sand River) wellfields.	Abstraction (Available Yield)	Discharge		Salts, Nutrients	
		A71B	High groundwater use to support economic activities (Several wellfields, groundwater schemes and rural water supply).	Abstraction (Available Yield)	Discharge		Salts, Nutrients	Pathogens
Middle Sand	A71-2	A71C	High groundwater use to support economic activities (agriculture), rural water supply and groundwater schemes.	Abstraction (Available Yield)	Discharge		Salts, Nutrients	
		A71D	High groundwater use to support groundwater schemes and rural water supply.	Abstraction (Available Yield)	Discharge			
		A71H	Moderate groundwater use to support groundwater schemes (Makhado).	Abstraction (Available Yield)			Salts, Nutrients	
Hout	A71-3	A71E	High groundwater use to support groundwater schemes and rural water supply. GW could play a role in supporting wetlands.	Abstraction (Available Yield)	Discharge		Salts, Nutrients	
		A71F	High groundwater use to support groundwater schemes and rural water supply. GW could play a role in supporting wetlands.	Abstraction (Available Yield)	Discharge		Salts, Nutrients	
		A71G	High groundwater use to support economic activities (agriculture), groundwater schemes and rural water supply.	Abstraction (Available Yield)			Salts, Nutrients	

Description	GRU	Quat	Description (of prioritised resource units)	Quantity			Quality	
		A72A	High groundwater use to support economic activities (agriculture), groundwater schemes and rural water supply.	Abstraction (Available Yield)	Discharge		Salts, Nutrients	
Sandbrak	A71-4	A71J	High groundwater use to support economic activities (agriculture) and rural water supply. GW could play a role in supporting wetlands.	Abstraction (Available Yield)			Salts, Nutrients	
		A72B	Moderate groundwater use to support economic activities (agriculture), groundwater schemes and rural water supply.	Abstraction (Available Yield)				
	A71-5	A71K	High groundwater use to support groundwater schemes, rural water supply and Musina (i.e., Limpopo River) wellfield.	Abstraction (Available Yield)	Discharge		Salts, Nutrients	Pathogens
Upper Nzhelele	A80-1	A80A	Low to moderate groundwater use to support groundwater schemes and rural water supply. GW play a role in supporting wetlands and spring seepages.	Abstraction (Available Yield)	Discharge			
		A80F	Moderate groundwater use to support economic activities (agriculture) and rural water supply. GW could play a role in supporting wetlands. Potential coal mining development.	Abstraction (Available Yield)			Salts, Nutrients	
Lower Nzhelele	A80-2	A80G	Moderate groundwater use to support economic activities (agriculture) and rural water supply. GW could play a role in supporting baseflow and spring seepages.	Abstraction (Available Yield)	Discharge	Low flow in river		
	A80-3	A80J	Moderate groundwater use to support economic activities (agriculture), groundwater schemes and rural water supply. GW could play a role in supporting wetlands.	Abstraction (Available Yield)	Discharge	Low flow in river		
Upper Luvuvhu	A91-1	A91A	High groundwater use to support groundwater schemes and rural water supply. GW could play a role in supporting baseflow.	Abstraction (Available Yield)	Discharge			
		A91B	Moderate groundwater use to support economic activities (agriculture), groundwater schemes and rural water supply. GW could play a role in supporting baseflow.	Abstraction (Available Yield)	Discharge		Salts, Nutrients	
		A91C	High groundwater use to support economic activities (agriculture), groundwater schemes and rural water supply. GW could play a role in supporting baseflow.	Abstraction (Available Yield)	Discharge		Salts, Nutrients	
		A91E	Low groundwater use to support groundwater schemes and rural water supply. GW could play a role in supporting baseflow.	Abstraction (Available Yield)	Discharge		Salts, Nutrients	

Description	GRU	Quat	Description (of prioritised resource units)	Quantity			Quality	
		A91F	Low groundwater use to support groundwater schemes and rural water supply. GW could play a role in supporting baseflow.	Abstraction (Available Yield)	Discharge		Salts, Nutrients	
		A91G	Low groundwater use to support groundwater schemes and rural water supply. GW could play a role in supporting baseflow and wetlands.	Abstraction (Available Yield)	Discharge	Low flow in river	Salts, Nutrients	
Mutale/Luvuvhu	A91-2	A91H	Low groundwater use to support groundwater schemes and rural water supply. GW could play a role in supporting baseflow.	Abstraction (Available Yield)	Discharge	Low flow in river		
		A92B	Low to Moderate groundwater use to support groundwater schemes and rural water supply. GW could play a role in supporting baseflow and wetlands.	Abstraction (Available Yield)	Discharge	Low flow in river		
		A92C	Low to Moderate groundwater use to support groundwater schemes and rural water supply. GW could play a role in supporting baseflow and spring seepages.	Abstraction (Available Yield)	Discharge			
		A92D	Low to Moderate groundwater use to support groundwater schemes and rural water supply. GW could play a role in supporting baseflow and wetlands.	Abstraction (Available Yield)	Discharge	Low flow in river		
Shingwedzi	B90-1	B90B	Low to Moderate groundwater use to support groundwater schemes and rural water supply.	Abstraction (Available Yield)				
		B90F	Low to Moderate groundwater use to support groundwater schemes and rural water supply. GW could play a role in supporting wetlands.	Abstraction (Available Yield)	Discharge			

Conclusion

Resource units were delineated within each IUA for river, dams, wetlands and groundwater resources and were prioritised using the RUPT to identify resource units which would be important to be monitored to ensure the protection of the water resource in accordance with the defined Water Resource Class of each IUA.

The priority resource units were evaluated, using the Resource Unit Evaluation Tool or a modification of the Tool to establish the sub-components and indicators that may be important to either users or the environment and which should be protected to support the resource dependent activities and/or maintain the integrity and ecological functioning of the water resource.

Going forward the draft RQOs will be developed for the priority sub-components and indicators in step 5 of the RQOs process.

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1 INTRODUCTION

1.1 Background

The Department of Water and Sanitation (DWS), Chief Directorate (CD): Water Ecosystems Management (WEM) initiated a study to determine Water Resource Classes, the Reserve and Resource Quality Objectives for Secondary Catchments A5-A9 in the Limpopo Water Management Area (WMA 1) and Secondary Catchment B9 in the Olifants Water Management Area (WMA 2).

The suite of Resource Directed Measures tools being implemented in these catchments aims to ensure sustainable utilisation of water resources to meet the ecological, social and economic needs of the communities dependent on them.

1.2 Objectives of the Study

The overall objective of this project is to classify and determine the Reserve and Resource Quality Objectives for all significant water resources in the Secondary catchments (A5-A9) of the Limpopo WMA and B9 in the Olifants WMA.

The Scope of Work as stipulated in the Terms of Reference calls for the following:

- Coordinate the implementation of the Water Resources Classification System, as required in Regulation 810 in Government Gazette 33541, by classifying all significant water resources in the Limpopo WMA (secondary catchments A5-A9) and Olifants WMA (secondary catchment B9).
- Determine the water quantity and quality components of the groundwater and surface water (rivers and wetlands) Reserve.
- Determine Resource Quality Objectives (RQOs) using the DWS Procedures to Determine and Implement RQOs.

1.3 Study area

The study area is the Secondary catchments (A5-A9) of the Limpopo WMA and B9 in the Olifants WMA (Figure 1-1). During the Classification process the study area was delineated into Integrated Units of Analysis (IUAs) and the rivers, groundwater and wetlands were delineated into Resource Units (RUs). Figure 1-1 shows the Water Resource Class of the IUAs and the the delineated resource units. The Target Ecological Category of each river resource unit is indicated in Figure 1-1.

1.4 Purpose of this report

This report outlines the prioritisation of the delineated resource units for rivers, dams, wetlands and groundwater resources in the study area and details the water resource sub-components and indicators that will go forward to the development of RQOs. These outputs align to the Steps 3 and 4 of the RQO process shown in Figure 2-1.

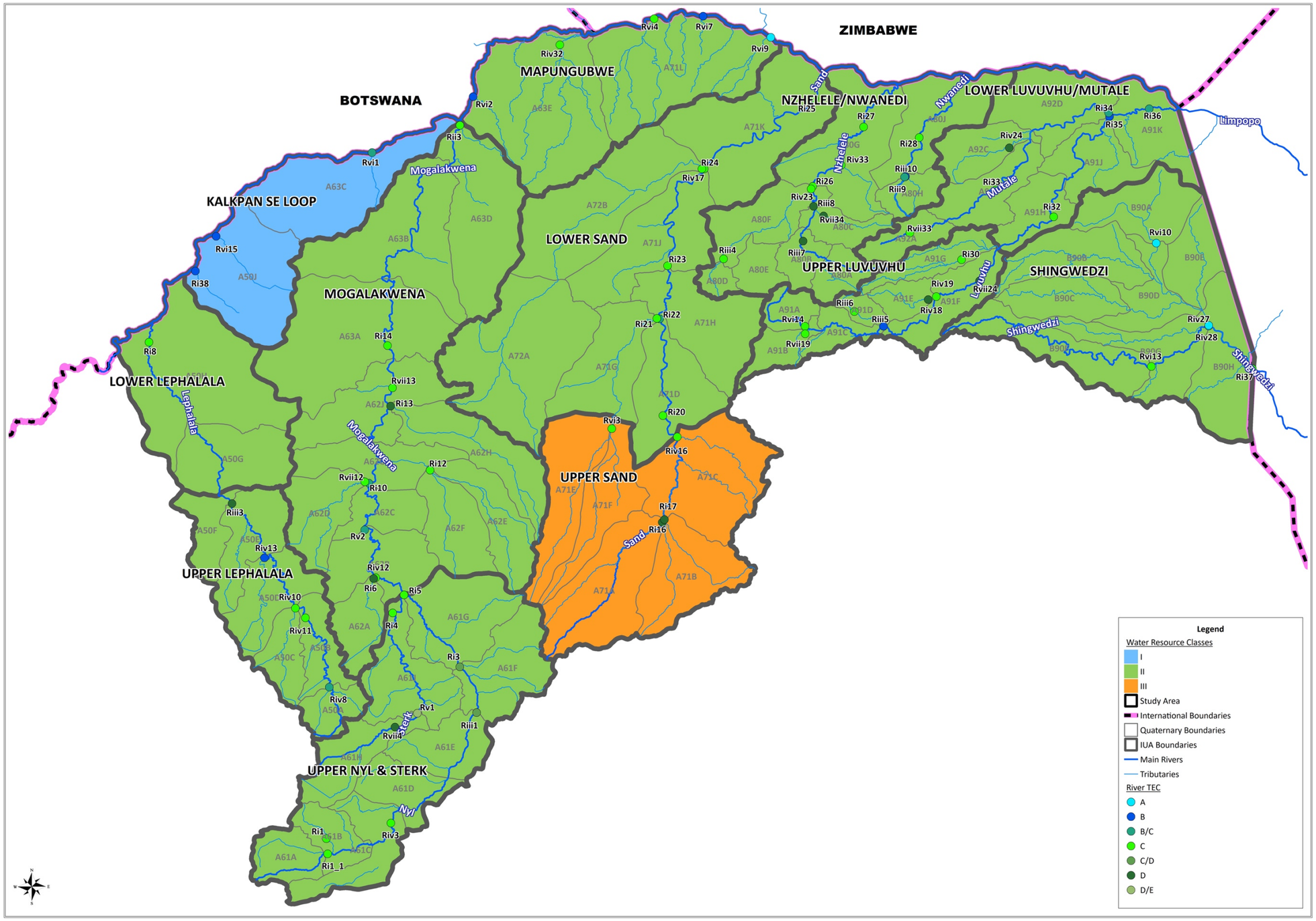


Figure 1-1. Map of the study area, showing the Water Resource Class of the IUAs and the delineated Resource Units

2 OVERVIEW OF THE RESOURCE QUALITY OBJECTIVE PROCESS

Resource Quality Objectives (RQOs) are numerical and/or descriptive statements about the biological, chemical and physical attributes that characterise a resource for a level of protection defined by its Water Resource Class. They are important management objectives that represent a goal for a desired protection toward which management can be directed. It therefore aids in providing guidance on what activities and impacts are acceptable or not. RQOs provide a baseline for measuring the success of management and for reviewing the effectiveness of source directed controls and regulatory activities.

The development of the RQOs is a seven-step process (Figure 2-1) established by the DWA (2011).

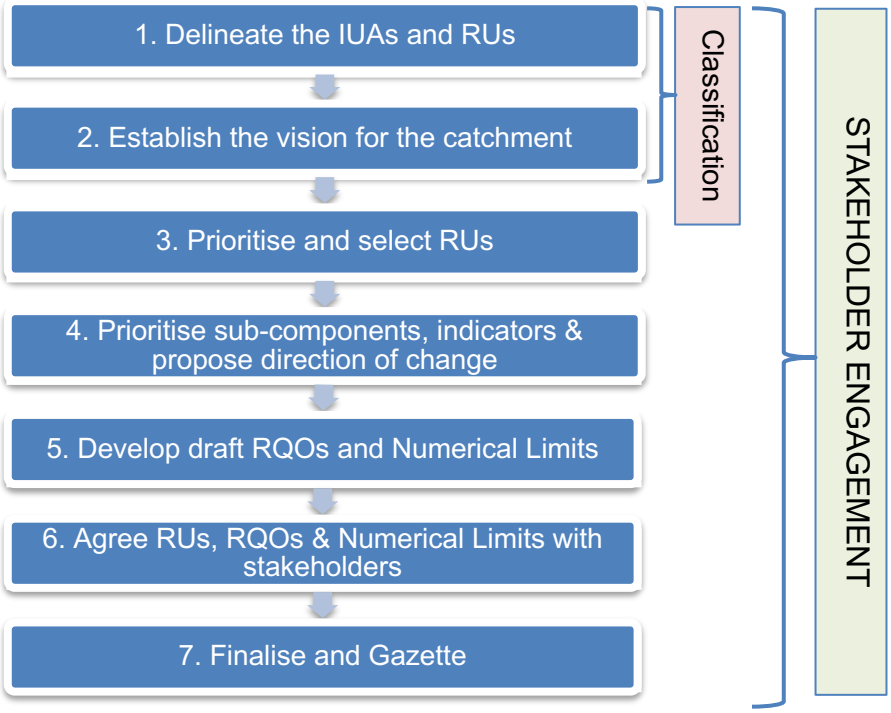


Figure 2-1. Seven-step RQO process

Step 1 of the RQOs process, is to delineate the Integrated Units of Analysis (IUA) and define the Resource Units (RUs). This is required to facilitate effective management of the water resource. Step 2 of the process is to establish a vision for the catchment. Steps 1 and 2 were completed during the Classification phase of the study.

The objective of Step 3 is to prioritise and select the most useful RUs for RQO determination. Many RUs were delineated in the study area, however in reality it is not practical nor feasible to monitor every RU in the study area. A rationalisation process using the Resource Unit Prioritisation Tool (RUPT), which is a decision support tool, was used to guide the selection process (DWA, 2011).

The RUPT is used to assess a range of criteria that would indicate the importance of monitoring each RU as part of management operations. This would include the position of RUs within an IUA, user and ecological considerations, practical constraints and management considerations. For the dam, wetland and groundwater prioritisation process the RUPT tool was modified to address current limitations in the methodology. The specific approaches to prioritise the water resources within the study area, are discussed in the sections that follow.

Step 4 of the RQO process has two key objectives: (i) to identify and prioritise sub-components that may be important to either users or the environment and (ii) to select those sub-components and associated indicators for which RQOs and Numerical Limits should be developed. This step bears relevance to the consideration of the impacts of land-based activities on the water resource.

Although there is a wide range of sub-components for which RQOs can be set, it is not necessary or practical to set RQOs for all sub-components in all selected RUs. A rationalisation process was therefore undertaken to evaluate and prioritise sub-components for RQO determination, using the Resource Unit Evaluation Tool (DWA, 2011).

Step 5 is to develop the draft RQOs and Numerical Limits for the prioritised RUs which may relate to all or some of the components of the water resource, including quantity, quality, habitat and biota. These RQOs are then published by way of government notice in the government gazette in Step 7.

Engagement with stakeholders is important in the RQO process to encourage the ownership of the decisions taken in selecting the RUs, indicators, RQOs and Numerical Limits for future monitoring and management of the water resources in the study area.

3 RESOURCE UNIT PRIORITISATION

3.1 River Resource Unit Prioritisation

3.1.1 Delineation of IUAs and River Resource Units

The delineation of the IUAs and the river RUs have been undertaken in the Classification and EWR phase of the study. The outcome of the delineation process is provided in Table 3-1. More detail on the process is provided in DWS, 2022.

Table 3-1. Delineation of the IUAs and river Resource Units

IUA name	River Resource Units	Quaternary catchments
Upper Lephalala	RRU-Riv8 - A50A-00354 RRU-Riv11 - A50B-00262 RRU-Riv10 - A50C-00273 RRU-Riv13 - A50D-00237 RRU-Riii3 - A50H-00110	A50A, A50B, A50C, A50D, A50E, A50F
Lower Lephalala	RRU-Ri8 – A50H-00110	A50G, A50H
Kalkpan se Loop	RRU-Ri38 – A50J-00073 RRU-Rvi15 – A50J-00061 RRU-Rvi1 – A63C-00033	A50J,A63C
Upper Nyl & Sterk	RRU-Rvii4 - A61H-00395 RRU-Rv1 - A61H-00395 RRU-Ri4 - A61J-00267 RRU-Ri1 - A61B-00489 RRU-Ri1-1 - A61B-00552 RRU-Riv3 - A61C-00501 RRU-Riii1 - A61E-00386 RRU-Ri3 - A61G-00297 RRU-Ri5 - A61G-00248	A61A, A61B, A61C, A61D, A61E, A61F, A61G, A61H, A61J

IUA name	River Resource Units	Quaternary catchments
Mogalakwena	RRU-Riv12 - A62B-00223 RRU-Ri6 - A62A-00253 RRU-Rv2 - A62B-00188 RRU-Rvii12 - A62D-00179 RRU-Ri10 - A62C-00188 RRU-Ri12 - A62G-00167 RRU-Ri13 - A62H-00148 RRU-Rvii13 - A62J-00143 RRU-Ri14 - A63A-00071 RRU-Rii3 - A63D-00034	A62A, A62B, A62C, A62D, A62E, A62F, A62G, A62H, A62J, A63A, A63B, A63D
Mapungubwe	RRU-Rvi2 - A63E-00011 RRU-Riv32 - A63E-00008 RRU-Rvi4 - A71L-00005 RRU-Rvi7 - A71L-00003 RRU-Rvi9 - A71L-00015	A63E, A71L
Upper Sand	RRU-Rvi3 - A71G-00131 RRU-Ri21 - A71G-00107 RRU-Ri16 - A71A-00211 RRU-Ri17 - A71B-00214 RRU-Riv16 - A71C-00156	A71A, A71B, A71C, A71E, A71F
Lower Sand	RRU-Ri20 - A71D-00118 RRU-Ri22 - A71D-00118 RRU-Ri23 - A71H-00088 RRU-Ri24 - A71J-00055 RRU-Riv17 - A72B-00038 RRU-Ri25 - A71K-00019	A71D, A71G, A71H, A71J, A71K, A72A, A72B
Nzhelele/Ṅwaneḍi	RRU-Riii4 - A80D-00075 RRU-Riv23 - A80F-00063 RRU-Riii7 - A80B-00069 RRU-Rvii34 - A80C-00068 RRU-Riii8 - A80F-00068 RRU-Ri26 - A80G-00053 RRU-Riv33 - A80G-00054 RRU-Ri27 - A80G-00026 RRU-Riii9 - A80H-00064 RRU-Riii10 - A80H-00060 RRU-Ri28 - A80J-00028	A80A, A80B, A80C, A80D, A80E, A80F, A80G, A80H, A80J
Upper Luvuvhu	RRU-Rvi14 - A91A-00105 RRU-Rvii19 - A91B-00120 RRU-Riii5 - A91C-00115 RRU-Riii6 - A91D-00108 RRU-Riv18 - A91E-00103 RRU-Riv19 - A91F-00111 RRU-Rvii24 - A91F-00093 RRU-Ri30 - A91G-00091	A91A, A91B, A91C, A91D, A91E, A91F, A91G
Lower Luvuvhu/Mutale	RRU-Ri32 - A91H-00045 RRU-Rvii33 - A92B-00051 RRU-Ri33 - A92B-00051 RRU-Riv24 - A92C-00049 RRU-Ri34 - A92D-00030 RRU-Ri35 - A91J-00040 RRU-Ri36 - A91K-00035	A91H, A91J, A91K, A92A, A92B, A92C, A92D

IUA name	River Resource Units	Quaternary catchments
Shingwedzi	RRU-Rvi10 - B90D-00067 RRU-Riv28 - B90H-00113 RRU-Rvi13 - B90F-00114 RRU-Riv27 - B90G-00124 RRU-Ri37 - B90H-00145	B90A, B90B, B90C, B90D, B90E, B90F, B90G, B90J

3.1.2 Prioritisation of River Resource Units

Seventy-five (75) river RUs were delineated across the study area. These were prioritised using the RUPT to provide a manageable number of important resource units for which RQOs need to be set and monitored.

The prioritisation of the river resource units were based on (i) position of the resource unit within an IUA; (ii) importance of the resource unit to users; (iii) threats posed to users by current or planned future activities in the resource unit, (iv) the ecological importance of the resource unit; (v) threats faced by the ecological component of the resource unit; (vi) resource units where management actions should be prioritised; and (vii) practical considerations of determining and monitoring RQOs. The criteria used in the assessment are outlined in Table 3-2.

The Tool's standard scoring and ranking of scores were used for the comparison between RUs. The scores given to the RUs to rank them to one another are provided in Appendix A 1 and Appendix A 2.

3.1.3 River Priority Resource Units

The RUs were prioritised in terms of the priority rating.

- A rating of 0.8-1.0 was given a high Priority = 1
- A rating of 0.4-0.7, was given a medium priority = 2
- A rating of <0.4, was given a low priority = 3.

The relative priority of the RUs and rationale for selection are shown in Table 3-3 and Figure 3-1. In the map the quaternary catchments in which the RUs were given the highest priority are those shown in red, medium priority RUs are shown in orange and those RUs that rated lower than 0.4 are shown in a light blue.

Thirty RUs were given a high priority and will be taken forward for development of RQOs. Twenty four RUs were given a medium priority and twenty one RUs rated at low priority.

3.1.4 Ecological Condition of the river Resource Units

The ecological condition of the river resource units are provided in Table 3-4. The ecological condition of the resource units in the highlighted rows have been field verified, while the ecological condition of the other river resource units are based on the 2011 PESEIS Desktop Spreadsheet Model.

Table 3-2. Criteria used in the RU prioritisation process

Criterion	Description and Reasoning	Ranking	Relative weighting	Sub-criteria	Rating Guideline
Position of resource unit within IUA	These are resource units associated with large mainstem rivers and located at the downstream end of an IUA and are located between socio-economic zones where user requirements are likely to differ. Such resource units also provide a useful surrogate for assessing whether or not management objectives (included gazetted IUA class) for the upstream catchment are being achieved since the cumulative effects of upstream impacts are likely to be expressed at this reach.	1	100	Resource units located on a large mainstem river at the downstream end of an IUA (IUA outlet node)	1 - Resource unit on mainstem river and at base of IUA 0 - RUs not associated with keystone sites
Importance for users	This criterion considers both the current and future use relevant to different users considerations	2	50	Resource units which provide important cultural services to society	0 - RUs with no known / limited provision of cultural services 0.5 - RUs providing some cultural services 1 - RUs providing very important or numerous cultural services
				Resource units which are important in supporting livelihoods of significant vulnerable communities	0 - RUs which do not support / provide limited support for vulnerable communities 0.5 - RUs providing some support for vulnerable communities 1 - RUs playing an important role in supporting vulnerable communities
				Resource units which are important in meeting strategic requirements and international obligations	0 -RUs not used for strategic purposes or to meet international obligations 0.5 -RUs moderately important for strategic purposes or are somewhat useful for verifying compliance with international obligations 1 - RUs extremely important for strategic purposes or are ideally suited for verifying compliance with international obligations

Criterion	Description and Reasoning	Ranking	Relative weighting	Sub-criteria	Rating Guideline
				Resource units that provide supporting and regulating services	0 - RUs which supply limited supporting and regulating services 0.5 - RUs which supply moderate supporting and regulating services 1 - RUs which supply extensive supporting and regulating services
				Resource units most important in supporting activities contributing to the economy (GDP & job creation) in the catchment (e.g. commercial agriculture, industrial abstractions and bulk abstractions by water authorities)	0 - RUs which do not directly support any activities which contribute to the economy 0.5 - RUs which support activities which provide a moderate contribution to the economy 1 - RUs which support activities which contribute significantly to the economy
Threat posed to users	These are resource units which are important for users and are threatened or likely to be threatened by current or planned future activities (e.g. mines, towns, industries, dams, intensive agriculture) and should be monitored due to the potential risk poses to users. Emphasis is placed on selecting those resource units most likely to be impacted by high risk activities and which could therefore have serious implications for users if not effectively managed.	2	50	Level of threat posed to users	0 - RUs where potential threat to users is low 0.5 - RUs where potential threat to users is moderate 1 - RUs where potential threat to users is high
Ecological Importance	This criterion is assessed to identify resource units that are important from an ecological perspective. A range of attributes relative to the water resource are considered.	2	50	Resource units with a high or very high EIS category	0 - RUs with a low or moderate EIS Category 0.5 - RUs with a high EIS Category 1 - RUs with a very high EIS Category
				Resource units which have an A/B NEC and / or PES	0 - RUs with a PES or NEC lower than a B Category 0.5 - RUs with a PES or NEC in a B Category

Criterion	Description and Reasoning	Ranking	Relative weighting	Sub-criteria	Rating Guideline
					1 - RUs with a PES or NEC in an A or A/B Category
				Resource units identified as National Freshwater Ecosystem Priority Areas	0 - RUs which do not identify as a priority area 0.5 - RUs located within 'Freshwater Ecosystem Support Areas' 1 - RUs located within 'Freshwater Ecosystem Priority Areas'
				Resource units identified as a priority in provincial / fine scale aquatic biodiversity plans	0 - RUs with a low irreplaceability value (0 - 0.5) 0.5 - RUs with a moderate Irreplaceability value (0.51 - 0.99) or located within identified 'Ecological Support Areas' 1 - RUs which are irreplaceable (IR = 1) or are located within 'Critical Biodiversity Areas'.
Threat faced by ecological component of the RU	This criterion is assessed to identify resource units which are threatened or are likely to be threatened by current or future activities that should be monitored due to the risk posed to the ecological elements of the water resource. This considers those RUs most likely to be impacted by high risk activities.	2	50	Level of threat posed to ecological components of the resource unit	0 - RUs where potential threat to ecological components is low 0.5 - RUs where potential threat to ecological components is moderate 1 - RUs where potential threat to ecological components is high
Management Considerations	This criterion requires the assessment of RUs where management actions should be prioritised. This applies to RUs or reaches where it is necessary to monitor the effectiveness of measures implemented to improve status quo.	2	50	Resource units with PES lower than a D Category or lower than the accepted gazetted category (NEC)	0 - RUs with a PES higher than a C Category or a PES higher than the NEC 1 - RUs with a PES lower than a C Category or a PES lower than the NEC
Practical Considerations	This criterion looks at the practical considerations of determining and monitoring RQOs	2	50	Availability of EWR site data or other monitoring data(RHP, DWS gauging weirs etc) located within the reach	0 - RUs where no resource quality information exists 0.5 - RUs for which a moderate level of resource quality information exists

Criterion	Description and Reasoning	Ranking	Relative weighting	Sub-criteria	Rating Guideline
					1 - RUs for which there is a good availability of resource quality information
				Accessibility of resource unit for monitoring	0 - RUs with very poor accessibility 0.5 - RUs with moderate accessibility 1 - RUs with good accessibility
				Safety risk associated with monitoring resource units.	0 - RUs which are not safe to monitor 0.5 - RUs where safety is questionable 1 - RUs where safety is not a concern

Table 3-3. River RU prioritisation (rows in bold are existing EWR sites)

Water Resource Class	River Resource Unit	Node	Sub-quaternary reach	River	Criteria	Position in IUA	Concern for users	Concern for environment	Management and practical considerations	Total Prioritization Score	Priority Rating	Priority	Reason for priority rating of resource unit
					Criteria Ranking	1	2	2	2				
					Relative weighting	100	50	50	50				
Upper Lephalala IUA													
II	RRU-Riv8	Riv8	A50A-00354	Lephalala		0.00	0.12	0.20	0.10	0.42	0.6	2	Downstream of the Lephalala and Rietbokvleispruit. Captures the impacts of agriculture. Good ecological condition of a B category
II	**RRU-Riv11**	**Riv11**	**A50B-00262**	**Lephalala**		**0.25**	**0.06**	**0.16**	**0.13**	**0.59**	**0.8**	**1**	**Main river, accessible. Represents RU in the IUA**
II	RRU-Riv10	Riv10	A50C-00273	Melk		0.00	0.05	0.08	0.05	0.17	0.2	3	On the Melk Rivier a tributary of the Lephalala
II	RRU-Riv13	Riv13	A50D-00237	Boklandspruit		0.00	0.05	0.11	0.13	0.28	0.4	2	On the Boklandspruit, a tributary of the Lephalala. Good ecological condition.
II	RRU-Riii3	Riii3	A50H-00110	Lephalala		0.25	0.06	0.17	0.21	0.69	1.0	1	Close to outlet of the Upper Lephalala IUA.
Lower Lephalala IUA													
II	**RRU-Ri8**	**Ri8**	**A50H-00110**	**Lephalala**		**0.25**	**0.06**	**0.17**	**0.21**	**0.69**	**1.0**	**1**	**At outlet of IUA. Strategic management of international obligations**
Kalkpan se Loop IUA													
I	RRU-Ri38	Ri38	A50J-00073	Kalkpan Se Loop		0.25	0.02	0.15	0.07	0.49	0.7	2	At outlet of catchment, however very limited development and impact in the catchment
I	RRU-Rvi15	Rvi15	A50J-00061	No Name		0.25	0.02	0.15	0.07	0.49	0.7	2	At outlet of catchment, however very limited development and impact in the catchment
I	**RRU-Rvi1**	**Rvi1**	**A63C-00033**	**Rietfontein**		**0.25**	**0.12**	**0.15**	**0.10**	**0.62**	**0.9**	**1**	**At outlet of IUA. Representative of other reaches in the IUA.**
Upper Nyl/Sterk IUA													
II	RRU-Rvii4	Rvii4	A61H-00395	Sterk		0.00	0.07	0.19	0.20	0.45	0.6	2	Captures the effects of upstream development before the Sterk River enters the Doorndraai Dam. Currently in a D ecological category
II	RRU-Rv1	Rv1	A61H-00395	Sterk		0.00	0.07	0.19	0.20	0.45	0.6	2	Downstream of Doorndraai Dam
II	RRU-Ri4	Ri4	A61J-00267	Sterk		0.25	0.10	0.13	0.20	0.67	0.9	1	On the Sterk River upstream of the confluence with the Mogalakwena River. Captures the effects of the upstream land use activities. Target to remain in a C ecological category. Important to monitor site
II	**RRU-Ri1**	**Ri1**	**A61B-00489**	**Olifantspruit**		**0.00**	**0.17**	**0.14**	**0.25**	**0.56**	**0.8**	**1**	**Represents inflow to the Ramsar declared Nylsvley wetland. Possible future development**
II	RRU-Ri1-1	Ri1-1	A61B-00552	Nyl		0.00	0.17	0.14	0.25	0.56	0.8	1	Inflow to the Nyl floodplain and the Nylsvlei Ramsar site. Possible future development
II	RRU-Riv3	Riv3	A61C-00501	Nyl		0.00	0.19	0.19	0.05	0.43	0.6	2	Below the Nylsvley Nature Reserve, upstream of the confluence with Badseloop
II	RRU-Riii1	Riii1	A61E-00386	Nyl		0.00	0.08	0.11	0.20	0.39	0.5	2	Before the confluence to form the Mogalakwena. Reach is in a D ecological category
II	RRU-Ri3	Ri3	A61G-00297	Mogalakwena		0.25	0.08	0.18	0.19	0.70	1.0	1	Middle of IUA, downstream of urban area and 2 significant tributaries, at outlet of A61F catchment. Good point to monitor upstream impacts.
II	**RRU-Ri5**	**Ri5**	**A61G-00248**	**Upper Mogalakwena**		**0.25**	**0.08**	**0.18**	**0.19**	**0.70**	**1.0**	**1**	**Outlet of IUA**
Mogalakwena IUA													
II	RRU-Riv12	Riv12	A62B-00223	Mogalakwena		0.00	0.06	0.09	0.09	0.25	0.3	3	Situated in the upper reaches of the IUA. Minimal impact.
II	RRU-Ri6	Ri6	A62A-00253	Mokamole		0.00	0.05	0.11	0.19	0.35	0.5	2	On a tributary of the Mogalakwena. EC in a D category
II	RRU-Rv2	Rv2	A62B-00188	Mogalakwena		0.00	0.06	0.09	0.09	0.25	0.3	3	At outlet of A62B in an urban area
II	RRU-Rvii12	Rvii12	A62D-00179	Klein Mogalakwena		0.00	0.03	0.13	0.07	0.22	0.3	3	On a tributary of the Mogalakwena.
II	RRU-Ri10	Ri10	A62C-00188	Mogalakwena		0.00	0.04	0.13	0.07	0.24	0.3	3	On the Mogalakwena upstream of the confluence with the Klein Mogalakwena

Water Resource Class	River Resource Unit	Node	Sub-quaternary reach	River	Criteria	Position in IUA	Concern for users	Concern for environment	Management and practical considerations	Total Prioritization Score	Priority Rating	Priority	Reason for priority rating of resource unit
					Criteria Ranking	1	2	2	2				
					Relative weighting	100	50	50	50				
II	RRU-Ri12	Ri12	A62G-00167	Matlalane		0.00	0.05	0.16	0.04	0.24	0.3	3	On a tributary of the Mogalakwena.
II	RRU-Ri13	Ri13	A62H-00148	Seepabana		0.00	0.03	0.11	0.19	0.34	0.5	2	On a tributary of the Mogalakwena.
II	RRU-Rvii13	Rvii13	A62J-00143	Mogalakwena		0.00	0.05	0.11	0.06	0.23	0.3	3	Upstream of Glen Alpine Dam
II	**RRU-Ri14**	**Ri14**	**A63A-00071**	**Middle Mogalakwena**		**0.25**	**0.16**	**0.16**	**0.13**	**0.70**	**1.0**	**1**	**. Key site for monitoring downstream of Glen Alpine Dam. Representative of site and accessible.**
II	**RRU-Rii3**	**Rii3**	**A63D-00034**	**Mogalakwena**		**0.25**	**0.13**	**0.10**	**0.25**	**0.72**	**1.0**	**1**	**At outlet of IUA. Strategic - management of international obligations**
Mapungubwe IUA													
II	RRU-Rvi2	Rvi2	A63E-00011	Stinkwater		0.25	0.13	0.20	0.13	0.71	1.0	1	At outlet of catchment, however very limited development and impact in the catchment. Important site in the Reserve.
II	**RRU-Riv32**	**Riv32**	**A63E-00008**	**Kolope**		**0.25**	**0.13**	**0.20**	**0.13**	**0.71**	**1.0**	**1**	**Outlet of IUA. Within the Mapungubwe National Park. Main system in IUA**
II	RRU-Rvi4	Rvi4	A71L-00005	Kongoloop		0.00	0.11	0.14	0.09	0.34	0.5	2	At outllet of A71L, which flows through agricultural area
II	RRU-Rvi7	Rvi7	A71L-00003	No Name		0.00	0.11	0.14	0.09	0.34	0.5	2	At outllet of A71L, which flows through natural area
II	RRU-Rvi9	Rvi9	A71L-00015	Soutsloot		0.00	0.11	0.14	0.09	0.34	0.5	2	At outllet of A71L, which flows through the Maremani Nature Reserve
Upper Sand IUA													
II	RRU-Rvi3	Rvi3	A71G-00131	Hout		0.00	0.04	0.11	0.04	0.19	0.2	3	On a tributary of the Sand that flows through agricultural lands
II	RRU-Ri21	Ri21	A71G-00107	Hout		0.00	0.04	0.11	0.04	0.19	0.2	3	Tributary of Sand before the confluence. Flows through agricultural land
III	RRU-Ri16	Ri16	A71A-00211	Sand		0.00	0.13	0.18	0.18	0.48	0.7	2	Sand River upstream of the confluence with the Diep. Flows through agricultural land
III	RRU-Ri17	Ri17	A71B-00214	Diep		0.00	0.05	0.18	0.18	0.40	0.6	2	Diep River upstream of confluenc with the Sand River
III	RRU-Riv16	Riv16	A71C-00156	Dwars		0.25	0.10	0.18	0.04	0.56	0.8	1	Lower Dwars, before confluence with Sand River and outlet of the Upper Sand IUA. Assess the effects of development along the Dwars River. Potential future development.
Lower Sand IUA													
III	**RRU-Ri20**	**Ri20**	**A71D-00118**	**Sand**		**0.25**	**0.17**	**0.14**	**0.13**	**0.69**	**0.8**	**1**	**Outlet of IUA. Below confluence of Sand and Dwars. Downstream of all impacts in the Upper Sand IUA. Representative of Sand River. Downstream of town**
III	RRU-Ri22	Ri22	A71D-00118	Sand		0.25	0.17	0.14	0.13	0.69	0.8	1	At the outlet of the A71D catchment, upstream of the confluence with the Hout River
II	RRU-Ri23	Ri23	A71H-00088	Sand		0.00	0.08	0.19	0.09	0.36	0.4	2	Flows through nature reserves.
II	RRU-Ri24	Ri24	A71J-00055	Sand		0.00	0.04	0.13	0.10	0.27	0.3	3	Upstream of confluence with the Brak. Flows through old agricultural fields
II	RRU-Riv17	Riv17	A72B-00038	Brak		0.00	0.02	0.11	0.08	0.21	0.3	3	Lower Brak before confluence with the Brak, which flows through old agricultural land
II	**RRU-Ri25**	**Ri25**	**A71K-00019**	**Sand**		**0.25**	**0.20**	**0.13**	**0.13**	**0.70**	**0.8**	**1**	**At outlet of IUA. Strategic - management of international obligations. Potential Future development.**
Nzhelele and Nwanedi IUA													
II	RRU-Riii4	Riii4	A80D-00075	Mutamba		0.00	0.02	0.06	0.03	0.12	0.1	3	Upper Mutamba. Minimal landuse impacts
II	RRU-Riv23	Riv23	A80F-00063	Mutamba		0.00	0.04	0.11	0.09	0.24	0.3	3	Mutamba before confluence with the Nzhelele. Flows through agricultural lands
II	RRU-Riii7	Riii7	A80B-00069	Nzhelele		0.00	0.13	0.17	0.18	0.48	0.6	2	Flows through a natural area upstream of Nzhelele Dam.
II	RRU-Rvii34	Rvii34	A80C-00068	Mafungudi		0.00	0.13	0.21	0.06	0.40	0.5	2	Inflow into Nzhelele Dam
II	RRU-Riii8	Riii8	A80F-00068	Nzhelele		0.00	0.04	0.11	0.09	0.24	0.3	3	Immediately downstream of Nzhelele Dam

Water Resource Class	River Resource Unit	Node	Sub-quaternary reach	River	Criteria	Position in IUA	Concern for users	Concern for environment	Management and practical considerations	Total Prioritization Score	Priority Rating	Priority	Reason for priority rating of resource unit
					Criteria Ranking	1	2	2	2				
					Relative weighting	100	50	50	50				
II	RRU-Ri26	Ri26	A80G-00053	Nzhelele		0.25	0.15	0.19	0.13	0.72	0.9	1	Downstream of the Nzhelele Dam and the confluence of the Nzhelele and Mutamba Rivers. Important monitoring site for future development on the Mutamba and Nzhelele Rivers
II	RRU-Riv33	Riv33	A80G-00054	Tshishiru		0.25	0.15	0.19	0.13	0.72	0.9	1	On the lower Tshishiru before the confluemce with the Nzhelele River, below site of potential developments. Record flow contribution to the Nzhelele River
II	**RRU-Ri27**	**Ri27**	**A80G-00026**	**Nzhelele**		**0.25**	**0.15**	**0.19**	**0.13**	**0.72**	**0.9**	**1**	**Outlet of IUA. Strategic - international obligations**
II	RRU-Riii9	Riii9	A80H-00064	Ṅwanedi		0.00	0.06	0.17	0.09	0.33	0.4	2	At outlet of Nwanedi Reservoir
II	RRU-Riii10	Riii10	A80H-00060	Luphephe		0.00	0.06	0.17	0.09	0.33	0.4	2	At outlet of Luphephe Reservoir
b	**RRU-Ri28**	**Ri28**	**A80J-00028**	**Ṅwanedi**		**0.25**	**0.11**	**0.20**	**0.13**	**0.68**	**0.8**	**1**	**Outlet of IUA. Strategic - international obligations. Potential future development**
Upper Luvuvhu IUA													
II	RRU-Rvi14	Rvi14	A91A-00105	Luvuvhu		0.00	0.11	0.13	0.04	0.27	0.3	3	Inflow to Albasini Dam
II	RRU-Rvii19	Rvii19	A91B-00120	Doringspruit		0.00	0.11	0.17	0.22	0.50	0.6	2	Inflow to Albasini Dam
II	RRU-Riii5	Riii5	A91C-00115	Luvuvhu		0.00	0.19	0.17	0.06	0.43	0.5	2	Luvuvhu River just upstream of the confluence with the Latonyanda, Flows through agricultural lands
II	**RRU-Riii6**	**Riii6**	**A91D-00108**	**Latonyanda**		**0.00**	**0.24**	**0.20**	**0.24**	**0.68**	**0.8**	**1**	**At lower Latonyanda before confluence with Luvuvhu. Flows through agricultural area. Important resource unit to users and environment. At outlet of A91D. Will provide information on land use impacts of the Latonyanda on the Luvuvhu River**
II	RRU-Riv18	Riv18	A91E-00103	Dzindi		0.00	0.08	0.19	0.22	0.48	0.6	2	Downstream of urban area. Upstream of the confluence of the Dzindi and Luvuvhu Rivers before it flows into the Nandoni Dam. Important for domestic use. Poor ecological condition that should not deteriorate
II	RRU-Riv19	Riv19	A91F-00111	Luvuvhu		0.00	0.06	0.13	0.09	0.28	0.3	3	Downstream of urban areas before the inflow into Nandoni Dam
II	RRU-Rvii24	Rvii24	A91F-00093	Luvuvhu		0.00	0.06	0.13	0.09	0.28	0.3	3	Downstream of Nandoni Dam
II	**RRU-Ri30**	**Ri30**	**A91G-00091**	**Mutshindudi**		**0.25**	**0.25**	**0.20**	**0.13**	**0.83**	**1.0**	**1**	**Representative of inflows to Luvuvhu downstream of Nandoni Dam.**
Lower Luvuvhu / Mutale IUA													
II	**RRU-Ri32**	**Ri32**	**A91H-00045**	**Luvuvhu**		**0.25**	**0.15**	**0.21**	**0.09**	**0.70**	**0.8**	**1**	**Outlet of IUA. On main river, contribution to Ramsar site**
II	RRU-Rvii33	Rvii33	A92B-00051	Mutale		0.25	0.16	0.16	0.13	0.69	0.8	1	On the upper Mutale River, downstream of Lake Fundudzi and upstream of the settlements. Important for monitoring proposed development of Rambuda Dam.
II	**RRU-Ri33**	**Ri33**	**A92B-00051**	**Middle Mutale**		**0.25**	**0.16**	**0.16**	**0.13**	**0.69**	**0.8**	**1**	**Outlet of IUA. Main river, contribution to Ramsar site**
II	RRU-Riv24	Riv24	A92C-00049	Mbodi		0.00	0.07	0.10	0.04	0.20	0.2	3	Representative of the Mbodi River. Minimal negative impacts.
II	**RRU-Ri34**	**Ri34**	**A92D-00030**	**Lower Mutale**		**0.25**	**0.23**	**0.21**	**0.13**	**0.81**	**1.0**	**1**	**At outlet of IUA. Strategic - management of international obligations, contribution to Ramsar site**
II	RRU-Ri35	Ri35	A91J-00040	Luvuvhu		0.00	0.05	0.10	0.04	0.18	0.2	3	Luvuvhu before the confluence with the Mutale.
II	**RRU-Ri36**	**Ri36**	**A91K-00035**	**Luvuvhu**		**0.25**	**0.17**	**0.23**	**0.10**	**0.75**	**0.9**	**1**	**At outlet of IUA. Strategic - management of international obligations, contribution to Ramsar site**
Shingwedzi River IUA													
II	RRU-Rvi10	Rvi10	B90D-00067	Shisha		0.00	0.12	0.00	0.05	0.17	0.2	3	Flows through natural area

Water Resource Class	River Resource Unit	Node	Sub-quaternary reach	River	Criteria	Position in IUA	Concern for users	Concern for environment	Management and practical considerations	Total Prioritization Score	Priority Rating	Priority	Reason for priority rating of resource unit
					Criteria Ranking	1	2	2	2				
					Relative weighting	100	50	50	50				
II	RRU-Riv28	Riv28	B90H-00113	Mphongolo		0.25	0.13	0.20	0.07	0.66	0.8	1	On the downstream end of the Mphongola before the confluence with the Shingwedzi. Record contribution of flow and quality to the Shingwedzi before outlet of IUA.
II	RRU-Rvi13	Rvi13	B90F-00114	Shingwedzi		0.00	0.15	0.11	0.06	0.32	0.4	2	Flows through natural area
II	RRU-Riv27	Riv27	B90G-00124	Shingwedzi		0.00	0.12	0.08	0.02	0.21	0.3	3	Upstream of the confluence with Mphongolo River. Natural area
II	**RRU-Ri37**	**Ri37**	**B90H-00145**	**Shingwedzi**		**0.25**	**0.13**	**0.20**	**0.07**	**0.66**	**0.8**	**1**	**At outlet of IUA. Strategic - management of international obligations**

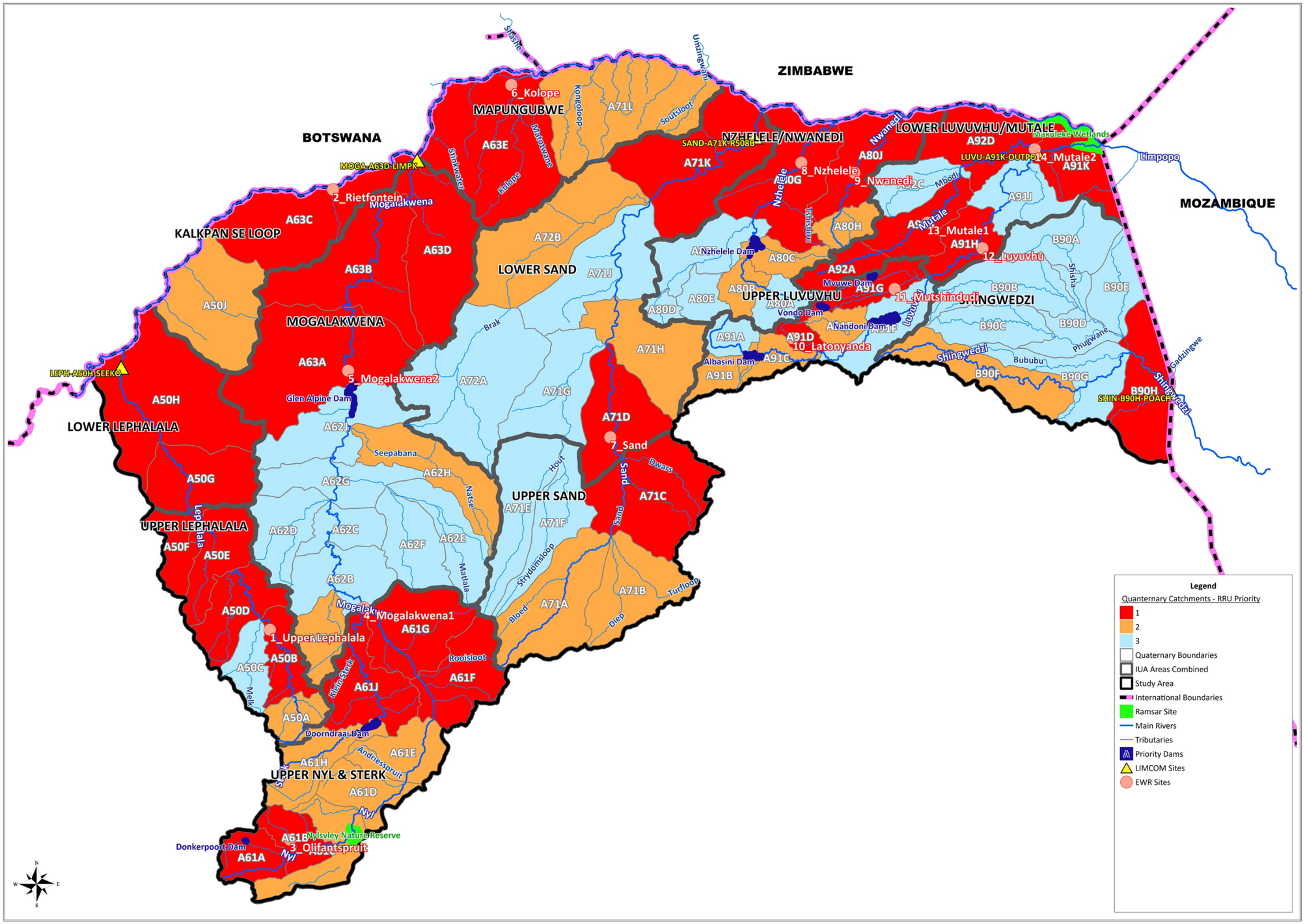


Figure 3-1. Relative priority of river resource units (Red is high priority, orange is medium priority and light blue is low priority for setting RQOs)

Table 3-4. Summary of ecological condition for the River Resource Units (rows in bold=field verification of ecological condition)

Water Resource Class	River Resource Unit	Biophysical Node Name	Sub-quaternary reach	River Name	Priority	PES	EI	ES	REC	TEC
Upper Lephalala IUA										
II	RRU-Riv8	Riv8	A50A-00354	Lephalala	2	B	High	High	B/C	B/C
II	**RRU-Riv11**	**Riv11**	**A50B-00262**	**Lephalala**	**1**	**C**	**High**	**Very High**	**C**	**C**
II	RRU-Riv10	Riv10	A50C-00273	Melk	3	C	High	Very High	C	C
II	RRU-Riv13	Riv13	A50D-00237	Boklandspruit	2	B	High	Very High	B	B
II	RRU-Riii3	Riii3	A50H-00110	Lephalala	1	D	High	High	D	D
Lower Lephalala IUA										
II	**RRU-Ri8**	**Ri8**	**A50H-00110**	**Lephalala**	**1**	**C**	**High**	**High**	**C**	**C**
Kalkpan se Loop IUA										
I	RRU-Ri38	Ri38	A50J-00073	Kalkpan Se Loop	2	B	Moderate	Very Low	B	B
I	RRU-Rvi15	Rvi15	A50J-00061	No Name	2	B	Moderate	Very Low	B	B
I	**RRU-Rvi1**	**Rvi1**	**A63C-00033**	**Rietfontein**	**1**	**B/C**	**Moderate**	**Very Low**	**B/C**	**B/C**
Upper Nyl/Sterk IUA										
II	RRU-Rvii4	Rvii4	A61H-00395	Sterk	2	E	Moderate	High	D	D
II	RRU-Rv1	Rv1	A61H-00395	Sterk	2	E	Moderate	High	D/E	D/E
II	RRU-Ri4	Ri4	A61J-00267	Sterk	1	C	Moderate	High	C	C
II	**RRU-Ri1**	**Ri1**	**A61B-00489**	**Olifantspruit**	**1**	**C**	**High**	**Very High**	**C**	**C**
II	RRU-Ri1-1	Ri1-1	A61B-00552	Nyl	1	C	Moderate	High	C	C
II	RRU-Riv3	Riv3	A61C-00501	Nyl	2	C	High	High	C	C
II	RRU-Riii1	Riii1	A61E-00386	Nyl	2	D	Moderate	Moderate	C/D	C/D
II	RRU-Ri3	Ri3	A61G-00297	Mogalakwena	1	D	Moderate	Moderate	C/D	C/D
II	**RRU-Ri5**	**Ri5**	**A61G-00248**	**Upper Mogalakwena**	**1**	**C**	**Moderate**	**Moderate**	**C**	**C**

Water Resource Class	River Resource Unit	Biophysical Node Name	Sub-quaternary reach	River Name	Priority	PES	EI	ES	REC	TEC
Mogalakwena IUA										
II	RRU-Riv12	Riv12	A62B-00223	Mogalakwena	3	C	Moderate	Moderate	C	C
II	RRU-Ri6	Ri6	A62A-00253	Mokamole	2	D	High	High	D	D
II	RRU-Rv2	Rv2	A62B-00188	Mogalakwena	3	C	High	High	B/C	B/C
II	RRU-Rvii12	Rvii12	A62D-00179	Klein Mogalakwena	3	C	Moderate	High	C	C
II	RRU-Ri10	Ri10	A62C-00188	Mogalakwena	3	C	High	High	B/C	B/C
II	RRU-Ri12	Ri12	A62G-00167	Matlalane	3	C	Moderate	Very Low	C	C
II	RRU-Ri13	Ri13	A62H-00148	Seepabana	2	D	Moderate	Very Low	D	D
II	RRU-Rvii13	Rvii13	A62J-00143	Mogalakwena	3	C	Moderate	Moderate	C	C
II	**RRU-Ri14**	**Ri14**	**A63A-00071**	**Middle Mogalakwena**	**1**	**C**	**High**	**Moderate**	**C**	**C**
II	**RRU-Rii3**	**Rii3**	**A63D-00034**	**Mogalakwena**	**1**	**C**	**Moderate**	**Moderate**	**C**	**C**
Mapungubwe IUA										
II	RRU-Rvi2	Rvi2	A63E-00011	Stinkwater	1	C	High	High	B	B
II	**RRU-Riv32**	**Riv32**	**A63E-00008**	**Kolope**	**1**	**C**	**Moderate**	**Low**	**C**	**C**
II	RRU-Rvi4	Rvi4	A71L-00005	Kongoloop	2	C	Moderate	Very Low	C	C
II	RRU-Rvi7	Rvi7	A71L-00003	No Name	2	C	High	Very Low	B	B
II	RRU-Rvi9	Rvi9	A71L-00015	Soutsloot	2	A	Moderate	Very Low	A	A
Upper Sand IUA										
II	RRU-Rvi3	Rvi3	A71G-00131	Hout	3	C	Moderate	Low	C	C
II	RRU-Ri21	Ri21	A71G-00107	Hout	3	C	Moderate	Moderate	C	C
III	RRU-Ri16	Ri16	A71A-00211	Sand	2	D	Moderate	Moderate	D/E	D
III	RRU-Ri17	Ri17	A71B-00214	Diep	2	D	Moderate	Low	D	D
III		Riv16	A71C-00156	Dwars	1	C	Moderate	Moderate	C	C

Water Resource Class	River Resource Unit	Biophysical Node Name	Sub-quaternary reach	River Name	Priority	PES	EI	ES	REC	TEC
Lower Sand IUA										
III	**RRU-Ri20**	**Ri20**	**A71D-00118**	**Sand**	**1**	**C**	**Moderate**	**Moderate**	**C**	**C**
III	RRU-Ri22	Ri22	A71D-00118	Sand	1	C	Moderate	Moderate	B/C	B/C
II	RRU-Ri23	Ri23	A71H-00088	Sand	2	C	High	High	C	C
II	RRU-Ri24	Ri24	A71J-00055	Sand	3	C	Moderate	Moderate	C	C
II	RRU-Riv17	Riv17	A72B-00038	Brak	3	C	Moderate	Moderate	C	C
II	**RRU-Ri25**	**Ri25**	**A71K-00019**	**Sand**	**1**	**C**	**High**	**Moderate**	**C**	**C**
Nzhelele and Nwanedi IUA										
II	RRU-Riii4	Riii4	A80D-00075	Mutamba	3	C	High	Very High	C	C
II	RRU-Riv23	Riv23	A80F-00063	Mutamba	3	C	Moderate	Moderate	C	C
II	RRU-Riii7	Riii7	A80B-00069	Nzhelele	2	D	Moderate	High	D	D
II	RRU-Rvii34	Rvii34	A80C-00068	Mafungudi	2	D	High	High	D	D
II	RRU-Riii8	Riii8	A80F-00068	Nzhelele	3	D	High	High	D	D
II	RRU-Ri26	Ri26	A80G-00053	Nzhelele	1	C	High	Moderate	C	C
II	RRU-Riv33	Riv33	A80G-00054	Tshishiru	1	C/D	Moderate	Low	C	C
II	**RRU-Ri27**	**Ri27**	**A80G-00026**	**Nzhelele**	**1**	**C**	**High**	**High**	**C**	**C**
II	RRU-Riii9	Riii9	A80H-00064	Ṅwaneḍi	2	B	High	Very High	B/C	B/C
II	RRU-Riii10	Riii10	A80H-00060	Luphephe	2	C	High	High	B	B
II	**RRU-Ri28**	**Ri28**	**A80J-00028**	**Ṅwaneḍi**	**1**	**C**	**High**	**High**	**C**	**C**
Upper Luvuvhu IUA										
II	RRU-Rvi14	Rvi14	A91A-00105	Luvuvhu	3	C	Moderate	High	C	C
II	RRU-Rvii19	Rvii19	A91B-00120	Doringspruit	2	C	Moderate	High	C	C
II	RRU-Riii5	Riii5	A91C-00115	Luvuvhu	2	C	Moderate	High	B	B
II	**RRU-Riii6**	**Riii6**	**A91D-00108**	**Latonyanda**	**1**	**C**	**Moderate**	**Very High**	**C**	**C**

Water Resource Class	River Resource Unit	Biophysical Node Name	Sub-quaternary reach	River Name	Priority	PES	EI	ES	REC	TEC
II	RRU-Riv18	Riv18	A91E-00103	Dzindi	2	D	High	Very High	D	D
II	RRU-Riv19	Riv19	A91F-00111	Luvuvhu	3	C	Moderate	High	C	C
II	RRU-Rvii24	Rvii24	A91F-00093	Luvuvhu	3	D	Moderate	High	D	D
II	**RRU-Ri30**	**Ri30**	**A91G-00091**	**Mutshindudi**	**1**	**C**	**Moderate**	**High**	**C**	**C**
Lower Luvuvhu / Mutale IUA										
II	**RRU-Ri32**	**Ri32**	**A91H-00045**	**Luvuvhu**	**1**	**C**	**High**	**High**	**C**	**C**
II	RRU-Rvii33	Rvii33	A92B-00051	Mutale	1	C	High	High	C	C
II	**RRU-Ri33**	**Ri33**	**A92B-00051**	**Middle Mutale**	**1**	**C**	**High**	**High**	**C**	**C**
II	RRU-Riv24	Riv24	A92C-00049	Mbodi	3	D	Moderate	Very Low	D	D
II	**RRU-Ri34**	**Ri34**	**A92D-00030**	**Lower Mutale**	**1**	**C**	**High**	**High**	**C**	**B/C**
II	RRU-Ri35	Ri35	A91J-00040	Luvuvhu	3	B	High	High	B	B
II	**RRU-Ri36**	**Ri36**	**A91K-00035**	**Luvuvhu**	**1**	**C**	**Very High**	**High**	**C**	**B/C**
Shingwedzi River IUA										
II	RRU-Rvi10	Rvi10	B90D-00067	Shisha	3	A	High	Moderate	A	A
II	RRU-Riv28	Riv28	B90H-00113	Mphongolo	1	A	High	Very Low	A	A
II	RRU-Rvi13	Rvi13	B90F-00114	Shingwedzi	2	C	High	Moderate	C	C
II	RRU-Riv27	Riv27	B90G-00124	Shingwedzi	3	A	High	Low	A	A
II	**RRU-Ri37**	**Ri37**	**B90H-00145**	**Shingwedzi**	**1**	**C**	**High**	**High**	**C**	**C**

3.2 Dam Resource Unit Prioritisation

Significant dams in the study area were identified in the Delineation and Status Quo report (DWS, 2022), based on size and importance of dams for water supply.

3.2.1 Criteria and rationale for Dam Resource Prioritisation

Further screening was conducted to identify the Dams RUs that should be prioritised. As a prioritisation tool has not been developed for dams, a list of criteria was determined based on the following:

1. *The cumulative level of impact* – This is the anticipated level of impact of current and future use/ activities in the upstream catchments on the inflows to the dam. The impact rating scores can range between Very High: -1; High: -0.75; Moderate: -0.5; Low: -0.25 and None; 0. Where current and future use activities have a positive impact on the dam the ratings would be positive. This is particularly the case for dams downstream of other dams where compensation releases are made.
2. *Protection of the Resources* – This is evaluated based on the importance of releases for EWRs downstream of the dam. Where the recommended ecological category is higher than current this was reflected as high. The rating ranged from Very High: 1; High:0.75; Moderate: 0.5, Low: 0.25; Not Important: 0.
3. *Water Resource Dependent Activities* – This is evaluated based on importance of the dam for in-dam activities and releases of water for downstream use (irrigation, domestic, mining and industries, etc.) The rating scores given range from Very High 1; High:0.75; Moderate: 0.5, Low: 0.25; Not Important: 0. The magnitude of the releases for and the categories for downstream use was considered in the rating.
4. *The water quality impact to dependent activities* – This criterion intends to determine the dams which have a negative impact on the quality of the dependent activities both in dam as well as the releases for the downstream users. The impact rating scores can range between Very High: -1; High: -0.75; Moderate: -0.5; Low: -0.25 and None; 0.

It was considered that not all the above criteria have equal weights. These were weighted differently as illustrated in Table 3-5 below.

Components with importance scores of 0.5 and higher for the 'importance for protection' or 'importance for other water use' are then selected as priority dam RUs.

Table 3-5. Criteria use to assess the prioritisation of dams

Criteria	Weight
Cumulative level if Impact of current and future use in upstream activities	0.20
Protection of the Resources - Releases for EWRs downstream of the dam	0.25
Water Resource Dependent Activities - Downstream Uses	0.25
Water Resource Dependent Activities – In dam activities	0.15
Water Quality Impact on downstream use	0.15
Total Score	**1.00**

3.3 Dam Resource Unit Prioritisation

3.3.1 Dam Prioritisation – Upper Nyl/Sterk and Mogalakwena Resource Units

Results of the RU prioritisation of the dams in the Upper Nyl/ Sterk and Mogalakwena IUA are presented in Table 3-6.

All three dams scored on the importance scores above the 0.5 threshold. It is important to note the following:

1) The Doorndraai Dam and Glen Alpine Dams are negatively impacted by the current and future water upstream of these dams. This is because there is increasing abstraction upstream of these two dams which will impact on the run-off into the dams. This will have an impact on releases for the downstream EWRs to meet the maintenance low flows and in some cases the maintenance high flows.

2) The needs for protection of the resources downstream of all three dams is significant and score very high on all three dams. This is because of the need to either maintain and /or improve the ecological condition of the sites downstream of the three dams.

3) All three dams are highly important for water resource dependent activities with releases to meet the downstream water users dependent of the dams. It must be noted that the available yield in all three dams is fully allocated, hence the very high importance ratings.

3.3.2 Dam Prioritisation – Upper and Lower Sand Resource Units

Results of the RU prioritisation of the dams in the Upper and Lower Sand River IUA are presented in Table 3-7. The weighted scored were based on the following:

1) The cumulative level of impact of the upstream water uses on the three dams of Turfloop, Houtriver and Seshego are not significant as all three dams are located upstream of the tributaries of the Sand River.

2) There are significant return flows into the Sand River which are much higher than the maintenance low flows required to meet the flows of the recommended ecological category of the sites in the Sand River catchments. This is attributed to the significant water transfers from the neighbouring catchments to meet the current and future requirements of the domestic, mining and industrial sectors in the catchment. To meet the flows required for the recommended ecological category, less maintenance low flows are required. Therefore, the dams are not required to release water for water resource protection. The dams scored low on this criterion.

3) For water dependent activities, the importance of the dams in the Sand River only supplements the water from transfers and therefore plays an insignificant role compared to the transfers into the system. The dams scored low on this criterion.

The overall weighted scores of all three dams did not achieve the threshold of 0.5 or higher. They were therefore not included in the prioritised dams for which RQOs should be developed.

Table 3-6. Resource unit priority scores for dams in the Upper Nyl/Sterk and Mogalakwena IUAs

Dams	River or Watercourse	Quaternary	MAR (million m3/a)	FSC (million m3/a)	FSC: MAR Ratio	Purpose	Criteria	Rating	Weight	Score	Ranking
Donkerpoort	Little Nyl	A61A	5.3	2.4	0.45	Municipal Use & Industries	Cumulative level if Impact of current and future use in upstream activities	-	0.20	-	2
							Protection of the Resources	1.00	0.25	0.25	
							Water Resource Dependent Activities - Downstream Uses	1.00	0.25	0.25	
							Water Resource Dependent Activities – In dam activities	0.25	0.15	0.04	
							Water Quality Impact on downstream use	0.25	0.15	0.04	
							Total Score		**1.00**	**0.58**	
Doorndraai	Sterk	A61H	38.1	46.5	1.22	Municipal Use & Industrial Use	Cumulative level if Impact of current and future use in upstream activities	- 0.25	0.20	- 0.05	1
							Protection of the Resources	1.00	0.25	0.25	
							Water Resource Dependent Activities - Downstream Uses	1.00	0.25	0.25	
							Water Resource Dependent Activities – In dam activities	0.50	0.15	0.08	
							Water Quality Impact on downstream use	0.50	0.15	0.08	
							Total Score		1.00	0.60	
Glen Alpine	Mogalakwena	A62J	204	18.9	0.09	Irrigation	Cumulative level if Impact of current and future use in upstream activities	- 0.25	0.20	- 0.05	3
							Protection of the Resources	1.00	0.25	0.25	
							Water Resource Dependent Activities - Downstream Uses	1.00	0.25	0.25	
							Water Resource Dependent Activities – In dam activities	0.25	0.15	0.04	
							Water Quality Impact on downstream use	0.25	0.15	0.04	
							Total Score		**1.00**	**0.53**	

Table 3-7. Resource unit priority scores for dams in the Upper and Lower Sand River IUAs

Dams	River or Watercourse	Quaternary	MAR (million m3/a)	FSC (million m3/a)	FSC: MAR Ratio	Purpose	Criteria	Rating	Weight	Score	Ranking
Turfloop	Sand	A71B	0.6	3.3	5.5	Municipal Use & Industries	Cumulative level if Impact of current and future use in upstream activities	-	0.20	-	2
							Protection of the Resources	0.25	0.25	0.06	
							Water Resource Dependent Activities - Downstream Uses	-	0.25	-	
							Water Resource Dependent Activities – In dam activities	-	0.15	-	
							Water Quality Impact on downstream use	0.25	0.15	0.04	
							Total Score		**1.00**	**0.10**	
Houtriver	Sand	A71E	0.4	7.5	18.75	Municipal Use & Industrial Use	Cumulative level if Impact of current and future use in upstream activities	- 0.25	0.20	- 0.05	3
							Protection of the Resources	0.25	0.25	0.06	
							Water Resource Dependent Activities - Downstream Uses	-	0.25	-	
							Water Resource Dependent Activities – In dam activities	-	0.15	-	
							Water Quality Impact on downstream use	0.50	0.15	0.08	
							Total Score		1.00	0.09	
Seshego	Bloed	A71A	204	2.38	0.01	Domestic & Stock Watering	Cumulative level if Impact of current and future use in upstream activities	- 0.25	0.20	- 0.05	1
							Protection of the Resources	-	0.25	-	
							Water Resource Dependent Activities - Downstream Uses	0.25	0.25	0.06	
							Water Resource Dependent Activities – In dam activities	-	0.15	-	
							Water Quality Impact on downstream use	0.75	0.15	0.11	
							Total Score		**1.00**	**0.13**	

3.3.3 Dam Prioritisation – Nzhelele /Nwanedi Resource Units

Results of the RU prioritisation of the dams in the Nzhelele and Nwanedi IUA are presented in Table 3-8.

There are five dams that were evaluated in the Nzhelele and Nwanedi IUA. The dam prioritisation highlighted the following:

1) Cumulative level of impact on current and future water use upstream of the dam:
    a. The Nzhelele Dam is negatively impacted by the upstream domestic water use from Mutshedzi Dam which limits the runoff to the dam. In addition, there is significant commercial forestry upstream of Nzhelele Dam. This together with the increasing invasive alien plants (IAP) is impacting negatively on the runoff into the dam.
    b. The other four dams are not significantly impacted by any cumulative impacts upstream of the dams.
2) Protection of the Resources:
    a. The recommended ecological category downstream of Nzhelele Dam requires releases of maintenance low flows from the dam to maintain and improve the ecological function of the river reach up to the confluence with the Limpopo River. Therefore, it scores very high on this criterion.
    b. All three other dams are in the Nwanedi River. All dams can contribute to the releases for the maintenance low flows required for the downstream EWRs. They scored high.
3) Water Resources Dependent Activities – Downstream Uses:
    a. There are significant downstream water users dependent on Nzhelele Dam with water diverted into canal to meet the needs of irrigation agriculture. There is also potential for the current mining activities to obtain a licence from Nzhelele Dam if they refurbish the leaking irrigation canal system. Nzhelele Dam scores very high on water resources dependent activities as it is the only resource for the downstream water use.
    b. The irrigation agriculture downstream of Cross Dam has not been taking up its allocation. Furthermore, the other two dams can also provide additional water for the downstream water uses in the Nwanedi River providing flexibility of supplying the users. They scored high on this criterion.
4) Water Quality impact on downstream users:
    a. The water quality of the water resources from the dam releases didn't impact negatively on the downstream water users. The impact rating was determined to be none on all five dams in the Nzhelele / Nwanedi IUA.

The overall weighted score for Nzhelele Dam achieved the threshold higher than 0.5. However, the overall weighted scores for the other four dams did not achieve the threshold of 0.5 or higher. Therefore, only Nzhelele Dam was prioritised for the RQOs of the dam resources.

Table 3-8. Resource unit priority scores for dams in the Nzhelele / Nwanedi River IUAs

Dams	River or Watercourse	Quaternary	MAR (million m3/a)	FSC (million m3/a)	FSC: MAR Ratio	Purpose	Criteria	Rating	Weight	Score	Ranking
Mutshedzi	Mutshedzi	A80A	15.5	2.2	0.14	Irrigation, Domestic & Industrial Use	Cumulative level if Impact of current and future use in upstream activities	-	0.20	-	3
							Protection of the Resources	0.75	0.25	0.19	
							Water Resource Dependent Activities - Downstream Uses	0.50	0.25	0.13	
							Water Resource Dependent Activities – In dam activities	-	0.15	-	
							Water Quality Impact on downstream use	-	0.15	-	
							Total Score		**1.00**	**0.31**	
Nzhelele	Nzhelele	A80C	73.4	51.2	0.70	Irrigation	Cumulative level if Impact of current and future use in upstream activities	- 0.25	0.20	- 0.05	1
							Protection of the Resources	1.00	0.25	0.25	
							Water Resource Dependent Activities - Downstream Uses	1.00	0.25	0.25	
							Water Resource Dependent Activities – In dam activities	0.50	0.15	0.08	
							Water Quality Impact on downstream use	-	0.15	-	
							Total Score		**1.00**	**0.53**	
Luphephe	Luphephe	A80H	21.4	14.8	0.69	Irrigation	Cumulative level if Impact of current and future use in upstream activities	-	0.20	-	2
							Protection of the Resources	1.00	0.25	0.25	
							Water Resource Dependent Activities - Downstream Uses	0.75	0.25	0.19	
							Water Resource Dependent Activities – In dam activities	-	0.15	-	
							Water Quality Impact on downstream use	-	0.15	-	
							Total Score		**1.00**	**0.44**	
Nwanedi	Nwanedi	A80H	9.5	5.3	0.56	Irrigation	Cumulative level if Impact of current and future use in upstream activities	-	0.20	-	4

Dams	River or Watercourse	Quaternary	MAR (million m3/a)	FSC (million m3/a)	FSC: MAR Ratio	Purpose	Criteria	Rating	Weight	Score	Ranking
							Protection of the Resources	0.75	0.25	0.19	
							Water Resource Dependent Activities - Downstream Uses	0.25	0.25	0.06	
							Water Resource Dependent Activities – In dam activities	0.25	0.15	0.04	
							Water Quality Impact on downstream use	-	0.15	-	
							Total Score		**1.00**	**0.29**	
Cross Dam	Nwanedi	A80H	204	2.6	0.01	Irrigation	Cumulative level if Impact of current and future use in upstream activities	-	0.20	-	5
							Protection of the Resources	0.50	0.25	0.13	
							Water Resource Dependent Activities - Downstream Uses	0.25	0.25	0.06	
							Water Resource Dependent Activities – In dam activities	-	0.15	-	
							Water Quality Impact on downstream use	-	0.15	-	
							Total Score		**1.00**	**0.19**	

3.3.4 Dam Prioritisation – Luvuvhu / Mutale Resource Units

Results of the RU prioritisation of the dams in the Upper Luvhuvhu and Luvuvhu/Mutale IUAs are presented in Table 3-9.

There are nine dams that were evaluated in the Upper Luvhuvhu and Luvuvhu/Mutale IUAs. The dam prioritisation highlighted the following:

1) Cumulative level of impact on current and future water uses in upstream of the dam:
    a. The upstream activities of the Albasini and Vondo Dams negatively impact on the inflows into these two dams significantly. In addition, Vondo Dam transfers water to the Mutshedzi dam. This will have a negative impact on the releases for the maintenance low flows from Vondo Dam. The impact rating for the two dams was low.
    b. The other eight dams are not significantly impacted by any cumulative impacts upstream of the dams. The impact rating for the eight dams was none.
2) Protection of the Resources:
    a. The recommended ECs downstream of Albasini, Vondo and Nandoni Dams require releases of maintenance low flows from the dams to maintain and improve the ecological function of the river reach into the Kruger National Park. In addition, the contribution of tributary inflow from Mbwedi River where Damani Dam is located is important to the downstream releases. Therefore, the impact rating scores were very high on this criterion.
    b. The impact rating for the other dams was also determined to be high as the releases from these dams would contribute to meeting the maintenance low flows for the downstream river reaches.
3) Water Resources Dependent Activities – Downstream Uses:
    a. There are significant downstream water users dependent on the dams in the Luvuvhu river systems with water diverted into canals to meet the needs of both domestic and irrigation agriculture. The impact rating scores for the dams in the Luvuvhu River system was very high to high.
    b. The dam in the Mutale River is important for cultural and in-dam activities. Its impact rating score for this criterion was medium.
4) Water Quality impact on downstream users:
    a. The water quality of the water resources from the dam releases has some negative impact on the downstream water users. The impact rating was determined to be low on all the dams in the Upper Luvuvhu and Luvuvhu/Mutale IUAs.

The overall weighted score for Nandoni, Vondo, Albasini and Damani Dams achieved the threshold of 5.0 or higher. However, the overall weighted scores for all the other dams did not achieve the threshold of 0.5 or higher. Therefore, only four dams in the Luvuvhu system were prioritised for developing RQOs.

Eight dams in total were prioritised in the study area for developing RQOs of the dam resources. The details of these dams are provided in Table 3-10 and Figure 3-2.

Table 3-9. Resource unit priority scores for dams in the Luvhuvhu / Mutale River IUAs

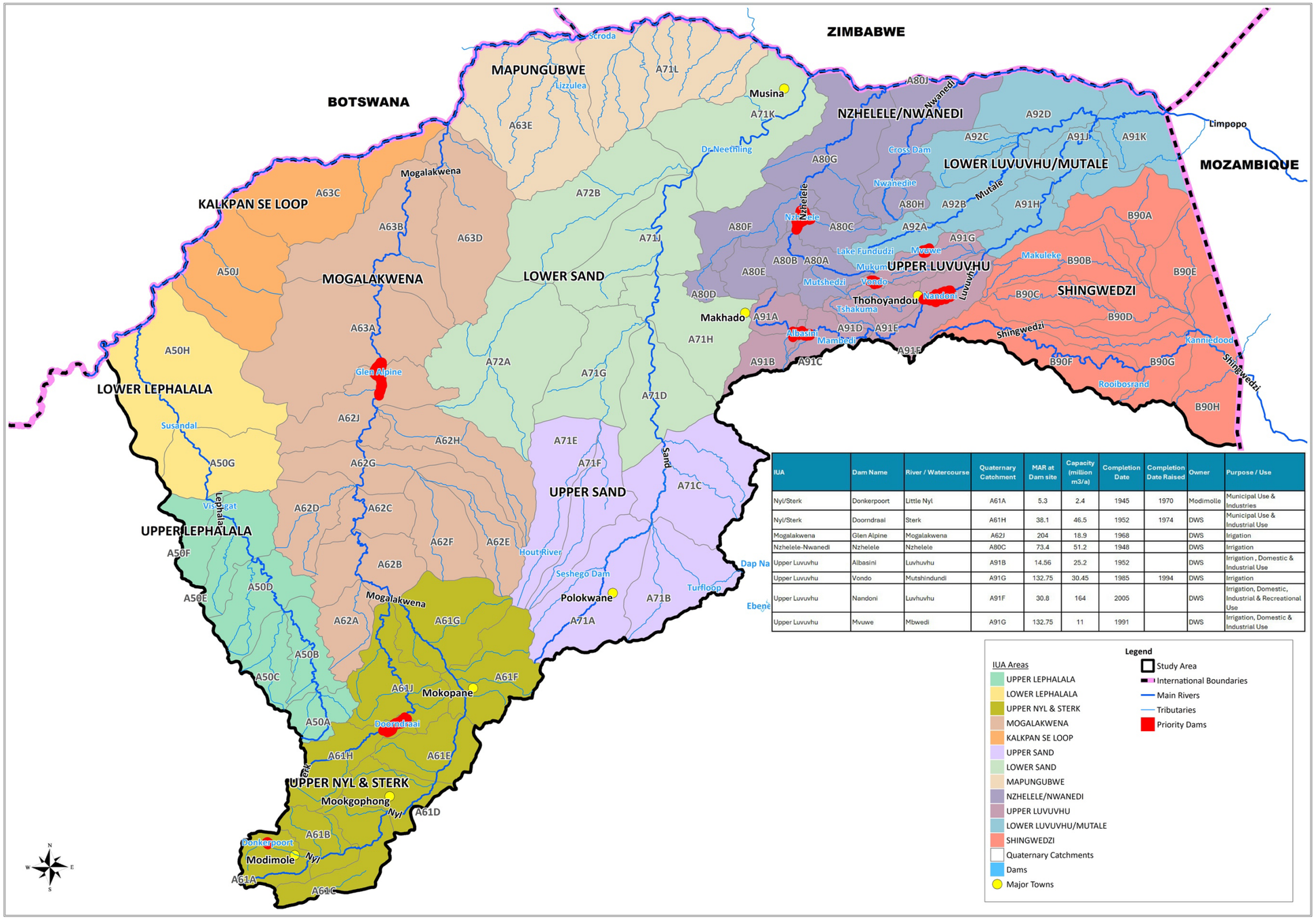
Dams	River or Watercourse	Quaternary	MAR (million m3/a)	FSC (million m3/a)	FSC: MAR Ratio	Purpose	Criteria	Rating	Weight	Score	Ranking
Albasini	Luvhuvhu	A91B	14.56	25.2	1.73	Irrigation, Domestic & Industrial Use	Cumulative level if Impact of current and future use in upstream activities	- 0.25	0.20	- 0.05	2
							Protection of the Resources	1.00	0.25	0.25	
							Water Resource Dependent Activities - Downstream Uses	1.00	0.25	0.25	
							Water Resource Dependent Activities – In dam activities	0.75	0.15	0.11	
							Water Quality Impact on downstream use	- 0.25	0.15	- 0.04	
							Total Score		**1.00**	**0.53**	
Mambedi Lower Dam	Mambedi Spruit	A91C	57.72	7.2	0.12	Irrigation	Cumulative level if Impact of current and future use in upstream activities	-	0.20	-	6
							Protection of the Resources	0.75	0.25	0.19	
							Water Resource Dependent Activities - Downstream Uses	1.00	0.25	0.25	
							Water Resource Dependent Activities – In dam activities	0.50	0.15	0.08	
							Water Quality Impact on downstream use	- 0.25	0.15	- 0.04	
							Total Score		**1.00**	**0.48**	
Vondo	Mutshindundi	A91G	132.75	30.45	0.23	Irrigation	Cumulative level if Impact of current and future use in upstream activities	-	0.20	-	4
							Protection of the Resources	1.00	0.25	0.25	
							Water Resource Dependent Activities - Downstream Uses	1.00	0.25	0.25	
							Water Resource Dependent Activities – In dam activities	0.50	0.15	0.08	
							Water Quality Impact on downstream use	- 0.25	0.15	- 0.04	
							Total Score		**1.00**	**0.54**	

Dams	River or Watercourse	Quaternary	MAR (million m3/a)	FSC (million m3/a)	FSC: MAR Ratio	Purpose	Criteria	Rating	Weight	Score	Ranking
Nandoni	Luvhuvhu	A91F	30.8	164	5.32	Irrigation, Domestic, Industrial & Recreational Use	Cumulative level of Impact of current and future use in upstream activities	-	0.20	-	1
							Protection of the Resources	1.00	0.25	0.25	
							Water Resource Dependent Activities - Downstream Uses	0.75	0.25	0.19	
							Water Resource Dependent Activities – In dam activities	1.00	0.15	0.15	
							Water Quality Impact on downstream use	- 0.25	0.15	- 0.04	
							Total Score		**1.00**	**0.55**	
Damani	Mbwedi	A91G	132.75	11	0.08	Irrigation, Domestic & Industrial Use	Cumulative level if Impact of current and future use in upstream activities	-	0.20	-	3
							Protection of the Resources	1.00	0.25	0.25	
							Water Resource Dependent Activities - Downstream Uses	1.00	0.25	0.25	
							Water Resource Dependent Activities – In dam activities	0.25	0.15	0.04	
							Water Quality Impact on downstream use	- 0.25	0.15	- 0.04	
							Total Score		**1.00**	**0.50**	
Tshakhuma	Latonyanda	A91D	48.12	3.85	0.08	Domestic & Industrial Use	Cumulative level if Impact of current and future use in upstream activities	-	0.20	-	5
							Protection of the Resources	0.75	0.25	0.19	
							Water Resource Dependent Activities - Downstream Uses	0.50	0.25	0.13	
							Water Resource Dependent Activities – In dam activities	0.50	0.15	0.08	
							Water Quality Impact on downstream use	- 0.25	0.15	- 0.04	
							Total Score		**1.00**	**0.35**	

Dams	River or Watercourse	Quaternary	MAR (million m3/a)	FSC (million m3/a)	FSC: MAR Ratio	Purpose	Criteria	Rating	Weight	Score	Ranking
Phiphindi	Mutshindundi	A91G	132.75	0.19	0.00	Domestic & Industrial Use	Cumulative level if Impact of current and future use in upstream activities	-	0.20	-	7
							Protection of the Resources	0.50	0.25	0.13	
							Water Resource Dependent Activities - Downstream Uses	0.50	0.25	0.13	
							Water Resource Dependent Activities – In dam activities	-	0.15	-	
							Water Quality Impact on downstream use	0.25	0.15	0.04	
							Total Score		**1.00**	**0.29**	
Mukumbani (Lake Fundudzi)	Mutale	A92A	114.19	21.5	0.19	Cultural Use	Cumulative level if Impact of current and future use in upstream activities	-	0.20	-	1
							Protection of the Resources	0.75	0.25	0.19	
							Water Resource Dependent Activities - Downstream Uses	0.50	0.25	0.13	
							Water Resource Dependent Activities – In dam activities	1.00	0.15	0.15	
							Water Quality Impact on downstream use	- 0.25	0.15	- 0.04	
							Total Score		**1.00**	**0.43**	
Thate Vondo Dam	Tshirovho	A92A	114.19	3.9	0.03	Domestic & Industrial Use	Cumulative level if Impact of current and future use in upstream activities	- 0.25	0.20	- 0.05	2
							Protection of the Resources	0.75	0.25	0.19	
							Water Resource Dependent Activities - Downstream Uses	1.00	0.25	0.25	
							Water Resource Dependent Activities – In dam activities	0.25	0.15	0.04	
							Water Quality Impact on downstream use	- 0.25	0.15	- 0.04	
							Total Score		**1.00**	**0.39**	

Table 3-10. Priority dams in the study area

IUA	Dam Name	River / Watercourse	Quaternary Catchment	MAR at Dam site	Capacity (million m3)	Completion Date	Completion Date Raised	Owner	Purpose / Use
Nyl/Sterk	Donkerpoort	Little Nyl	A61A	5.3	2.4	1945	1970	Modimolle	Municipal Use & Industries
Nyl/Sterk	Doorndraai	Sterk	A61H	38.1	46.5	1952	1974	DWS	Municipal Use & Industrial Use
Mogalakwena	Glen Alpine	Mogalakwena	A62J	204	18.9	1968		DWS	Irrigation
Nzhelele-Nwanedi	Nzhelele	Nzhelele	A80C	73.4	51.2	1948		DWS	Irrigation
Upper Luvuvhu	Albasini	Luvuvhu	A91B	14.56	25.2	1952		DWS	Irrigation, Domestic & Industrial Use
Upper Luvuvhu	Vondo	Mutshindudi	A91G	132.75	30.45	1985	1994	DWS	Irrigation
Upper Luvuvhu	Nandoni	Luvuvhu	A91F	30.8	164	2005		DWS	Irrigation, Domestic, Industrial & Recreational Use
Upper Luvuvhu	Mvuwe	Mbwedi	A91G	132.75	11	1991		DWS	Irrigation, Domestic & Industrial Use



IUA	Dam Name	River / Watercourse	Quaternary Catchment	MAR at Dam site	Capacity (million m3/a)	Completion Date	Completion Date Raised	Owner	Purpose / Use
Nyl/Sterk	Donkerpoort	Little Nyl	A61A	5.3	2.4	1945	1970	Modimolle	Municipal Use & Industries
Nyl/Sterk	Doorndraai	Sterk	A61H	38.1	46.5	1952	1974	DWS	Municipal Use & Industrial Use
Mogalakwena	Glen Alpine	Mogalakwena	A62J	204	18.9	1968		DWS	Irigation
Nzhelele-Nwanedi	Nzhelele	Nzhelele	A80C	73.4	51.2	1948		DWS	Irrigation
Upper Luvuvhu	Albasini	Luvhuvhu	A91B	14.56	25.2	1952		DWS	Irrigation , Domestic & Industrial Use
Upper Luvuvhu	Vondo	Mutshindundi	A91G	132.75	30.45	1985	1994	DWS	Irrigation
Upper Luvuvhu	Nandoni	Luvhuvhu	A91F	30.8	164	2005		DWS	Irrigation, Domestic, Industrial & Recreational Use
Upper Luvuvhu	Mvuwe	Mbwedi	A91G	132.75	11	1991		DWS	Irrigation, Domestic & Industrial Use

Figure 3-2. Prioritised dams in the study area

3.4 Wetland Resource Unit Prioritisation

The focus of the wetland component for this report is to outline RU prioritisation and the determination of wetland components, sub-components and indicators that will go forward to the development of RQOs for wetlands. To do so however, it is necessary to outline the approach to setting wetland RQOs as well as the prioritisation of wetlands, which was done as a detailed task of this project and is reported on in detail in volume 1 of the wetland report (DWS, 2024; this project).

3.4.1 Wetland RQO Process

Due to the high number of wetlands within the study area (Figure 3-4), it is unrealistic to implement and monitor RQOs for each individual wetland. Following the recommendations and method guidelines by DWS (2016) and more recently by Bredin *et al* (2019), specific RQOs will be set for the highest priority wetlands. The overall, integrated process of determining RQOs for wetlands is shown in Figure 3-3. Similarly, Bredin *et al.* (2019) outline a 5-step process to determine wetland RQOs:

- Identify potentially significant wetland resources. This was done as part of the inception report of this project.
- Identify, verify, and prioritize wetland resources to inform the delineation of Resource Units. This was completed as part of volume 1 of the wetland report (wetland ecostatus and priority).
- Desktop delineation, Present Ecological State and Importance and Sensitivity of Priority Wetland Resources to determine the Recommended Ecological Category and to inform the delineation of Resource Units. This was also completed as part of volume 1 of the wetland report (wetland ecostatus and priority) and incorporated infield verification of wetland delineation, ecostatus and impacts.
- Determine sub-components and indicators; and
- Set Resource Quality Objectives, and numerical criteria, and provide implementation information.

The objective of the wetland component is to specify RQOs for wetlands at both a catchment level as well as prioritised individual wetland RUs (prioritisation was conducted as part of the RU and IUA prioritisation, delineation and wetland status quo reporting task. Catchment-level RQOs provide broad level objectives for wetland management within the WMA. RQOs for priority individual wetland or wetland complexes are dependent on available baseline data, and where such data are available, this enables the specification of numeric as well as narrative RQOs to manage these systems according to the desired ecological condition.

The following summarises the process for RQO determination (DWS, 2016 and Bredin *et al.*, 2019):

1. Collate information on flow and non-flow related impacts

This requires collation of information on flow and non-flow related impacts identified in previous tasks.

2. Select sub-components and indicators for RQO determination and monitoring

The main components of relevance to wetlands includes water quantity, water quality, wetland habitats and biota. Sub-components and indicators should reflect those that are sensitive to actual or potential impacts and can be measured and monitored.

3. Provide narrative RQOs for indicators of High Priority wetlands

This involves the preparation of narrative RQOs for sub-components and indicators identified as relevant in the previous action.

4. Provide numeric RQOs for indicators of high Priority wetlands

This involves the preparation of numerical RQOs to complement the narrative RQOs but will be limited by existing baseline data or dependent on infield verification.

5. Provide broad level narrative RQOs for wetlands across the WMA

Generic management guidelines specific to the wetland RUs should provide management and monitoring approaches for specific sub-components (relevant to the wetland types and risks of the relevant wetland region).

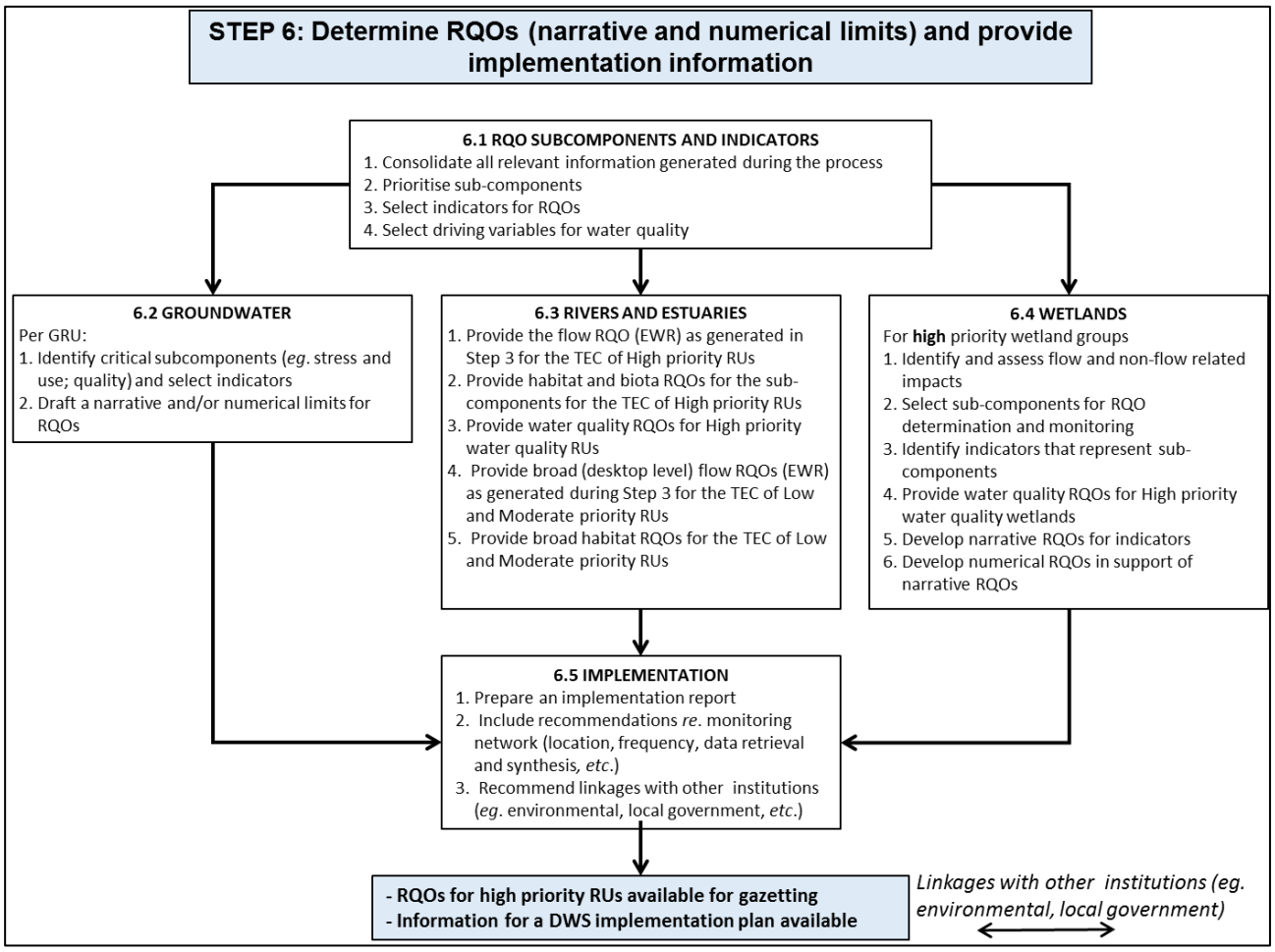


Figure 3-3. Illustration of the sub-steps for the process of RQO determination (narrative and numerical; after DWS, 2016).

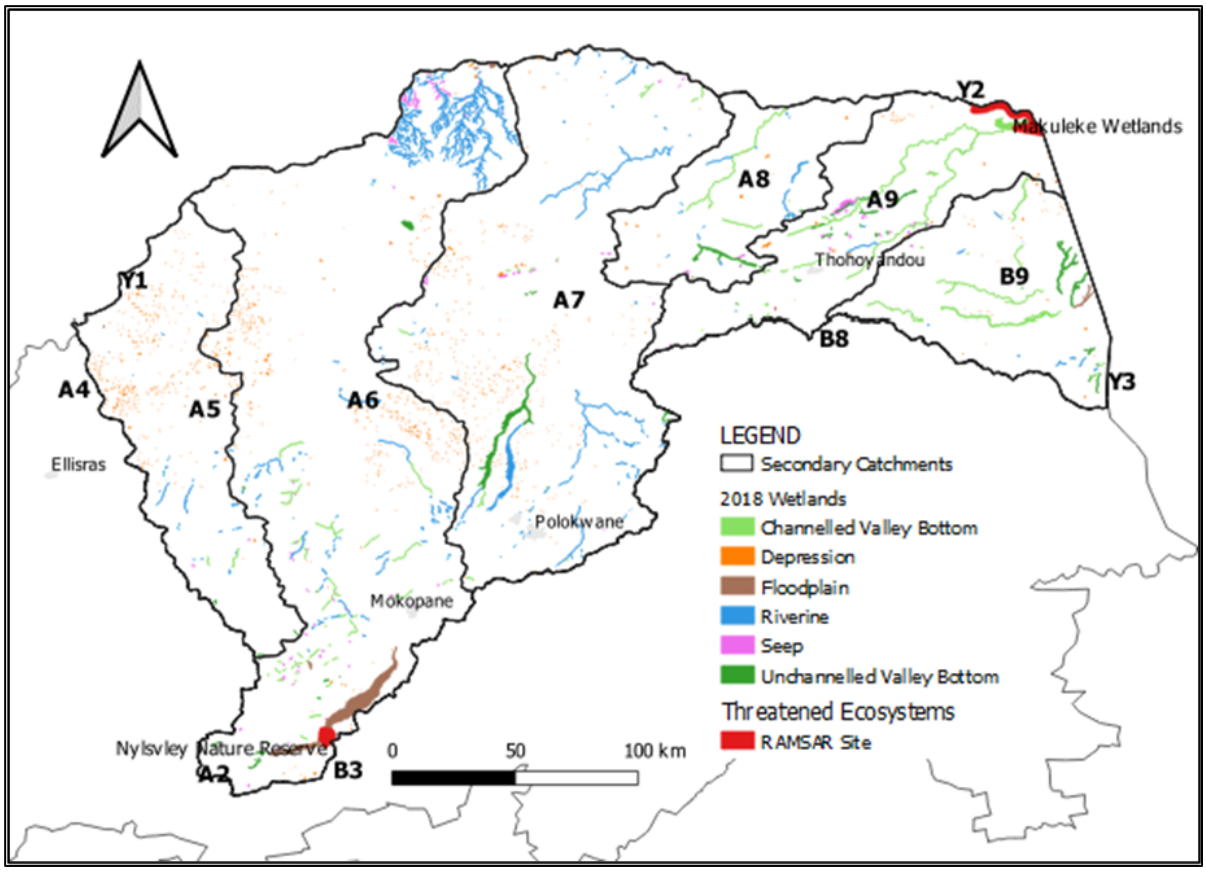


Figure 3-4. Wetlands within the study area showing distribution of different HGM types (2018 updated wetland map 5) and secondary catchments.

3.4.2 Wetland Prioritisation

The objective of this step was to identify high-priority wetlands or wetland groups since wetlands are numerous and scattered throughout the study area, and limited resources prevent detailed assessment of all of them. Only the highest priority wetlands are therefore earmarked for further analysis in the process. These high-priority areas were selected based on ecological, socio-cultural and water resource use importance and are often areas of high ecological importance where water resources are stressed or may be stressed in future. A simple 7-step process was followed using the best available data (Figure 3-5):

- Step 1: Determine wetland present ecological state (PES) at sub quaternary catchment scale.
- Step 2: Determine wetland ecological importance (EI) at the same scale as above.
- Step 3: Determine wetland sensitivity (ES) at the same scale as above.
- Step 4: Determine the wetland importance score (IS) by integrating EI, ES and socio-cultural importance (SCI).
- Step 5: Determine the integrated environmental importance of wetland/s (IEI) by integrating IS and PES.
- Step 6: Determine wetland priority by integration of IEI and water resource use importance (WRUI).
- Step 7: Contribute to determining High Priority Areas by integrating with other components.

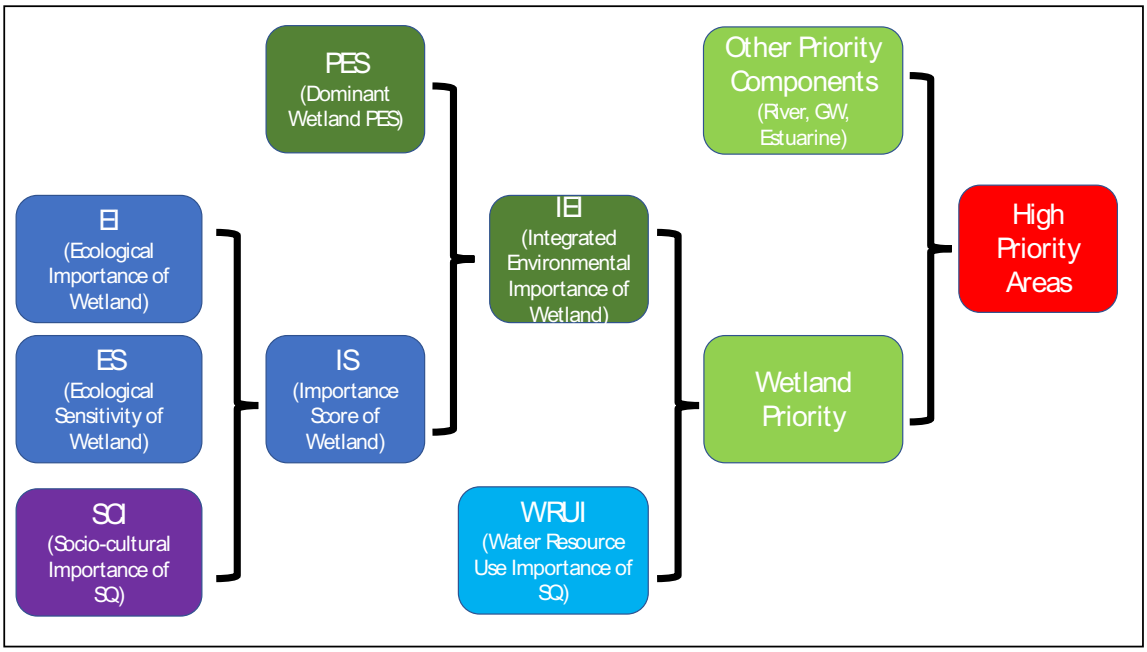


Figure 3-5. Summary of the process to identify high-priority wetlands.

The results of wetland prioritisation are geographically shown in Figure 3-6 at the sub-quaternary (SQ). scale and are also tabulated in Table 3-11. SQs with Very High priority comprised 9.7% of SQs and 37.7% of SQs had a High priority leaving just over 52% of SQs with a Moderate or Low priority.

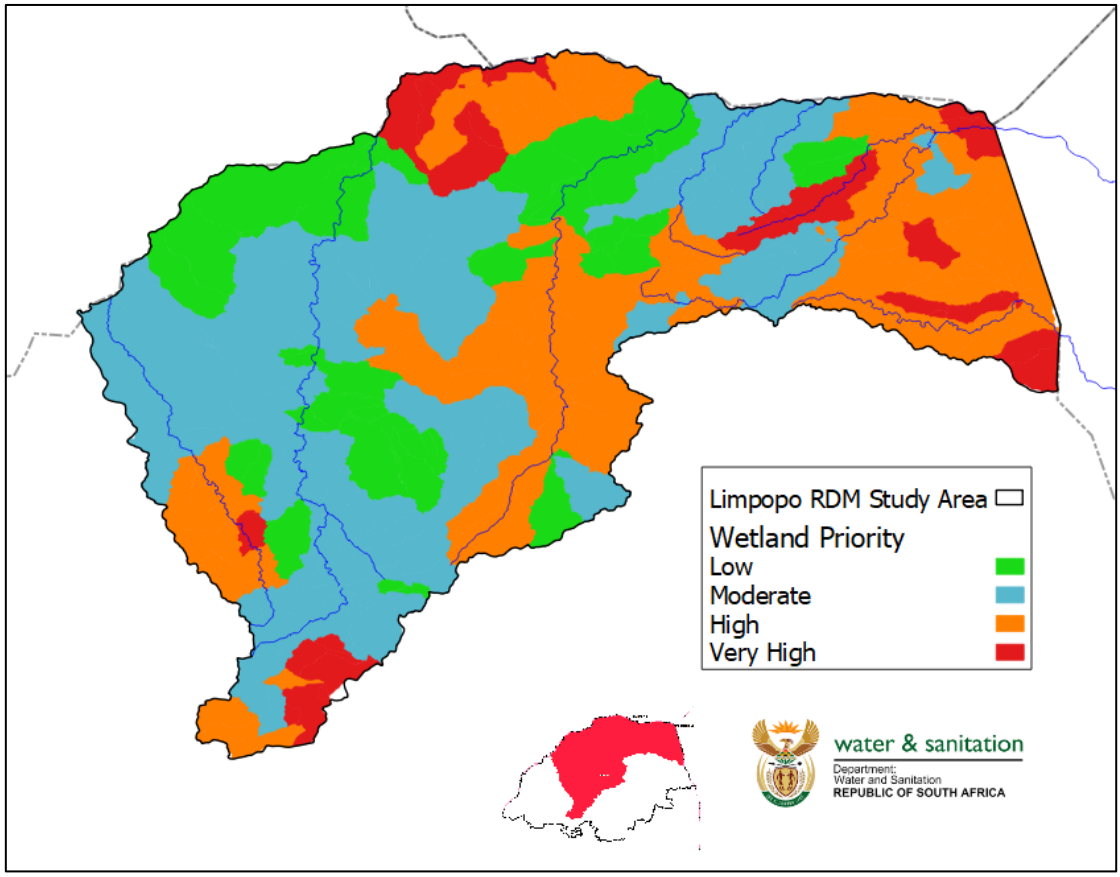


Figure 3-6. Wetland priority per SQ.

Table 3-11. Summary of wetland properties and priority at the SQ scale. PES, EI and ES categories represent the dominant state of all wetlands within each SQ. (Priority is from Very Low – 1 – to Very High – 4).

SQ	River Named in SQ	Wetland PES	Wetland EI	Wetland ES	SQ Priority based on internal Wetlands
A50A-00354	Lephalala	B	HIGH	MODERATE	3
A50A-00357	Snyspruit	D	VERY HIGH	VERY HIGH	2
A50A-00370	Rietbokvleispruit	C/D	HIGH	MODERATE	2
A50A-00374	Lephalala	D	HIGH	VERY HIGH	2
A50B-00262	Lephalala	B	VERY HIGH	VERY HIGH	4
A50B-00298	Lephalala	D	HIGH	VERY HIGH	3
A50B-00303		D/E	HIGH	MODERATE	3
A50B-00344	Lephalala	B	HIGH	MODERATE	3
A50B-00345		C	HIGH	MODERATE	3
A50C-00273	Melk	C/D	HIGH	VERY HIGH	3
A50C-00302		D/E	HIGH	VERY HIGH	3
A50C-00310	Melk	D	HIGH	VERY HIGH	3
A50D-00229	Lephalala	D	HIGH	LOW	3
A50D-00237	Bloklandspruit	D	HIGH	VERY HIGH	3
A50D-00278	Goud	C	HIGH	VERY HIGH	3
A50D-00281	Bloklandspruit	D/E	HIGH	VERY HIGH	3
A50E-00196	Lephalala	C	HIGH	MODERATE	3
A50E-00210	Goud	D	VERY HIGH	MODERATE	3
A50H-00110/Lephalala	Lephalala	B/C	VERY HIGH	MODERATE	2
A50H-00110/Limpopo	Limpopo	C	LOW	LOW	1
A50H-00090	Limpopo	B/C	VERY HIGH	MODERATE	2
A50J-00061		B/C	HIGH	MODERATE	1
A50H-00110/Limpopo	Limpopo	C	LOW	LOW	2
A50J-00073/Kalkpan se Loop	Kalkpan se Loop	B/C	HIGH	HIGH	1
A50H-00110/Limpopo	Limpopo	C	LOW	LOW	1
A61A-00520	Little Nyl	C/D	VERY HIGH	VERY HIGH	3
A61A-00561	Great Nyl	C/D	VERY HIGH	VERY HIGH	3
A61B-00489	Olifantspruit	C	VERY HIGH	VERY HIGH	2
A61B-00503	Middelfonteinspruit	C	VERY HIGH	VERY HIGH	2
A61B-00541	Nyl	C	VERY HIGH	VERY HIGH	2
A61B-00552	Nyl	C	VERY HIGH	VERY HIGH	2
A61C-00484	Badseloop	C/D	VERY HIGH	VERY HIGH	3
A61C-00501	Nyl	C	VERY HIGH	VERY HIGH	4
A61C-00574		C/D	MODERATE	VERY HIGH	3
A61D-00442	Tobiasspruit	C	VERY HIGH	VERY HIGH	4
A61D-00464	Nyl	C	VERY HIGH	VERY HIGH	4
A61E-00386	Nyl	C/D	VERY HIGH	VERY HIGH	2
A61E-00427	Andriesspruit	C	VERY HIGH	VERY HIGH	2

SQ	River Named in SQ	Wetland PES	Wetland EI	Wetland ES	SQ Priority based on internal Wetlands
A61E-00465	Nyl	C	VERY HIGH	VERY HIGH	2
A61F-00276	Rooisloot	D/E	VERY HIGH	VERY HIGH	2
A61F-00319	Dorps	D	HIGH	VERY HIGH	2
A61F-00333	Mogalakwena	D	HIGH	VERY HIGH	2
A61F-00353	Mogalakwena	D	MODERATE	VERY HIGH	1
A61F-00371		D/E	HIGH	MODERATE	1
A61G-00248	Mogalakwena	D/E	VERY HIGH	VERY HIGH	2
A61G-00266	Groot-Sandsloot	E	VERY HIGH	VERY HIGH	2
A61G-00274	Mogalakwena	E	HIGH	LOW	2
A61G-00294		D	HIGH	LOW	2
A61G-00297	Mogalakwena	C/D	HIGH	VERY HIGH	2
A61H-00395	Sterk	E	VERY HIGH	VERY HIGH	2
A61H-00418	Sterk	C/D	VERY HIGH	VERY HIGH	2
A61H-00441		C/D	HIGH	VERY HIGH	2
A61J-00267	Sterk	D/E	VERY HIGH	VERY HIGH	2
A61J-00299	Sterk	C/D	VERY HIGH	VERY HIGH	2
A61J-00306	Klein-Sterk	C	VERY HIGH	VERY HIGH	2
A61J-00349		B/C	HIGH	LOW	2
A61J-00359	Mmadikiri	C	VERY HIGH	VERY HIGH	2
A61J-00369	Sterk	C	HIGH	LOW	2
A61J-00375		C	VERY HIGH	VERY HIGH	2
A61J-00376	Sterk	C/D	VERY HIGH	VERY HIGH	2
A62A-00253	Mokamole	D/E	VERY HIGH	VERY HIGH	1
A62B-00188	Mogalakwena	D	VERY HIGH	VERY HIGH	2
A62B-00223	Mogalakwena	D/E	VERY HIGH	VERY HIGH	2
A62D-00179	Klein Mogalakwena	D	VERY HIGH	VERY HIGH	2
A62D-00198	Klein Mogalakwena	D	VERY HIGH	LOW	1
A62D-00202	Mothlakole	D	VERY HIGH	LOW	1
A62E-00184	Matlala	D/E	VERY HIGH	LOW	1
A62E-00190	Seokeng	E	HIGH	LOW	1
A62E-00191	Matlala	E	VERY HIGH	LOW	1
A62F-00185		E	VERY HIGH	LOW	1
A62G-00167	Matlalane	D	MODERATE	MODERATE	1
A62G-00177	Mogalakwena	D	VERY HIGH	VERY HIGH	1
A62H-00148	Seepabana	E	VERY HIGH	LOW	1
A62H-00155		B/C	MODERATE	MODERATE	1
A62H-00158	Natse	B/C	VERY HIGH	MODERATE	2
A62H-00192	Tshipu	C/D	MODERATE	MODERATE	1
A62H-00195		B/C	MODERATE	MODERATE	1
A62J-00140		D/E	MODERATE	VERY HIGH	1

SQ	River Named in SQ	Wetland PES	Wetland EI	Wetland ES	SQ Priority based on internal Wetlands
A62J-00142	Mogalakwena	C	HIGH	MODERATE	2
A62J-00143	Mogalakwena	E	LOW	VERY HIGH	1
A63A-00071	Mogalakwena	C	VERY HIGH	MODERATE	2
A63B-00046	Mogalakwena	D	HIGH	LOW	1
A63B-00077	Leokeng	D	HIGH	VERY HIGH	2
A63C-00033		B/C	MODERATE	MODERATE	1
A50H-00110/Limpopo	Limpopo	C	LOW	LOW	2
A63D-00034	Mogalakwena	D/E	HIGH	HIGH	1
A63D-00036	Mogalakwena	B/C	MODERATE	LOW	1
A63D-00037	Sonope	D	VERY HIGH	LOW	1
A63D-00044	Sethonoge	B	VERY HIGH	VERY HIGH	2
A63E-00010	Madibohloko	B/C	VERY HIGH	LOW	4
A50H-00110/Limpopo	Limpopo	C	LOW	LOW	2
A63E-00011/Stinkwater	Stinkwater	B/C	VERY HIGH	LOW	4
A63E-00016	Setoka	D	VERY HIGH	LOW	3
A63E-00018	Kolope	B/C	VERY HIGH	LOW	4
A63E-00020	Setonki	E	VERY HIGH	LOW	3
A63E-00021	Kolope	D	VERY HIGH	LOW	3
A63E-00024	Matotwane	B	VERY HIGH	LOW	4
A63E-00025	Kolope	B	VERY HIGH	LOW	4
A63E-00005	Limpopo	B/C	HIGH	HIGH	4
A63E-00007/Kolope	Kolope	B/C	VERY HIGH	VERY HIGH	4
A50H-00110/Limpopo	Limpopo	C	LOW	LOW	2
A63E-00007/Kolope	Kolope	B/C	VERY HIGH	VERY HIGH	4
A63E-00008	Kolope	D	VERY HIGH	HIGH	3
A63E-00009	Limpopo	B	HIGH	LOW	4
A71A-00211	Sand	D/E	HIGH	LOW	3
A71A-00239	Bloed	D	HIGH	MODERATE	3
A71A-00249	Sand	D	HIGH	MODERATE	3
A71B-00214	Diep	D	MODERATE	LOW	1
A71B-00221	Turfloop	D	HIGH	VERY HIGH	2
A71B-00222	Diep	D	VERY HIGH	MODERATE	1
A71C-00156	Dwars	D	VERY HIGH	MODERATE	3
A71C-00172	Sand	D	VERY HIGH	LOW	3
A71C-00181	Koperspruit	D	VERY HIGH	MODERATE	3
A71C-00183	Sand	D	VERY HIGH	LOW	3
A71D-00118	Sand	D	VERY HIGH	MODERATE	3
A71E-00169	Hout	E	VERY HIGH	VERY HIGH	2
A71F-00170	Brakspruit	C/D	VERY HIGH	VERY HIGH	2
A71F-00174		C	VERY HIGH	VERY HIGH	2

SQ	River Named in SQ	Wetland PES	Wetland EI	Wetland ES	SQ Priority based on internal Wetlands
A71F-00176	Strydomsloop	D/E	VERY HIGH	VERY HIGH	2
A71G-00107	Hout	C/D	HIGH	VERY HIGH	3
A71G-00129	Mogwatsane	C/D	HIGH	MODERATE	3
A71G-00131	Hout	D	VERY HIGH	VERY HIGH	3
A71H-00088	Sand	C/D	HIGH	VERY HIGH	3
A71J-00055	Sand	D/E	VERY HIGH	MODERATE	1
A71J-00074	Sand	B	HIGH	HIGH	3
A71J-00076		E	MODERATE	MODERATE	1
A71J-00084	Moleletsane	D	VERY HIGH	MODERATE	1
A71K-00019/SAND	Sand	D	HIGH	VERY HIGH	1
A50H-00110/Limpopo	Limpopo	C	LOW	LOW	1
A71K-00029		D	MODERATE	LOW	1
A71K-00031	Sand	D	VERY HIGH	LOW	1
A71L-00012		D/E	HIGH	LOW	3
A71L-00013	Kongoloop	D	HIGH	HIGH	3
A71L-00014		D/E	VERY HIGH	LOW	3
A71L-00015	Soutsloot	B	MODERATE	HIGH	3
A71L-00017	Kongoloop	D	MODERATE	HIGH	3
A71L-00002		C	HIGH	LOW	3
A50H-00110/Limpopo	Limpopo	C	LOW	LOW	2
A71L-00022	Soutsloot	D/E	HIGH	VERY HIGH	3
A71L-00023		D/E	HIGH	VERY HIGH	3
A71L-00003		B	HIGH	LOW	3
A50H-00110/Limpopo	Limpopo	C	LOW	LOW	2
A71L-00004		C	HIGH	HIGH	3
A50H-00110/Limpopo	Limpopo	C	LOW	LOW	2
A63E-00005	Limpopo	B/C	HIGH	HIGH	3
A50H-00110/Limpopo	Limpopo	C	LOW	LOW	1
A71L-00006		E	VERY HIGH	LOW	3
A50H-00110/Limpopo	Limpopo	C	LOW	LOW	1
A72A-00116	Boshela	E/F	HIGH	VERY HIGH	3
A72A-00123	Brak	D	HIGH	LOW	3
A72A-00133	Ga-Mamasonya	D/E	HIGH	MODERATE	3
A72A-00134	Brak	C	HIGH	LOW	3
A72B-00038	Brak	D/E	VERY HIGH	MODERATE	1
A72B-00052		D/E	VERY HIGH	LOW	1
A72B-00057	Brak	C	VERY HIGH	VERY HIGH	2
A80A-00100	Tshiluvhadi	D	HIGH	MODERATE	3
A80A-00102	Phangani	D/E	HIGH	MODERATE	3
A80A-00089	Nzhelele	D	VERY HIGH	VERY HIGH	3

SQ	River Named in SQ	Wetland PES	Wetland EI	Wetland ES	SQ Priority based on internal Wetlands
A80A-00095	Mutshedzi	B	VERY HIGH	VERY HIGH	3
A80B-00069	Nzhelele	D/E	VERY HIGH	VERY HIGH	3
A80C-00068	Mufungudi	D/E	VERY HIGH	VERY HIGH	2
A80D-00075	Mutamba	D/E	HIGH	MODERATE	1
A80F-00063	Mutamba	C	VERY HIGH	VERY HIGH	2
A80F-00065	Nzhelele	D	VERY HIGH	VERY HIGH	2
A80F-00070		C/D	HIGH	MODERATE	1
A50H-00110/Limpopo	Limpopo	C	LOW	LOW	1
A80G-00026/Nzhelele	Nzhelele	C/D	VERY HIGH	VERY HIGH	2
A80G-00043		D/E	VERY HIGH	VERY HIGH	2
A80G-00048	Nzhelele	C/D	VERY HIGH	VERY HIGH	2
A80G-00053	Nzhelele	C	VERY HIGH	VERY HIGH	2
A80G-00054	Tshishiru	E	VERY HIGH	VERY HIGH	2
A80H-00060	Luphephe	D	VERY HIGH	MODERATE	2
A80H-00064	Nwanedi	D/E	VERY HIGH	MODERATE	2
A50H-00110/Limpopo	Limpopo	C	LOW	LOW	1
A80J-00028/Nwanedi	Nwanedi	B/C	VERY HIGH	MODERATE	2
A91A-00105	Luvuvhu	D/E	HIGH	VERY HIGH	3
A91B-00119	Luvuvhu	D	HIGH	HIGH	2
A91B-00120	Doringspruit	C/D	HIGH	VERY HIGH	2
A91C-00115	Luvuvhu	D	VERY HIGH	VERY HIGH	3
A91C-00122	Mudzwiriti	C	HIGH	VERY HIGH	3
A91D-00108	Latonyanda	D	HIGH	VERY HIGH	2
A91E-00103	Dzindi	D	HIGH	VERY HIGH	2
A91F-00111	Luvuvhu	D	HIGH	VERY HIGH	2
A91F-00093	Luvuvhu	D	VERY HIGH	VERY HIGH	2
A91G-00078	Mukhase	C/D	HIGH	HIGH	2
A91G-00079	Mbwedi	D/E	VERY HIGH	HIGH	2
A91G-00083		B	HIGH	HIGH	3
A91G-00086	Mutshindudi	D	VERY HIGH	VERY HIGH	2
A91G-00087	Mukhase	D	HIGH	HIGH	2
A91G-00091	Mutshindudi	D	VERY HIGH	HIGH	2
A91G-00092	Mutshindudi	B	HIGH	HIGH	3
A91G-00094	Tshinane	C	HIGH	HIGH	2
A91G-00098	Mutshindudi	E	VERY HIGH	VERY HIGH	2
A91H-00045	Luvuvhu	C/D	VERY HIGH	VERY HIGH	3
A91J-00040	Luvuvhu	D	VERY HIGH	VERY HIGH	2
A91J-00050	Matsaringwe	C	VERY HIGH	VERY HIGH	2
A91K-00032	Limpopo	B/C	VERY HIGH	VERY HIGH	4
A91K-00035	Luvuvhu	C	VERY HIGH	VERY HIGH	4

SQ	River Named in SQ	Wetland PES	Wetland EI	Wetland ES	SQ Priority based on internal Wetlands
A91K-00039	Luvuvhu	C/D	VERY HIGH	VERY HIGH	3
A91K-00042	Mashikiri	D	VERY HIGH	VERY HIGH	3
A91K-00056	Saselandonga	C	HIGH	HIGH	3
A91K-00058		C	HIGH	LOW	3
A92B-00051	Mutale	C	VERY HIGH	VERY HIGH	4
A92C-00041	Tshipise	E	VERY HIGH	VERY HIGH	1
A92C-00047	Mutale	D	VERY HIGH	VERY HIGH	1
A92C-00049	Mbodi	D	VERY HIGH	VERY HIGH	1
A92D-00027	Limpopo	C	VERY HIGH	HIGH	3
A92D-00030	Mutale	D/E	VERY HIGH	VERY HIGH	3
B90A-00062		C/D	VERY HIGH	VERY HIGH	3
B90A-00066	Shisha	D/E	HIGH	MODERATE	3
B90B-00080		C	HIGH	MODERATE	3
B90B-00096	Mphongolo	D	HIGH	HIGH	3
B90B-00097		D	HIGH	HIGH	3
B90B-00099		D/E	HIGH	HIGH	3
B90B-00081	Mphongolo	C	VERY HIGH	MODERATE	4
B90B-00082	Mphongolo	E	HIGH	VERY HIGH	3
B90B-00101	Mphongolo	D	VERY HIGH	VERY HIGH	3
B90C-00104	Shihloti	D	VERY HIGH	VERY HIGH	3
B90C-00106	Phugwane	E	VERY HIGH	VERY HIGH	3
B90D-00067	Shisha	E	VERY HIGH	VERY HIGH	3
B90D-00109	Phugwane	C	VERY HIGH	VERY HIGH	3
B90D-00085	Mphongolo	D/E	VERY HIGH	VERY HIGH	3
B90D-00112	Mphongolo	C	VERY HIGH	VERY HIGH	3
B90E-00072	Nkulumbeni	C/D	VERY HIGH	VERY HIGH	3
B90F-00114	Shingwedzi	E	VERY HIGH	VERY HIGH	3
B90G-00121	Bububu	B/C	VERY HIGH	VERY HIGH	4
B90G-00136	Nshenhene	C	VERY HIGH	VERY HIGH	4
B90G-00144	Tshange	C/D	HIGH	HIGH	3
B90G-00125	Bububu	B/C	VERY HIGH	VERY HIGH	4
B90G-00130	Shingwedzi	B/C	VERY HIGH	VERY HIGH	3
B90G-00124	Shingwedzi	B/C	HIGH	LOW	4
B90H-00147	Dzombo	B	VERY HIGH	LOW	4
B90H-00152	Kumba	B/C	VERY HIGH	VERY HIGH	4
B90H-00113	Mphongolo	C	VERY HIGH	VERY HIGH	3
B90H-00117	Shingwedzi	D	VERY HIGH	VERY HIGH	3
B90H-00145	Shingwedzi	C	HIGH	LOW	3

3.4.3 Resource Unit Prioritisation

The study area comprises 12 IUAs and 16 RUs for wetlands (Figure 3-7). Since wetland priority has been done at the SQ scale, prioritisation of RUs was done by a summation of SQ's within each catchment with Very High priority (rating of 4 in Table 3-11). Thus, the frequency of wetlands of Very High priority within respective RUs was used to prioritise RUs. The results are tabulated in Table 3-12.

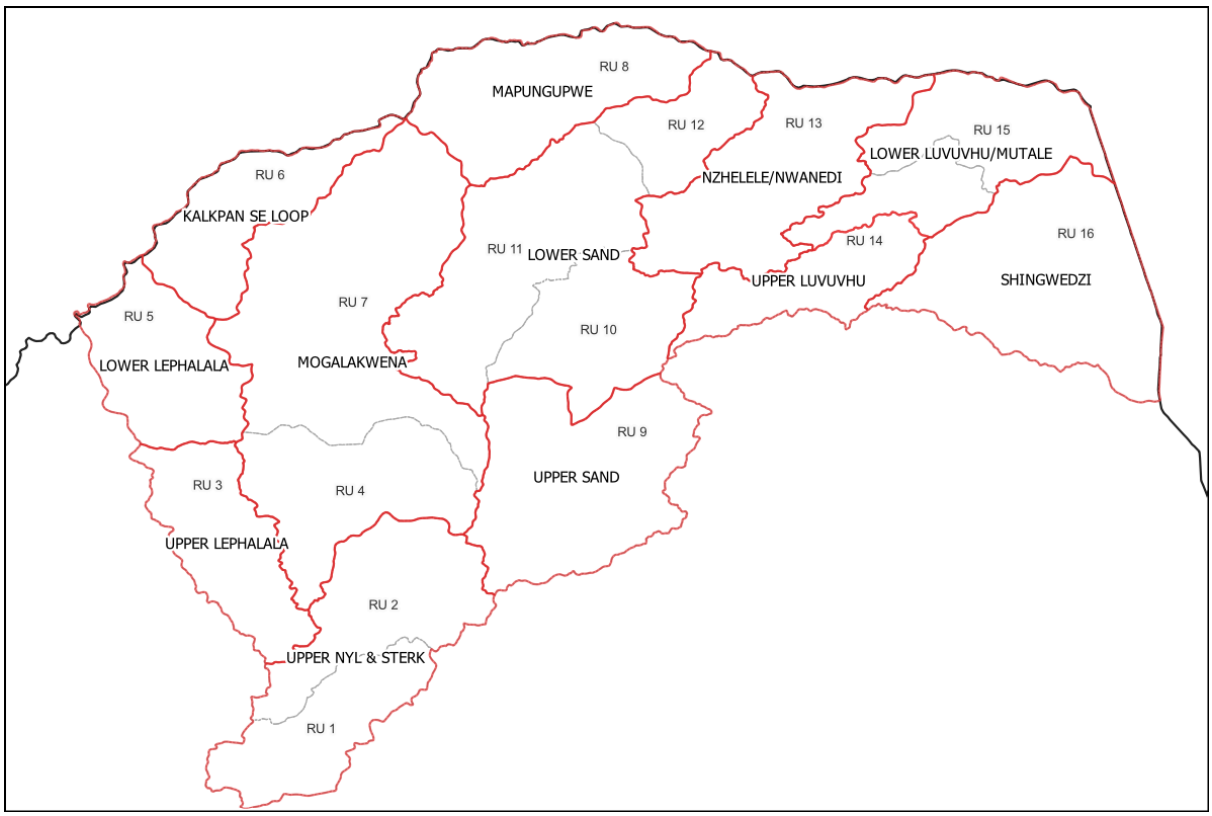


Figure 3-7. Map of the study area showing IUAs (outlined in red) and RUs (outlined in grey).

3.4.4 Wetland Priority Resource Units

The IUAs with most SQ that have Very High priority wetlands, in order of magnitude, are the Shingwedzi, Lower Luvuvhu / Mutale, Mapungubwe and Upper Nyl & Sterk IUAs, all of which have a score of more than 10, and within these the RUs with the highest score, in order of magnitude, are RU16, 8 and 14 (score >10), followed by RU 1, 15, 13 and 3 (score >=5).

Table 3-12. Count of SQs with different levels of wetland priority (1-4) per IUA and RU within respective IUAs.

IUA / RU	Wetland Priority			
	1	2	3	4
KALKPAN SE LOOP	12	6		
RU 6	12	6		
LOWER LEPHALALA	1	13		
RU 5	1	13		
LOWER LUVUVHU/MUTALE	10	23	45	17
RU 14	2	13	18	9
RU 15	8	10	27	8
LOWER SAND	40	31	64	3
RU 10	7	7	29	
RU 11	21	19	25	3
RU 12	12	5	10	
MAPUNGUBWE	13	4	24	13
RU 8	13	4	24	13
MOGALAKWENA	70	71	15	7
RU 4	31	32	8	3
RU 7	39	39	7	4
NZHELELE/NWANEDI	22	46	30	5
RU 13	22	46	30	5
SHINGWEDZI		7	69	19
RU 16		7	69	19
UPPER LEPHALALA	8	24	38	5
RU 3	8	24	38	5
UPPER LUVUVHU	2	39	38	3
RU 14	2	39	38	3
UPPER NYL & STERK	8	107	19	11
RU 1		31	12	9
RU 2	8	76	7	2
UPPER SAND	7	24	31	
RU 9	7	24	31	

3.5 Groundwater Resource Unit Prioritisation

The framework for RU prioritisation focusses on the prioritisation of river RUs (DWA, 2011). It requires a set of criteria and sub-criteria to be rated to calculate a priority rating for resource units. Therefore, a set of criteria and sub-criteria appropriate to groundwater were selected for the groundwater prioritisation process, based on available datasets. The selected criteria and the relative points applied is shown in Table 3-13. The criteria are summarized as:

- Importance for (human) users: groundwater is relied upon as a “sole supply source” in several areas of the WMA. This is evaluated through assessing the presence of sole-supply towns. In addition to use for domestic supply, groundwater plays an important role in supporting activities contributing to the economy (GDP, job creation) in several areas of the WMA catchment (e.g. commercial agriculture, industrial abstraction). strategic water source areas for groundwater have been defined and take into account areas of high groundwater availability and high or strategic groundwater use (Le Maitre *et al*, 2019), and these areas are also included as sub-criteria.
- Level of surface water – groundwater interaction: groundwater has a variable role in supporting the environment through discharge to surface water that support Ecological Water Requirements (EWRs). Where groundwater has a potential role in contribution to baseflow, these areas are prioritised to protect this contribution. In addition, the presence of priority wetlands that are likely to be groundwater-fed is also included as sub-criteria.
- Threat posed to users: the various aquifers in the resource unit may be at risk of abstraction that is not maintainable, or of water quality impacts. The threat of water quality impact is considered in the prioritisation through the assessment of water quality data to identify medium to long-term declining trends (completed for the Status Quo phase of the project). The threat of over- abstraction is also considered through the assessment of water level data to identify medium to long-term declining trends. In addition, the stress index (use/recharge) under present day and under likely future conditions is used as an indication of where over-abstraction may be a risk, although this is not a definitive indicator. The future stress index is based on the recommended scenario analysis.
- Practical considerations: to implement and enforce RQOs, they must be measurable. The existence of current monitoring points was considered in the prioritisation criteria, although they were not strongly weighted.

A challenge applying the rating shown in the table is that some of the sub-criteria refer to data that is spatially discretised below the scale of the groundwater resource unit i.e. the sub-criteria can have a spatial variability across the resource unit. However, only one rating can be applied per resource unit. The sub- criteria category which covers the largest part of the resource unit was assigned.

A final score is derived for each quaternary catchment. The final resource unit prioritisation rating score (0- 100, low to high) has been divided into three categories from 1 (not priority), 2 (low priority), 3 (high priority). The categories were based on the distribution of the final scores, and a cut-off value of >50.0 (out of 100) was selected as representative of high priority 3.

In addition, some quaternary catchments were amended manually based on the following reasoning:

- A quaternary catchment was considered a high priority (i.e., A80F) where it was flagged for development and the establishment of baseline data with new monitoring networks will be required.

Table 3-13. Criteria and sub-criteria used to prioritise groundwater resource units, showing the rating applied (following DWA, 2011).

Criterion	Weights (%)	Sub-criteria	Weights (%) (equivalent points)	Rating guidelines
Importance for users	25	Rus most important in supporting 'sole-supply' settlements	60 (15 points)	0 – RUs which do not have groundwater supply schemes
				0.5 – RUs supporting some groundwater supply schemes (1-2)
				1 – RUs supporting several groundwater supply schemes (>2)
		RUs within strategic water source areas for groundwater (high groundwater availability & strategic use)	20 (5 points)	0 - RUs outside of SWSA-GW
				1 – RUs within SWSA-GW
		RUs most important in supporting activities contributing to economy (GDP, job creation) (e.g. commercial agriculture, industrial abstraction, bulk abstraction by water authorities)	20 (5 points)	0 – RUs which do not directly support any activities which contribute to economy [as indicated by <0.1l/s/km2]
				0.5 – RUs which moderately support activities which provide a contribution to economy [as indicated by 0.1-0.3l/s/km2]
				1 – RUs which significantly support activities which contribute to the economy [as indicated by >0.3l/s/km2]
Threat posed to users	30	Medium to Long-term declining trend in water or piezometric levels	35 (10.5 points)	0 – RUs where no trend is visible, or where no data is available to assess trend
				0.5 – RUs where short-term trend is potentially visible, or minor
				1 – RUs where long-term trend is visible
		Medium to Long-term increasing trend in natural water quality	35 (10.5 points)	0 – RUs where no trend is visible, or where no data is available to assess trend
				0.5 – RUs where short-term trend is potentially visible, or minor
				1 – RUs where long-term trend is visible
		Presence of high stress category (currently)	15 (4.5 points)	0 – RUs where stress is low (category I)
				0.5 – RUs where stress is moderate (category II)
				1 – RUs where stress is high (category III)
		Presence of high stress category (future)	15 (4.5 points)	0 – RUs where stress is low (category I)
				0.5 – RUs where stress is moderate (category II)
				1 – RUs where stress is high (category III)
Practical Considerations	15	Availability of water quality monitoring data located within RU	50 (7.5 points)	0 – RUs where no resource quality information exists
				0.5 – RUs for which a moderate level of resource quality information exists (1-7 points)

Criterion	Weights (%)	Sub-criteria	Weights (%) (equivalent points)	Rating guidelines
				1 – RUs for which there is a good availability of resource quality information (>7 points)
		Availability of water level monitoring data located within RU	50 (7.5 points)	0 – RUs where no water level information exists
				0.5 – RUs for which a moderate level of water level information exists (1-3 points)
				1 – RUs for which there is a good availability of water level information (>3 points)
Level of surface water – groundwater interaction	30	Relevance of groundwater contribution to maintain required low flow conditions	50 (15 points)	0 – RUs without relevant groundwater contribution (low GWBF/EWR) (GWBF/RE < 4%)
				0.5 – RUs where groundwater contribution supports low flow condition (GWBF/RE moderate, 4-25%)
				1 – RUs where groundwater contribution is crucial to maintain low flow condition (GWBF/RE moderate, >25%)
		Relevance of groundwater contribution to maintain priority groundwater-dependent ecology	50 (15 points)	0 – RUs without potential groundwater-dependent systems (e.g. Wetlands)
				0.5 – RUs with some potential groundwater-dependent systems (e.g. Wetlands) (<200ha)
				1 – RUs with potential of groundwater-dependent systems (e.g. Wetlands) (>200ha)

3.5.1 Groundwater Priority Resource Units

Full results of the prioritisation process, showing the scoring system per priority resource unit, are shown spatially in Figure 3-8 and listed in Table 3-14. A total of 43 quaternary catchments are prioritised, based on the priority ranking approach followed. As discussed in section 0 manual selection of some quaternary catchments where done based on the availability of baseline data as well as the overall significance of groundwater. The reason for the prioritisation of an area and the existence of baseline data informs the type of RQOs to be developed. In cases where there is insufficient baseline data on which to establish an RQO, narrative RQOs can be developed along with monitoring recommendations to establish the baseline and implement more detailed RQOs in future. Where there are no quaternary catchments prioritised for the development of RQOs it is recommended that best practice wellfield/groundwater management guidelines are implemented.

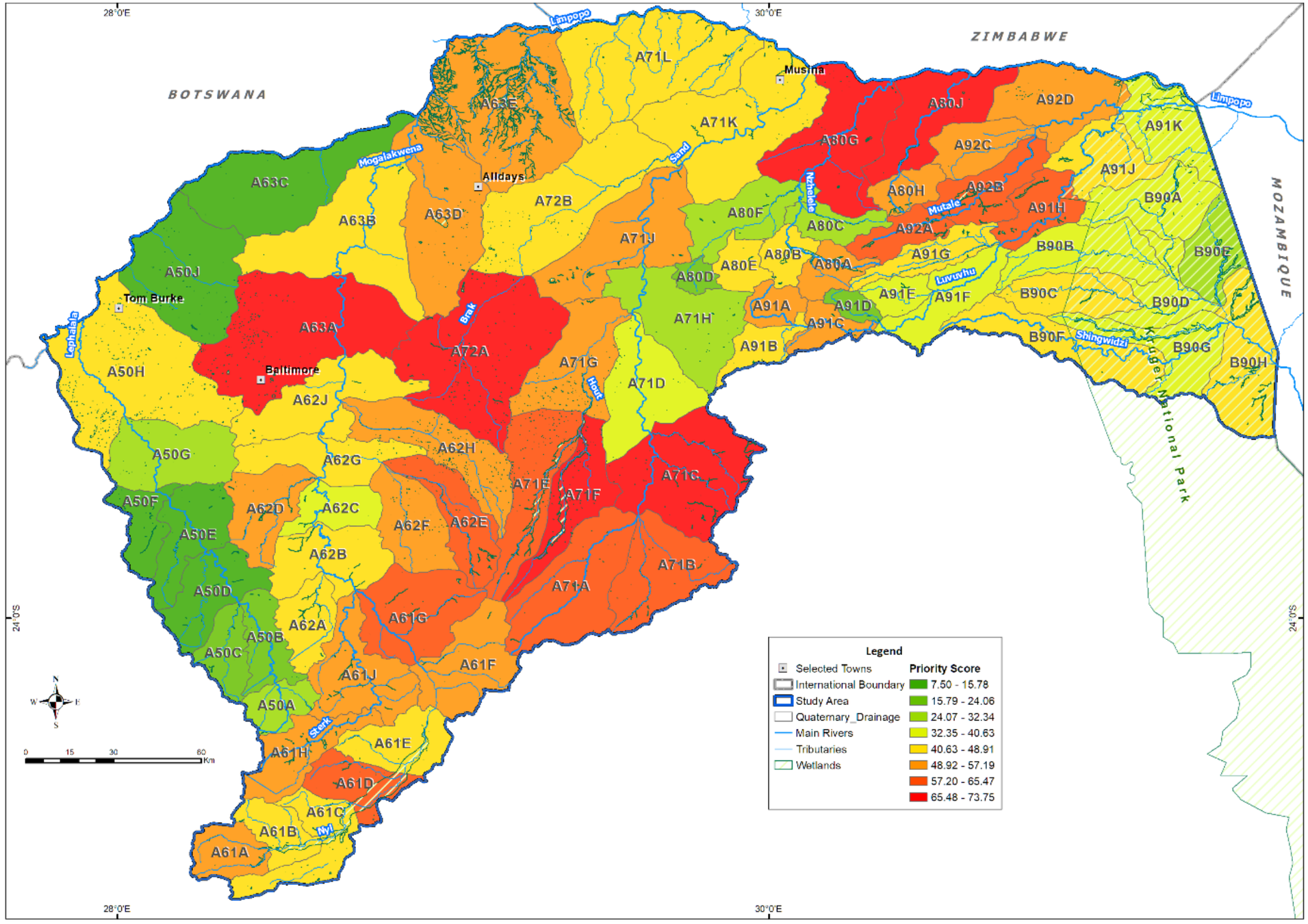


Figure 3-8. Map of study area showing prioritised groundwater units

Table 3-14. Prioritised groundwater units based on criteria scores and ratings.

Quat	RU Priority (1 to 3)	Criteria:	Importance for users			Threat posed to users				Practical considerations		Level of SW-GW interaction		Priority
		Criteria weight:	25			30				15		30		
		Sub-criteria weight:	60	20	20	35	35	15	15	50	50	50	50	
		Score	Supporting Groundwater Schemes	Presence of SWSA-GW	Supporting economic activities	Declining trend in water or piezometric levels	Increasing trend in water quality	Presence of high stress category (current)	Presence of high stress category (future)	Availability of water level monitoring data	Availability of water quality monitoring data	Relevance of groundwater to maintain low flow conditions	Relevance of groundwater contribution to potential GEP	
A50A	2	26.3	0.5	0	0	0	0	0	0	0	0.5	1	0	
A50B	2	22.5	0.5	0	0	0	0	0	0	0	0	1	0	
A50C	2	18.8	0	0	0	0	0	0	0	0	0.5	1	0	
A50D	1	7.5	0	0	0	0	0	0	0	0	0	0.5	0	
A50E	1	7.5	0	0	0	0	0	0	0	0	0	0.5	0	
A50F	1	11.3	0	0	0	0	0	0	0	0	0.5	0.5	0	
A50G	2	27.8	1	0	0	0	0.5	0	0	0	1	0	0	
A50H	2	46.0	1	0	0.5	0	0.5	0.5	0.5	0.5	1	0	0.5	Pr.
A50J	1	11.3	0.5	0	0	0	0	0	0	0	0.5	0	0	
A61A	3	51.3	1	1	1	0	0	0	0	0	0.5	1	0.5	Pr.
A61B	2	43.8	1	1	1	0	0	0	0	0	0.5	1	0	Pr.
A61C	2	48.8	1	1	0.5	0	0	0	0	0	0.5	1	0.5	Pr.
A61D	3	62.5	1	1	1	0	0	0	0	0	1	1	1	Pr.
A61E	2	45.8	1	1	0.5	0	0	0.5	0.5	0	0.5	1	0	Pr.
A61F	3	50.3	1	1	0.5	0	0.5	0	0	0	1	1	0	Pr.
A61G	3	62.0	1	0	1	0	0.5	0.5	1	0	1	1	0.5	Pr.
A61H	3	51.3	1	0	0.5	0	0	0	0	0	0.5	1	1	Pr.
A61J	3	53.8	1	1	0	0	0	0	0	0	0.5	1	1	
A62A	2	45.0	1	0	0	0	0	0	0	0	1	1	0.5	
A62B	2	45.0	1	0	0	0	0.5	0	0.5	0	1	0.5	0.5	
A62C	2	35.3	1	0	0	0	0.5	0	0	0	1	0.5	0	
A62D	3	52.5	1	0	0	0	0.5	0	0.5	0	1	0.5	1	
A62E	3	60.3	1	0	0.5	0	0.5	0	0	0	1	1	1	Pr.
A62F	3	56.5	1	0	0.5	0.5	1	0.5	0.5	0.5	1	0.5	0	
A62G	2	44.3	1	0	0	0	1	0	0	0.5	1	0.5	0	
A62H	2	49.0	1	0	0.5	0	0.5	0	0	0.5	1	0.5	0.5	
A62J	2	42.0	1	0	0	0.5	1	0	0	0.5	1	0	0	
A63A	3	68.8	1	0	1	1	1	1	1	0.5	1	0	0.5	Pr.
A63B	2	42.0	1	0	0	1	0.5	0	0	0.5	1	0	0	
A63C	1	11.3	0	0	0	0	0	0	0	0.5	1	0	0	Pr.
A63D	2	49.0	1	0	0.5	0	0.5	0	0	0.5	1	0	1	Pr.
A63E	2	49.0	1	0	0.5	0	0	1	1	0.5	0.5	0	1	Pr.
A71A	3	61.0	1	1	1	1	0.5	1	1	0.5	1	0	0	Pr.
A71B	3	58.0	1	1	1	0	0.5	1	1	0.5	1	0	0.5	Pr.
A71C	3	65.5	1	1	1	0	0.5	1	1	0.5	1	0	1	Pr.
A71D	2	39.0	1	1	0.5	0	0	1	1	0.5	0.5	0	0	Pr.
A71E	3	63.0	1	1	0.5	0	0.5	1	1	0.5	1	0	1	Pr.
A71F	3	70.8	1	1	1	0.5	0.5	1	1	0.5	1	0	1	Pr.
A71G	3	53.5	0.5	1	1	1	0.5	1	1	0.5	1	0	0	Pr.
A71H	2	31.5	0.5	1	0.5	0	0.5	0	0	0.5	1	0	0	Pr.
A71J	2	49.3	0.5	0	1	0.5	0	1	1	0.5	0.5	0	1	Pr.
A71K	2	45.5	0.5	0	1	0.5	0	1	1	0.5	1	0	0.5	Pr.
A71L	2	41.8	0.5	0	1	0.5	0	1	1	0.5	0.5	0	0.5	Pr.
A72A	3	73.8	1	1	1	1	1	1	1	0.5	1	0	0.5	Pr.
A72B	2	42.3	0.5	0	0.5	0.5	0	0.5	0.5	0.5	0.5	0.5	0.5	Pr.
A80A	3	54.0	1	1	0.5	0.5	0	0	0	0.5	1	0	1	Pr.
A80B	2	44.3	1	1	0.5	0.5	0.5	0	0	0.5	1	0	0	
A80C	2	28.8	1	0	0.5	0	0	0	0	0.5	1	0	0	
A80D	2	20.0	0.5	1	0	0	0	0	0	0.5	0.5	0	0	
A80E	2	44.3	1	1	0.5	0.5	0.5	0	0	0.5	1	0	0	
A80F	2	31.8	1	0	0.5	0	0	0.5	1	0.5	0.5	0	0	Pr.
A80G	3	70.8	1	0	0.5	0.5	0	0.5	1	0.5	1	1	1	Pr.
A80H	3	56.5	1	0	0.5	0.5	0	0	0	0.5	1	1	0.5	
A80J	3	73.5	1	0	0	0.5	0.5	0.5	1	0.5	1	1	1	Pr.

Quat	RU Priority (1 to 3)	Criteria:	Importance for users			Threat posed to users				Practical considerations		Level of SW-GW interaction		Priority
		Criteria weight:	25			30				15		30		
		Sub-criteria weight:	60	20	20	35	35	15	15	50	50	50	50	
		Score	Supporting Groundwater Schemes	Presence of SWSA-GW	Supporting economic activities	Declining trend in water or piezometric levels	Increasing trend in water quality	Presence of high stress category (current)	Presence of high stress category (future)	Availability of water level monitoring data	Availability of water quality monitoring data	Relevance of groundwater to maintain low flow conditions	Relevance of groundwater contribution to potential GEP	
A91A	3	57.0	0.5	1	0.5	1	0	1	1	0.5	0.5	1	0	Pr.
A91B	2	48.3	0.5	1	1	0	0	0.5	0.5	0.5	1	1	0	Pr.
A91C	3	50.5	0.5	1	1	0.5	0	1	1	0.5	1	0.5	0	Pr.
A91D	2	20.0	0.5	0	1	0	0	0	0	0.5	0.5	0	0	
A91E	2	39.0	0.5	1	0.5	0.5	0	0	0	0.5	1	0.5	0	Pr.
A91F	2	36.0	1	0	0	0	0	0	0.5	0.5	1	0.5	0	Pr.
A91G	2	46.3	1	1	0	0.5	0	0	0.5	0.5	1	0	0.5	Pr.
A91H	3	63.8	1	0	0	0.5	0	0	0.5	0.5	1	1	1	Pr.
A91J	2	42.8	0.5	0	0	0.5	0	0	0	0.5	0.5	0.5	1	
A91K	2	33.8	0	0	0	0	0	0	0	1	0.5	0.5	1	
A92A	3	59.0	1	1	0	0.5	0	0	0	0.5	1	0.5	1	
A92B	3	60.0	1	0	0	0	0	0	0	1	1	1	1	Pr.
A92C	3	55.5	1	0	0	0.5	0.5	0	0	1	1	1	0	Pr.
A92D	2	49.5	1	0	0	0	0.5	0.5	1	1	1	0.5	0	Pr.
B90A	2	39.0	0.5	0	0	0.5	0	0	0	1	0.5	0	1	
B90B	2	35.3	0.5	0	0	0.5	0	0	0	1	1	0.5	0	Pr.
B90C	2	48.0	0.5	0	0	0.5	0.5	0	0	1	1	0.5	0.5	
B90D	2	33.0	0	0	0	1	0	0	0	1	0	1	0	
B90E	2	27.8	0	0	0	0.5	0	0	0	1	0	0	1	
B90F	2	48.0	0.5	0	0	0.5	0.5	0	0	1	1	0.5	0.5	Pr.
B90G	2	39.0	0.5	0	0	0.5	0	0	0	1	0.5	0	1	
B90H	2	44.3	0	0	0	1	0	0	0	1	0.5	0.5	1	

Pr = priority

3.6 Priority Resource Units in each IUA

A summary of the resource units that were prioritised in each IUA is provided in Table 3-15.

Table 3-15. Priority resource units in the study area

IUA	River Resource Unit	Dam Resource Unit	Wetland Resource Unit	Groundwater Resource Unit
Upper Lephalala	RRU-Riv11 A50B-00262			
	RRU-Riii3 - A50H-00110			
Lower Lephalala	RRU-Ri8 A50H-00110			A50-2 (A50G)
				A50-3 (A50H)
Kalkpan se Loop	RRU-Rvi1 A63C-00033			A50-4 (A63C)
Upper Nyl/Sterk	RRU-Ri4 - A61J-00267	Doorndraai	Nyl River floodplain	A61-1 (A61A,B,C,D,E)
	RRU-Ri1 A61B-00489	Donkerpoort	Nyl Pans	A61-2 (A61H)
	RRU-Ri1-1 - A61B-00552		Wonderkrater	A61-3 (A61F, G)
	RRU-Ri3 - A61G-00297			
	RRU-Ri5 A61G-00248			
Mogalakwena	RRU-Ri14 A63A-00071	Glen Alpine	Mokamole	A62-2 (A62E)
	RRU-Rii3 A63D-00034			A63-1 (A63A,D)
Mapungubwe	RRU-Rvi2 - A63E-00011		Maloutswa Floodplain	A63/71-3 (A63E, A71L)
	RRU-Riv32 A63E-00008		Kolope riverine wetlands	
Upper Sand	RRU-Riv16 - A71C-00156			A71-1 (A71A, B)
				A71-2 (A71C, D, H)
				A71-3 (A71E, F, G, A72A)
Lower Sand	RRU-Ri20 A71D-00118			A71-4 (A71J, A72B)
	RRU-Ri22			A71-5 (A71K)
	RRU-Ri25 A71K-00019			
Nzhelele/Nwanedi	RRU-Ri26 - A80G-00053	Nzhelele		A80-1 (A80A, F)
	RRU-Riv33 - A80G-00054			A80-2 (A80G)
	RRU-Ri27 A80G-00026			A80-3 (A80J)
	RRU-Ri28 A80J-00028			
Upper Luvuvhu	RRU-Riii6 A91D-00108	Albasini		A91-1 (A91A, B, C, E, F, G)
	RRU-Ri30 A91G-00091	Vondo		
Lower Luvuvhu/Mutale	RRU-Ri32 A91H-00045	Mvuwe	Luvuvhu Floodplain (Makuleke)	A91-2 (A91H, A92B, C, D)
	RRU-Rvii33	Nandoni	Lake Fundudzi	
	RRU-Ri33 A92B-00051		Mutale wetlands	

IUA	River Resource Unit	Dam Resource Unit	Wetland Resource Unit	Groundwater Resource Unit
	RRU-Ri34 - A92D-00030			
	RRU-Ri36 A91K-00035			
Shingwedzi	RRU-Riv28 - B90H-00113		Malahlapanga	B90-1 (B90B, F)
	RRU-Ri37 B90H-00145		Bububu	

4 APPROACH TO SUB-COMPONENT PRIORITISATION AND INDICATOR SELECTION OVERVIEW

There is a wide range of sub-components for which RQOs can be set, however it is not necessary nor practical to set RQOs for all sub-components in all selected resource units. The Resource Unit Evaluation Tool, which is a decision support tool (DWS, 2011) was used to evaluate and prioritise sub-components for RQO determination. Sub-components for dams, wetlands and groundwater were also selected through independent approaches based on assessment and evaluation of overall priorities.

The Tool has two primary functions: (i) to determine the level of threat posed to each of the sub-components by impacting activities in the catchment and (ii) to identify which sub-components should be protected to support water resource dependent activities and/or maintain the integrity and ecological functioning of the water resource.

The Tool was applied using desktop knowledge, local knowledge, specialist studies, and a detailed understanding of the catchments. The assessment was undertaken in a workshop environment with technical specialists and will be presented and discussed with catchment managers and key stakeholders. The overall priorities identified through the evaluation process were used to guide the selection of sub-components for RQO determination. Once the sub-components were selected, suitable indicators for monitoring were then identified.

4.1 River sub-component prioritisation and indicator selection

Table 4-1 indicates a generic list of components, sub-components and indicators that are generally important to rivers. This generic list forms the basis for customising components for each specific high priority river resource unit.

Table 4-1. Generic river sub-components, indicators and reasons for selection

Component	Sub-component	Indicator	Reason for selection
Water quantity	Low flows	Maintenance low flows (MCM)	This is part of the Reserve baseline information and standard for measuring all other ecosystem responses.
	High flows	Maintenance high flows (MCM)	
Water quality	Nutrients	Total inorganic nitrogen Orthophosphate	High nutrient concentrations have a significant impact on the structure and functioning of biotic communities because they stimulate growth of algae and aquatic plants. Nitrogen from fertilisers leaches more
	Salts	Electrical conductivity (EC) Total Dissolved salts	EC is an indicator of the salinity or concentration of dissolved salts. It is affected by the geology of a catchment and mining, irrigation return-flows, industrial effluents, runoff from urban areas and urban sprawl.
	System variables	Dissolved oxygen	The maintenance of adequate dissolved oxygen (DO) concentrations is critical for the survival and functioning of the aquatic biota because it is required for the respiration of all aerobic organisms. The DO concentration

Component	Sub-component	Indicator	Reason for selection
			provides a useful measure of the health of an aquatic ecosystem.
		pH	Indicates the acidity and alkalinity and determines the solubility of metals in the water.
		Water temperature	Temperature is important for the survival of biota such as fish and invertebrates, it affects biological processes and the solubility of dissolved oxygen, metals and toxic substances.
	Toxins/Biocides	Unionised ammonia Pesticides Metals Atrazine Endosulfan	Biocides are chemical substances, mixtures, or microorganisms intended to control the growth of pest organisms.
	Pathogens	Escherichia coli Faecal coliforms	Risk to human water users (waterborne diseases)
Habitat	Geomorphology	Bed erosion	The process of lowering the active channel bed elevation in relation to flood features, possibly disconnecting the floodplain/flood features from the channel through increased channel volume. This indicator informs other geomorphic indicators.
		Bank erosion	The process of destabilisation and erosion of the banks and flood benches resulting in a steeper less stable bank and a reduction in flood bench and floodplain width. This indicator informs other geomorphic indicators.
		Bed sediment size	The median size of sediment on the bed. Armouring will increase the size of bed sediment, while siltation will reduce the size of the bed sediment. This indicator shows trends in the median bed sediment size.
		Embeddedness	Reduction in interstitial spaces between larger clasts due to infilling with fine sediment, smothering coarse habitat associated with riffles, runs, glides and pools. This indicator shows the extent to which coarse habitats are covered with fine sediment and not available to biota.
		Pool depth	The geomorphic depth of pools in relation to riffle elevation. This indicates whether pool depth/volume changes during low flow periods.
		Backwaters and secondary channels	Slow flowing habitats along the channel margins or on the flood features. This indicates whether slow flowing habitats are filled in with sediment and not available when inundated.
		Inset bench and bars	The area/extent of fine sediment deposits along the channel margin that are inundated by small floods. These are colonised by marginal vegetation and form a habitat for a range of biota during small floods and high baseflows.

Component	Sub-component	Indicator	Reason for selection
		Inundated sandy habitat	Inundated sandy habitat, on inset benches and sand bars, are important habitat for some aquatic plants and animals.
		Inundated cobble habitat	Inundated cobble habitats important habitat for some of the aquatic biota.
		Riffles	Coarse sediment habitat in fast flow. This habitat is essential for several invertebrate and fish species to complete their life cycles.
		Flood bench	Infrequently inundated higher-lying fine sediment benches which form habitat for dry bank riparian plants, various biota and are a refuge for aquatic organisms during flood events.
Biota	Riparian vegetation Aquatic	Algae (biofilms and filamentous)	Algae provide food for instream fauna (fish and invertebrates) but can also affect habitat quality detrimentally.
		Aquatic vegetation	Aquatic vegetation provide habitat, including protection and breeding sites, and food for fish and invertebrates.
	Riparian vegetation Wet Bank (inter-annual floods)	Marginal zone graminoids	This guild includes grasses, sedges and reeds and is important for bank stabilisation, habitat creation for aquatic fauna (both inundated instream and overhanging vegetation) and for food (seeds, fruits, rotting leaf material).
		Marginal zone broad-leaf plants	This guild includes broad-leaved hydrophytes that grow in the water as emergent vegetation or along the edges and provide important instream habitat for fish and aquatic invertebrates.
		Marginal zone woody plants	Marginal zone trees are important for bank stabilization, flood attenuation and provide overhanging shelter for instream fauna, particularly fish.
		Flood feature graminoids	This guild includes grasses, sedges and reeds growing in the lower zone. Non-woody vegetation is important for bank stabilization, grazing for animals and birds, habitat creation and for food (seeds, fruits, rotting leaf material) and habitats for fish spawning during flooding.
		Flood feature woody plants	Trees and shrubs are important for bank and sediment stabilization, flood attenuation and provide shelter and nesting sites for riparian fauna.
	Riparian vegetation Dry Bank (inter-annual floods)	Macro-channel bank riparian trees	MCB trees and shrubs are important for bank and sediment stabilization, flood attenuation and provide shelter and nesting sites for riparian fauna.
		Macro-channel bank terrestrial woody plants	Terrestrial trees on the MCB should be transient and indicate terrestrialisation
	Riparian vegetation (whole zone)	Alien invasive plant species	Mostly focussed on notorious aquatic species and/or woody perennial species.
	Fish	FRAI score	To assess the health and integrity of fish communities in a specific area by comparing

Component	Sub-component	Indicator	Reason for selection
			the current fish assemblage to a reference condition (a natural or pristine state)
		Overall fish health	A composite measure of fish integrity.
		Species diversity	A robust measure of biodiversity.
		Key species	Identification of the fish species that would be most impacted by flow-derived transformations within a river reach and consider them as “key species”. (Easily identified and representative of a guild).
	Macroinvertebrates	MIRAI Category and Score	The MIRAI is used to determine the Invertebrate ecological condition. It is done by integrating the ecological requirements of the invertebrate taxa in a community or assemblage and their response to modified habitat conditions
		SASS5 Total Score and ASPT	This is a rapid bioassessment technique used to assess the health of rivers by examining benthic macroinvertebrates
		Key taxa and abundance	Key taxa are those that are particularly important or abundant within a specific environment or community
		Taxon dominance	Describes a scenario where a particular species or group of species (a taxon) holds a disproportionately large presence and influence within a community compared to other species, impacting environmental conditions, diversity and ecosystem functioning.

4.1.1 Selected user sub-components and indicators for rivers

Sub-components and indicators were selected to represent each of the high priority river RUs (Table 4-2), based on current monitoring taking place in the area, available data that can be expanded on to assess the ecological health of the resource unit, and if land impacts warrant an assessment of the indicator. More detail on the choice of sub-components and indicators is given in APPENDIX B. For many of the high priority RUs, baseline data exists, and continued monitoring will need to be undertaken to ensure the target ecological categories are met. For these RU, narrative RQOs and Numerical Limits will be set. For eleven of the RUs, no baseline data exists and for these sites it would be important to set up a baseline monitoring programme. Recommended indicators for monitoring are outlined in Table 4-2. After a few years of collecting monitoring data, it would be possible to develop the numerical RQO for each site.

Twenty-four RUs were rated medium priority. Over time, a baseline monitoring programme should be established for these RUs after which RQOs can be developed. Recommended indicators for monitoring are outlined in Table 4-3. The monitoring of the high and medium priority RUs will provide good coverage for management of the area.

The PES, EI and ES are recommended to be assessed at each review of the PESEIS Desktop Spreadsheet Model to determine if there are any changes to the river condition for those RUs at a low priority.

Table 4-2. Sub-components and indicators proposed for the high priority river resource units

IUA		Upper Lephalala		Lower Lephalala Kalkpan se Loop		Upper Nyl/Sterk					Mogalakwena		Mapungubwe		Upper Sand	Lower Sand			Nzhelele/Nwanedi				Upper Luvuvhu		Lower Luvuvhu/Mutale					Shingwedzi	
Resource Unit		RRU-Riv11	RRU-Riii3	RRU-Ri8	RRU-Rvi1	RRU-Ri4	RRU-Ri1	RRU-Ri1-1	RRU-Ri3	RRU-Ri5	RRU-Ri14	RRU-Rii3	RRU-Rvi2	Riv32	RRU-Riv16	RRU-Ri20	RRU-Ri22	RRU-Ri25	RRU-Ri26	RRU-Riv33	RRU-Ri27	RRU-Ri28	RRU-Riii6	RRU-Ri30	RRU-Ri32	RRU-Rvii33	RRU-Ri33	RRU-Ri34	RRU-Ri36	RRU-Riv28	RRU-Ri37
Sub-component	Indicator																														
Low flow	Maintenance low flow	X		X	X		X			X	X	X		X		X		X			X	X	X	X		X	X	X		X
High flow	Maintenance high flow	X		X	X		X			X	X			X		X		X			X	X	X	X		X	X	X		X
	Discharge		X			X		X	X				X		X	X	X		X	X						X			X		
Geomorphology	IHI score															X														X	
	GAI Score	X					X			X	X							X			X	X	X	X	X		X	X	X		X
	Bed erosion	X		X	X		X			X	X	X		X		X		X			X	X	X	X	X		X	X	X		X
	Bank erosion	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X		X
	Flood bench	X	X	X		X	X	X	X	X	X	X	X		X	X		X	X	X	X	X	X	X	X	X	X	X	X	X		X
	Sediment size	X	X	X		X	X	X	X	X	X	X	X		X	X		X	X	X	X	X	X	X	X	X	X	X	X	X		X
	Pool depth	X	X	X		X	X	X	X	X	X	X	X		X			X	X	X	X	X	X	X	X	X	X	X	X	X		X
	Embeddedness	X	X	X		X	X	X	X	X	X	X	X		X			X	X	X	X	X	X	X	X	X	X	X	X	X		X
Salts	Electrical conductivity (EC)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

IUA		Upper Lephalala		Lower Lephalala Kalkpan se Loop		Upper Nyl/Sterk					Mogalakwena		Mapungubwe		Upper Sand	Lower Sand			Nzhelele/Nwanedi				Upper Luvuvhu		Lower Luvuvhu/Mutale					Shingwedzi	
Resource Unit		RRU-Riv11	RRU-Riii3	RRU-Ri8	RRU-Rvi1	RRU-Ri4	RRU-Ri1	RRU-Ri1-1	RRU-Ri3	RRU-Ri5	RRU-Ri14	RRU-Rii3	RRU-Rvi2	Riv32	RRU-Riv16	RRU-Ri20	RRU-Ri22	RRU-Ri25	RRU-Ri26	RRU-Riv33	RRU-Ri27	RRU-Ri28	RRU-Riii6	RRU-Ri30	RRU-Ri32	RRU-Rvii33	RRU-Ri33	RRU-Ri34	RRU-Ri36	RRU-Riv28	RRU-Ri37
Sub-component	Indicator																														
Nutrients	Total Inorganic nitrogen (TIN)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Orthophosphate (PO_4-P)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
System variables	Dissolved oxygen	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	pH	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Water temperature	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	TSS																											X		X	
Toxins	Ammonia (NH3-N)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Atrazine	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Endosulfan	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Pathogens	Escherichia coli (E coli)	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

IUA		Upper Lephalala		Lower Lephalala Kalkpan se Loop		Upper Nyl/Sterk					Mogalakwena		Mapungubwe		Upper Sand	Lower Sand			Nzhelele/Nwanedi					Upper Luvuvhu		Lower Luvuvhu/Mutale						Shingwedzi	
Resource Unit		RRU-Riv11	RRU-Riii3	RRU-Ri8	RRU-Rvi1	RRU-Ri4	RRU-Ri1	RRU-Ri1-1	RRU-Ri3	RRU-Ri5	RRU-Ri14	RRU-Rii3	RRU-Rvi2	Riv32	RRU-Riv16	RRU-Ri20	RRU-Ri22	RRU-Ri25	RRU-Ri26	RRU-Riv33	RRU-Ri27	RRU-Ri28	RRU-Riii6	RRU-Ri30	RRU-Ri32	RRU-Rvii33	RRU-Ri33	RRU-Ri34	RRU-Ri36	RRU-Riv28	RRU-Ri37
Sub-component	Indicator																															
	Faecal coliforms	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Riparian Vegetation - Aquatic zone	Key species	X																										X				
Riparian vegetation - Marginal zone	Dominant vegetation	X			X		X			X	X	X												X	X		X	X				
	Key species	X			X		X			X	X	X												X	X		X	X				
	Alien plant species	X			X		X			X	X	X												X	X		X	X				
	Terrestrial woody cover	X			X		X			X	X	X												X	X		X	X				
	Indigenous woody	X			X		X			X	X													X	X		X	X				
	Non-woody cover	X			X		X			X	X													X	X		X	X				
	Reed cover	X			X		X			X	X	X												X	X		X					
Riparian Vegetation - Marginal Zone (bed)	Dominant vegetation			X												X		X			X	X	X						X		X	
	Key species			X												X					X	X	X						X			

IUA		Upper Lephalala		Lower Lephalala Kalkpan se Loop		Upper Nyl/Sterk					Mogalakwena		Mapungubwe		Upper Sand	Lower Sand			Nzhelele/Nwanedi				Upper Luvuvhu		Lower Luvuvhu/Mutale						Shingwedzi	
Resource Unit		RRU-Riv11	RRU-Riii3	RRU-Ri8	RRU-Rvi1	RRU-Ri4	RRU-Ri1	RRU-Ri1-1	RRU-Ri3	RRU-Ri5	RRU-Ri14	RRU-Rii3	RRU-Rvi2	Riv32	RRU-Riv16	RRU-Ri20	RRU-Ri22	RRU-Ri25	RRU-Ri26	RRU-Riv33	RRU-Ri27	RRU-Ri28	RRU-Riii6	RRU-Ri30	RRU-Ri32	RRU-Rvii33	RRU-Ri33	RRU-Ri34	RRU-Ri36	RRU-Riv28	RRU-Ri37
Sub-component	Indicator																														
	Alien plant species			X												X		X			X	X	X						X		X
	Non-woody cover																				X										
	Terrestrial woody cover			X												X		X			X	X	X						X		X
	Reed cover			X												X		X			X	X	X						X		X
Riparian Vegetation - Non-marginal zone (lower - flood benches)	Dominant vegetation	X			X					X	X			X		X					X	X			X	X					
	Key species	X			X					X	X			X		X					X	X			X	X					
	Alien plant species	X			X					X	X			X		X					X	X			X	X					
	Terrestrial woody cover	X			X					X	X			X		X					X	X			X	X					
	Indigenous woody cover	X			X					X	X														X	X					
	Non-woody cover	X			X					X	X					X					X				X	X					

IUA		Upper Lephalala		Lower Lephalala Kalkpan se Loop		Upper Nyl/Sterk					Mogalakwena		Mapungubwe		Upper Sand	Lower Sand			Nzhelele/Nwanedi				Upper Luvuvhu		Lower Luvuvhu/Mutale						Shingwedzi	
Resource Unit		RRU-Riv11	RRU-Riii3	RRU-Ri8	RRU-Rvi1	RRU-Ri4	RRU-Ri1	RRU-Ri1-1	RRU-Ri3	RRU-Ri5	RRU-Ri14	RRU-Rii3	RRU-Rvi2	Riv32	RRU-Riv16	RRU-Ri20	RRU-Ri22	RRU-Ri25	RRU-Ri26	RRU-Riv33	RRU-Ri27	RRU-Ri28	RRU-Riii6	RRU-Ri30	RRU-Ri32	RRU-Rvii33	RRU-Ri33	RRU-Ri34	RRU-Ri36	RRU-Riv28	RRU-Ri37
Sub-component	Indicator																														
Riparian vegetation - Non-marginal zone (upper - banks)	Dominant vegetation	X		X	X		X			X	X	X		X		X		X			X	X	X	X		X	X	X		X
	Alien plant species	X		X	X		X			X	X	X		X		X		X			X	X	X	X		X	X	X		X
Riparian Zone	PES	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Species richness	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Threatened riparian species										X			X							X	X		X	X			X			
	Endemic riparian species	X					X			X	X					X						X	X	X	X	X		X			
Fish	FRAI score	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Overall fish health	X		X	X		X			X	X			X		X		X			X	X	X	X		X	X	X		X
	Species diversity	X		X	X		X			X	X			X		X		X			X	X	X	X		X	X	X		X
	Key species	X		X	X		X			X	X			X		X		X			X	X	X	X		X	X	X		X

IUA		Upper Lephalala		Lower Lephalala Kalkpan se Loop		Upper Nyl/Sterk					Mogalakwena		Mapungubwe		Upper Sand	Lower Sand			Nzhelele/Nwanedi				Upper Luvuvhu		Lower Luvuvhu/Mutale						Shingwedzi	
Resource Unit		RRU-Riv11	RRU-Riii3	RRU-Ri8	RRU-Rvi1	RRU-Ri4	RRU-Ri1	RRU-Ri1-1	RRU-Ri3	RRU-Ri5	RRU-Ri14	RRU-Rii3	RRU-Rvi2	Riv32	RRU-Riv16	RRU-Ri20	RRU-Ri22	RRU-Ri25	RRU-Ri26	RRU-Riv33	RRU-Ri27	RRU-Ri28	RRU-Riii6	RRU-Ri30	RRU-Ri32	RRU-Rvii33	RRU-Ri33	RRU-Ri34	RRU-Ri36	RRU-Riv28	RRU-Ri37
Sub-component	Indicator																														
Macroinvertebrates	MIRAI Category and Score	X	X			X	X	X	X	X	X		X		X		X		X	X	X	X	X	X	X	X	X	X		X	
	SASS5 Total Score and ASPT	X	X			X	X	X	X	X	X		X		X		X		X	X	X	X	X	X	X	X	X	X		X	
	Key taxa and abundance	X		X	X		X			X	X			X		X		X			X	X	X	X	X		X	X	X		X
	Taxon dominance	X		X	X		X			X	X			X		X		X			X	X	X	X	X		X	X	X		X

Table 4-3. Sub-components and indicators proposed for the medium priority river resource units

IUA		Upper Lephalala IUA		Kalkpan se Loop IUA		Upper Nyl/Sterk IUA				Mogalakwena IUA		Mapungubwe IUA			Upper Sand IUA		Lower Sand IUA	Nzhelele and Nwanedi IUA				Upper Luvuvhu IUA			Shingwedzi River IUA
Resource Unit		RRU-Riv8	RRU-Riv13	RRU-Ri38	RRU-Rvi15	RRU-Rvii4	RRU-Rv1	RRU-Riv3	RRU-Riii1	RRU-Ri6	RRU-Ri13	RRU-Rvi4	RRU-Rvi7	RRU-Rvi9	RRU-Ri16	RRU-Ri17	RRU-Ri23	RRU-Riii7	RRU-Rvii34	RRU-Riii9	RRU-Riii10	RRU-Rvii19	RRU-Riii5	RRU-Riv18	RRU-Rvi13
Sub-component	Indicator																								
Water Quantity	Discharge	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Riparian zone	PES	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Species richness	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Fish	FRAI	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Macroinvertebrates	MIRAI Category and Score	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	SASS5 Total Score and ASPT	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

4.2 Dam sub-component prioritisation and indicator selection

In determining the choice of components, sub-components and indicators for determining dam RQOs, consideration was given to the purpose of the dam, current and future pressures on the dam, importance of the dam to downstream use and for recreational activities.

A generic list which forms the basis for customising components for specific priority Dam RUs is provided in Table 4-4.

Table 4-4. Generic components, subcomponents and indicators for dams

Component	Subcomponent	Reason for selection	Indicator
Quantity	Dam releases	Dam storage levels determine the water allocations that can be supplied to each user sector with EWR a priority user	Percentage storage level based on decisions made at the start of the hydrological year as part of the annual operating analysis
Quality	Nutrients	The system must be maintained at concentrations where they do not impact negatively on the ecosystem, on agriculture and are acceptable for municipal treatments	Total Phosphates (mg/l) Chlorophyll a (µg/l)
	Salts	Salt levels must be maintained at concentrations where they do not impact negatively on the ecosystem, on agriculture and are acceptable for municipal treatments	Electrical Conductivity (EC) (mS/m) Total dissolved salts (TDS) (mg/l)
	Pathogens	The system must be maintained in a state that is safe for contact recreation	Escherichia coli, Faecal coliforms
Biota	Fish	Fish abundance must be maintained at a level that fulfils ecosystem services roles of recreational angling and subsistence harvesting.	Maintain a stable catch per unit effort relative to previous surveys undertaken under similar seasons and conditions.
		Fish health to be maintained in a state that allows for consumption and recreational angling.	Overall health of individuals Parasite burden and bacterial infections impacting <1% of the fish population
Aquatic alien vegetation	Nutrients	There is a direct link of aquatic alien vegetation abundance and vigour to nutrients with the water column	Total Phosphates (mg/l) Chlorophyll a (µg/l)
	Extent of alien vegetation	Invasive aquatic alien plant species hace the potential to cover dams, causing fish kills and potentially unhealthy conditions for humans	% aerial cover of alien vegetation (% of dam surface area)

4.2.1 Selected user sub-components and indicators for dams

In terms of the quantity component of the RQOs for dams, each priority dam should have an operating rule such as provided in Table 4-5 which ensures the allocation of water to users, including the water to meet downstream ecological water requirements.

The sub-components and indicators for the water quantity, water quality and biotic component as shown in Table 4-6 will be selected for all priority dams.

Table 4-5. Example of an operating rule for dams

Objective	Task ID	Task	Description of Task	Unit of Measure	Data Source
Maintain the Dam storage capacity to meet the releases to meet Base Flows	1	Starting Storages at beginning of hydrological year (1 April)	Establish the starting storage of the dam level	% of storage capacity	Use of SAWS data and SARCOF for weather outlook prediction & application
	2	Short term Characteristic Curve of Dam	Determine the short-term characteristic curves (STCCs) -	Volume of water available at different assurance levels for a given starting period	Water Resource Yield Model
	3	User priority classification of the dam incl. EWR releases	Review and Update the User categories for each system to include the EWR & International Obligations	Priority classification table	Annual Operating Analysis
	4	Curtailment Curve	Apply the STCCs to the starting storage to determine the water allocations that can be supplied to each user sector with EWR a priority user	Graphical plot of starting storage level vs factor of water allocation to be supplied for the hydrological year	Hydrological Drought Analysis Model (HDAM)
	5	Stakeholder Participations	Engage with the System Operating Forum (SOF) on the proposed releases for the hydrological year (including releases for the EWR)	Avoid dam storage level going down below the percentage to carry over to the next hydrological cycle. Review on 1 Nov- projected runoff	N/A

Table 4-6. Components, sub-components and indicators proposed for each of the high priority dams.

Dam Name	Component	Sub-component	Indicator/ Measure
	Quantity	Monthly Flow releases	Maintainance low flows Maintainance high flows
All prioroity dams	Quality	Nutrients	Total Phosphates (mg/l) Chlorophyll a (µg/l)
		Salts	Electrical Conductivity (EC) (mS/m) Total dissolved salts (TDS) (mg/l)
		Pathogens	Escherichia coli, Faecal coliforms
	Biota	Fish	Maintenance of fish species diversity
			Fish health
			Fish abundance
		Alien aquatic plant species	Water Quality (Nutrients)
			Aerial extent

4.3 Wetland sub-component prioritisation and indicator selection

Step 4 of the procedure for determining wetland RQOs has two key objectives. Firstly, to build an understanding of impacts, and the current and future pressures on priority wetland resources. During this process it is important to consider the impacts of land-based activities on priority wetland resources. Secondly identify sub-components that may be important to either users or the environment and select those sub-components and associated indicators for which RQOs, and where possible numerical criteria, should be developed. Volume 1 of the wetland report (DWS, 2024) outlines the detail of impacts for each high priority wetland, including land use and PES score and category and these underpin the choice of components, sub-components and indicators. Table 4-7 indicates a generic list of components, sub-components and indicators that are generally important to most wetlands. This generic list forms the basis for customising components for each specific high priority wetland, since not all may be relevant to each wetland / wetland complex.

Table 4-7. Generic list of components, sub-components and indicators that are generally important to most wetlands.

SQs	Component	Subcomponent	Indicator
Wetland name, HGM typing and extent (Ha)			
	Water quantity	Water Inputs	Hydrology (EWR)
			Stream permanency
			Seasonality
			Depth to ground water (springs / floodplains)
		Water distribution and retention patterns	Flooding by damming within the wetland
			Lake / Pan water level regime

SQs	Component	Subcomponent	Indicator
	Habitat	Wetland vegetation structure / composition	Extent of natural grassland within the wetland complex (land cover classes 12-13; SANLC, 2020)
			Extent of natural wooded land within the wetland complex (land cover classes 1-4; SANLC, 2020)
			Extent of herbaceous wetlands (land cover classes 22-23; SANLC, 2020)
		Habitat fragmentation within the wetland delineation	Extent of alien invasive plants within the wetland / complex
			Extent of planted forest within the wetland complex (land cover classes 5-7; SANLC, 2020)
			Land cover classes denoted to mines and quarries within the wetland complex (classes 68-72; SANLC, 2020)
			Land cover classes denoted to cultivated areas within the wetland complex (classes 32-46 & 73; SANLC, 2020)
			Land cover classes denoted to built-up areas and infrastructure within the wetland complex (classes 47-67; SANLC, 2020)
			Erosion / incision
	Biota	Waterbirds	Wetland is within 500m of a threatened waterbird point locality.
			Wetland / floodplain birds (species diversity / abundance)
		Mammals	Mammal species diversity (wetland-dependent)
			Hippo abundance (VU)
		Reptiles	Crocodile abundance
			Reptile species diversity (wetland-dependent)
		Fish	Species diversity in the wetland (may be only during flooding)
		Amphibians	Frogs and toads (species diversity)
		Wetland plants	Endangered / unique species diversity
		Taxon richness	Number of wetland-dependent species
	Water quality	Sediments	Sediment deposition / scour balance
		Water chemistry	Water quality (effluent) to comply with effluent standards.

4.3.1 Selected user sub-components and indicators for wetlands

Components, sub-components and indicators were selected to represent each of the high priority wetlands (summary shown in Table 4-8). These are in line with those components and sub-components suggested by Bredin *et al.*, 2019, and represent drivers of internal structure and function of wetlands, are listed in Table 4-9, and will be used to derive narrative and where possible numeric RQOs for each wetland / wetland complex.

Table 4-8. Summary of infield verification of high priority wetlands.

High Priority Wetland	PES Score	PES Category	EI	ES	REC	Reason for REC	TEC	How to achieve the TEC
Luvuvhu Floodplain (Makuleke)	80	B/C	Very High	High	B	Very High EI supports half category increase	B	Reduce AIP; manage elephant impact
Nyl River Floodplain	65	C	Very High	High	B/C	Very High EI supports half category increase	B/C	Reduce AIP & artificial water storage; manage grazing & trampling pressure
Wonderkrater	80	B/C	Very High	Moderate	B	Very High EI supports half category increase	B	Reduce AIP; manage grazing & trampling pressure
Nyl Pans	57	D	High	High	C/D	High EI supports half category increase	C/D	Improve water quality
Maloutswa Floodplain	66	C	Very High	High	B/C	Very High EI supports half category increase	C	Maintain PES
Kolope Wetlands	90	A/B	Very High	Low	A/B	Maintain PES as already near natural	A/B	Maintain PES
Lake Fundudzi	78	B/C	Very High	High	B	Very High EI supports half category increase	B	Reduce AIP
Mutale Wetlands	62	C/D	Very High	High	C	Very High EI supports half category increase	C	Reduce AIP & sand mining
Mokamole (tributary of the Mogalakwena)	80	B/C	High	High	B	High EI supports half category increase	B/C	Maintain PES
Malahlapanga	78	B/C	Very High	Moderate	B	Very High EI supports half category increase	B/C	Maintain PES
Bububu wetlands (tributary of the Shingwedzi)	97	A	Very High	Moderate	A	Maintain PES as already natural	A	Maintain PES

Table 4-9. Components, sub-components and indicators proposed for each of the high priority wetlands

SQs	Component	Subcomponent	Indicator
Luvuvhu Floodplain (Makuleke) - river & floodplain complex with pans (3648 Ha)			
	Water quantity	Water Inputs	Hydrology (EWR)
			Depth to ground water on the floodplain
			Flooding by damming with the wetland

SQs	Component	Subcomponent	Indicator
		Water distribution and retention patterns	Pan water level regime
	Habitat	Wetland vegetation structure / composition	Extent of natural wooded land within the wetland complex (land cover classes 1-4, 2020)
			Extent of herbaceous wetlands (land cover classes 22-23, 2020)
		Habitat fragmentation with the wetland delineation	Extent of alien invasive plants within the wetland / complex
			Aerial extent of developments within the wetland complex (includes mines and quarries, SANLC classes 68-72, built-up areas, infrastructure, canals, furrows and trenching , SANLC classes 47-67)
			Land cover classes denoted to cultivated areas within the wetland complex (classes 32-46 & 73, 2020)
	Biota	Waterbird species	Migratory species diversity dependent on wetland complex
			Wetland / floodplain birds (species diversity / abundance)
		Mammals	Mammal species diversity (wetland-dependent)
			Elephant abundance
			Hippo abundance (VU)
		Reptiles	Crocodile abundance
			Reptile species diversity (wetland-dependent)
		Fish	Species diversity in the Luvuvhu River and perennial pans
		Amphibians	Frogs and toads (species diversity)
		Wetland plants	Endangered / unique species diversity
		Taxon richness	Number of wetland-dependent species
	Water quality	Sediments	Sediment deposition / scour balance
		Water chemistry	Water quality (effluent) to comply with effluent standards.
Nyl River floodplain (19378 Ha)			
	Water quantity	Water Inputs	Hydrology (EWR)
			Stream permanency
			Seasonality
		Water distribution and retention patterns	Flooding by damming within the wetland
	Habitat	Wetland vegetation structure / composition	Extent of natural grassland within the wetland complex (land cover classes 12-13; SANLC, 2020)
			Extent of natural wooded land within the wetland complex (land cover classes 1-4; SANLC, 2020)
			Extent of herbaceous wetlands (land cover classes 22-23; SANLC, 2020)
		Habitat fragmentation within the wetland delineation	Extent of alien invasive plants within the wetland / complex
			Extent of planted forest within the wetland complex (land cover classes 5-7; SANLC, 2020)

SQs	Component	Subcomponent	Indicator
			Aerial extent of developments within the wetland complex (includes mines and quarries, SANLC classes 68-72, built-up areas, infrastructure, canals, furrows and trenching, SANLC classes 47-67)
			Land cover classes denoted to cultivated areas within the wetland complex (classes 32-46 & 73; SANLC, 2020)
	Biota	Waterbirds	Wetland is within 500m of a threatened waterbird point locality.
			Wetland / floodplain birds (species diversity / abundance)
		Mammals	Mammal species diversity (wetland-dependent)
		Reptiles	Reptile species diversity (wetland-dependent)
		Fish	Species diversity in the wetland (may be only during flooding)
		Amphibians	Frogs and toads (species diversity)
		Wetland plants	Endangered / unique species diversity
		Taxon richness	Number of wetland-dependent species
	Water quality	Sediments	Sediment deposition / scour balance
		Water chemistry	Water quality (effluent) to comply with effluent standards.
Wonderkrater depressional wetland (655ha)			
	Water quantity	Water Inputs	Depth to ground water (Spring)
	Habitat	Wetland vegetation structure / composition	Extent of natural grassland within the wetland complex (land cover classes 12-13; SANLC, 2020)
			Extent of natural wooded land within the wetland complex (land cover classes 1-4; SANLC, 2020)
			Extent of herbaceous wetlands (land cover classes 22-23; SANLC, 2020)
		Habitat fragmentation within the wetland delineation	Extent of alien invasive plants within the wetland / complex
			Extent of planted forest within the wetland complex (land cover classes 5-7; SANLC, 2020)
			Aerial extent of developments within the wetland complex (includes mines and quarries, SANLC classes 68-72, built-up areas, infrastructure, canals, furrows and trenching , SANLC classes 47-67)
			Land cover classes denoted to cultivated areas within the wetland complex (classes 32-46 & 73; SANLC, 2020)
			Erosion / incision
	Biota	Wetland plants	Endangered / unique species diversity
		Taxon richness	Number of wetland-dependent species
Nyl Pans (valley bottom with a channel with depressional / lakes; 2096 Ha)			
	Water quantity	Water Inputs	Hydrology (EWR)
			Stream permanency

SQs	Component	Subcomponent	Indicator
			Seasonality
	Habitat	Wetland vegetation structure / composition	Extent of natural grassland within the wetland complex (land cover classes 12-13; SANLC, 2020)
			Extent of natural wooded land within the wetland complex (land cover classes 1-4; SANLC, 2020)
			Extent of herbaceous wetlands (land cover classes 22-23; SANLC, 2020)
		Habitat fragmentation within the wetland delineation	Extent of alien invasive plants within the wetland / complex
			Extent of planted forest within the wetland complex (land cover classes 5-7; SANLC, 2020)
			Aerial extent of developments within the wetland complex (includes mines and quarries, SANLC classes 68-72, built-up areas, infrastructure, canals, furrows and trenching , SANLC classes 47-67)
			Land cover classes denoted to cultivated areas within the wetland complex (classes 32-46 & 73; SANLC, 2020)
		Lake area	Extent of natural open water (wet & dry season)
	Biota	Waterbird species	Wetland / floodplain birds (species diversity)
		Wetland plants	Endangered / unique species diversity
		Taxon richness	Number of wetland-dependent species
	Water Quality	Water chemistry	Water quality (effluent) to comply with effluent standards.
Maloutswa Floodplain (3888 Ha)			
	Water quantity	Water Inputs	Hydrology (EWR)
			Stream permanency
			Seasonality
		Water distribution and retention patterns	Flooding by damming within the wetland
	Habitat	Wetland vegetation structure / composition	Extent of natural grassland within the wetland complex (land cover classes 12-13; SANLC, 2020)
			Extent of natural wooded land within the wetland complex (land cover classes 1-4; SANLC, 2020)
			Extent of herbaceous wetlands (land cover classes 22-23; SANLC, 2020)
		Habitat fragmentation within the wetland delineation	Extent of alien invasive plants within the wetland / complex
			Extent of planted forest within the wetland complex (land cover classes 5-7; SANLC, 2020)
			Aerial extent of developments within the wetland complex (includes mines and quarries, SANLC classes 68-72, built-up areas, infrastructure, canals, furrows and trenching, SANLC classes 47-67)
			Land cover classes denoted to cultivated areas within the wetland complex (classes 32-46 & 73; SANLC, 2020)

SQs	Component	Subcomponent	Indicator
			Erosion / incision
	Biota	Waterbirds	Wetland / floodplain birds (species diversity)
		Mammals	Mammal species diversity (wetland-dependent)
		Wetland plants	Endangered / unique species diversity
		Taxon richness	Number of wetland-dependent species
	Water quality	Sediments	Sediment deposition / scour balance
		Water chemistry	Water quality (effluent) to comply with effluent standards.
Kolope Wetlands (Riverine; 27511 Ha)			
	Water quantity	Water Inputs	Hydrology (EWR)
		Water distribution and retention patterns	Flooding by damming within the wetland
	Habitat	Wetland vegetation structure / composition	Extent of natural grassland within the wetland complex (land cover classes 12-13; SANLC, 2020)
			Extent of natural wooded land within the wetland complex (land cover classes 1-4; SANLC, 2020)
			Extent of herbaceous wetlands (land cover classes 22-23; SANLC, 2020)
		Habitat fragmentation within the wetland delineation	Extent of alien invasive plants within the wetland / complex
			Extent of planted forest within the wetland complex (land cover classes 5-7; SANLC, 2020)
			Aerial extent of developments within the wetland complex (includes mines and quarries, SANLC classes 68-72, built-up areas, infrastructure, canals, furrows and trenching, SANLC classes 47-67)
			Land cover classes denoted to cultivated areas within the wetland complex (classes 32-46 & 73; SANLC, 2020)
	Biota	Taxon richness	Number of wetland-dependent species
Lake Fundudzi (depressional; 517 Ha)			
	Water quantity	Water Inputs	Hydrology (EWR)
		Water distribution and retention patterns	Lake water level regime
	Habitat	Wetland vegetation structure / composition	Extent of natural grassland within the wetland complex (land cover classes 12-13; SANLC, 2020)
			Extent of natural wooded land within the wetland complex (land cover classes 1-4; SANLC, 2020)
			Extent of herbaceous wetlands (land cover classes 22-23; SANLC, 2020)
		Habitat fragmentation within the wetland delineation	Extent of alien invasive plants within the wetland / complex
			Extent of planted forest within the wetland complex (land cover classes 5-7; SANLC, 2020)
			Aerial extent of developments within the wetland complex (includes mines and quarries, SANLC classes 68-72, built-up areas, infrastructure, canals, furrows and trenching, SANLC classes 47-67)

SQs	Component	Subcomponent	Indicator
			Land cover classes denoted to cultivated areas within the wetland complex (classes 32-46 & 73; SANLC, 2020)
		Lake area	Extent of natural open water (wet & dry season)
	Biota	Taxon richness	Number of wetland-dependent species
	Water quality	Sediments	Sediment deposition / scour balance
		Water chemistry	Water quality (effluent) to comply with effluent standards.
Mutale Wetlands (Valley bottom with and without channel; 3513 Ha)			
	Water quantity	Water Inputs	Hydrology (EWR)
		Water distribution and retention patterns	Flooding by damming within the wetland
	Habitat	Wetland vegetation structure / composition	Extent of natural grassland within the wetland complex (land cover classes 12-13; SANLC, 2020)
			Extent of natural wooded land within the wetland complex (land cover classes 1-4; SANLC, 2020)
			Extent of herbaceous wetlands (land cover classes 22-23; SANLC, 2020)
		Habitat fragmentation within the wetland delineation	Extent of alien invasive plants within the wetland / complex
			Extent of planted forest within the wetland complex (land cover classes 5-7; SANLC, 2020)
			Aerial extent of developments within the wetland complex (includes mines and quarries, SANLC classes 68-72, built-up areas, infrastructure, canals, furrows and trenching, SANLC classes 47-67)
			Land cover classes denoted to cultivated areas within the wetland complex (classes 32-46 & 73; SANLC, 2020)
			Extent of sand mining
	Biota	Taxon richness	Number of wetland-dependent species
	Water quality	Water chemistry	Water quality (effluent) to comply with effluent standards.
Mokamole (tributary of the Mogalakwena; Valley bottom with a channel; 464 Ha)			
	Water quantity	Water Inputs	Hydrology (EWR)
		Water distribution and retention patterns	Flooding by damming within the wetland
	Habitat	Wetland vegetation structure / composition	Extent of natural grassland within the wetland complex (land cover classes 12-13; SANLC, 2020)
			Extent of natural wooded land within the wetland complex (land cover classes 1-4; SANLC, 2020)
			Extent of herbaceous wetlands (land cover classes 22-23; SANLC, 2020)
		Habitat fragmentation within the wetland delineation	Extent of alien invasive plants within the wetland / complex
			Extent of planted forest within the wetland complex (land cover classes 5-7; SANLC, 2020)
			Aerial extent of developments within the wetland complex (includes mines and quarries, SANLC

SQs	Component	Subcomponent	Indicator
			classes 68-72, built-up areas, infrastructure, canals, furrows and trenching, SANLC classes 47-67)
			Land cover classes denoted to cultivated areas within the wetland complex (classes 32-46 & 73; SANLC, 2020)
	Biota	Taxon richness	Number of wetland-dependent species
Peat domes in KNP - Malahlapanga (47 Ha)			
	Water quantity	Water Inputs	Depth to ground water (springs)
	Habitat	Wetland vegetation structure / composition	Extent of natural grassland within the wetland complex (land cover classes 12-13; SANLC, 2020)
			Extent of natural wooded land within the wetland complex (land cover classes 1-4; SANLC, 2020)
			Extent of herbaceous wetlands (land cover classes 22-23; SANLC, 2020)
		Habitat fragmentation within the wetland delineation	Extent of alien invasive plants within the wetland / complex
			Aerial extent of developments within the wetland complex (includes mines and quarries, SANLC classes 68-72, built-up areas, infrastructure, canals, furrows and trenching , SANLC classes 47-67)
			Land cover classes denoted to cultivated areas within the wetland complex (classes 32-46 & 73; SANLC, 2020)
	Biota	Mammals	Elephant density
			Buffalo density
		Taxon richness	Number of wetland-dependent species
Bububu wetlands (tributary of the Shingwedzi); Riverine with sodic; 6533 Ha)			
	Water quantity	Water Inputs	Hydrology (EWR)
	Habitat	Wetland vegetation structure / composition	Extent of natural grassland within the wetland complex (land cover classes 12-13; SANLC, 2020)
			Extent of natural wooded land within the wetland complex (land cover classes 1-4; SANLC, 2020)
			Extent of herbaceous wetlands (land cover classes 22-23; SANLC, 2020)
		Habitat fragmentation within the wetland delineation	Extent of alien invasive plants within the wetland / complex
			Aerial extent of developments within the wetland complex (includes mines and quarries, SANLC classes 68-72, built-up areas, infrastructure, canals, furrows and trenching, SANLC classes 47-67)
			Land cover classes denoted to cultivated areas within the wetland complex (classes 32-46 & 73; SANLC, 2020)
	Water quality	Sediments	Sediment deposition / scour balance

4.4 Groundwater sub-component prioritisation and indicator selection

The generic components, sub-components and indicators for groundwater are listed in Table 4-10. The selection of sub-components and indicators for each priority groundwater resource are listed in Table 4-11. For each indicator, a RQO description will be developed, along with a numerical value where possible (i.e. for those that are numeric).

Table 4-10. Selected user sub-components and indicators for groundwater.

Component	Sub-Component (Key)	Rationale for sub-component choice	Indicator Selection
Quantity	Abstraction (available yield)	Whilst exploiting groundwater storage is acceptable for managing drought, and could be acceptable for short periods (e.g., high demand periods), over the long-term, groundwater use should be sustainable for all users and the environment. The RQO essentially implies that groundwater mining is considered unacceptable in the long-term. Implementation of this RQO requires the authority to isolate the cause of groundwater level decline and identify over-abstraction (unacceptable) from transition to new dynamic equilibrium (unavoidable), drought and climate change (unavoidable).	Groundwater Levels: (Seasonal abstraction) water level recovers from abstraction impact during wet season, under consideration of climate change and drought cycles. (Permanent abstraction) water level decline stabilises under consideration of aquifer response time.
	Discharge	Groundwater use should be sustainable for all users and the environment. In areas where groundwater and surface water are hydraulically connected, it is assumed that the reversal of the natural gradient with surface water could have unacceptable impacts. Where groundwater discharges to surface water, groundwater abstraction close to surface water (distance dependent on aquifer diffusivity), or groundwater abstraction rates that reduce aquifer water levels beneath that of the river, would reverse the gradient towards the river, and surface water would be 'lost' to groundwater (indirect recharge).	Groundwater Levels: Relative water levels between groundwater and surface water (in mamsl) (i.e., losing or gaining streams)
	Low flow in river	It is assumed that (a portion of) the low flow is derived from groundwater. Whilst all abstraction reduces natural discharge to some extent and at some point, in time, it would be unacceptable for abstraction to cause groundwater discharge to reduce below the maintenance low flow value, at locations that have been identified as having higher dependence on groundwater.	Gauging Flows: Compliance with the low flow requirements in the river
Quality	Nutrients, Salts	Groundwater management measures must ensure groundwater quality is protected. The parameters selected will support identification of a variety of pollution sources (captured in increase in salts) (e.g., mining), agricultural pollution (fertilisers) and industrial, domestic and animal sewage. The numerical values represent the 95 percentiles for the listed aquifer within the Groundwater Resource Unit. This is taken as a limit of acceptable deviation from natural background. Where insufficient data exists to establish robust statistics for an aquifer within an area, numerical values are either taken from the same aquifer in neighbouring areas or from data for the same	Groundwater Quality: NO_3 (as N) and Ecological Category
	Pathogens	Groundwater management measures must ensure groundwater quality is protected. The parameters selected will support identification of pollution from wastewater (pathogens) and other bacteriological sources. The numerical value is based on drinking water quality standards.	Groundwater Quality: E-coli, Total Coliform

Table 4-11. Sub-component and indicator selection for prioritised quaternary catchments.

Description	GRU	Quat	Description (of prioritised resource units)	Quantity			Quality	
Middle Lephalala	A50-2	A50G	Low to Moderate groundwater use to support rural water supply and groundwater schemes.	Abstraction (Available Yield)			Salts, Nutrients	
Lower Lephalala	A50-3	A50H	Moderate groundwater use to support economic activities (agriculture), rural water supply and groundwater schemes.	Abstraction (Available Yield)			Salts, Nutrients	
Kalkpan	A50-4	A63C	Low to Moderate groundwater use to rural water supply. GW could play a role in supporting spring seepages.	Abstraction (Available Yield)	Discharge	Low flow in river		
Nyl River Valley	A61-1	A61A	High groundwater use to support groundwater schemes and Modimolle wellfield. GW play a moderate role in supporting baseflow.	Abstraction (Available Yield)	Discharge			
		A61B	Low to Moderate groundwater use to support rural water supply. GW plays a moderate role in supporting baseflow (and wetlands).	Abstraction (Available Yield)	Discharge	Low flow in river		
		A61C	Low to Moderate groundwater use to support rural water supply. GW plays a moderate role in supporting baseflow (and Nylsvley).	Abstraction (Available Yield)	Discharge			
		A61D	Low to Moderate groundwater use to support groundwater schemes and Mookgophong wellfield. GW plays a moderate role in supporting baseflow (and wetlands).	Abstraction (Available Yield)	Discharge		Salts, Nutrients	Pathogens
		A61E	Moderate groundwater use to support groundwater schemes/wellfields and rural water supply. GW plays a moderate role in supporting baseflow (and wetlands).	Abstraction (Available Yield)	Discharge		Salts, Nutrients	Pathogens
Sterk	A61-2	A61H	Low to Moderate groundwater use to support groundwater schemes/wellfields and rural water supply. GW could play a moderate role in supporting baseflow (and wetlands).	Abstraction (Available Yield)	Discharge			
Upper Mogalakwena	A61-3	A61F	Low to Moderate groundwater use to support groundwater schemes/Mokopane wellfields and rural water supply. GW plays a role in supporting baseflow.	Abstraction (Available Yield)	Discharge		Salts, Nutrients	Pathogens

Description	GRU	Quat	Description (of prioritised resource units)	Quantity			Quality	
		A61G	Moderate groundwater use to support groundwater schemes, Mogalakwena Mine wellfields and rural water supply. GW plays a moderate role in supporting baseflow.	Abstraction (Available Yield)	Discharge		Salts, Nutrients	
Matlala	A62-2	A62E	Low to Moderate groundwater use to support economic activities (agriculture) and rural water supply. GW could play a role in supporting baseflow (and wetlands).	Abstraction (Available Yield)	Discharge			
Lower Mogalakwena	A63-1	A63A	High groundwater use to support economic activities (agriculture).	Abstraction (Available Yield)			Salts, Nutrients	
		A63D	Moderate groundwater use to support economic activities (agriculture) (Alldays) and groundwater schemes and rural water supply.	Abstraction (Available Yield)			Salts, Nutrients	
Limpopo Tributaries	A63/71-3	A63E	High groundwater use to support economic activities (agriculture). Hosts Mapungubwe and Venetia Mine. GW could play a role in supporting wetlands.	Abstraction (Available Yield)	Discharge		Salts, Nutrients	
		A71L	High groundwater use to support economic activities (mining). Schroda/Greefswald Wellfields. Hosts Mapungubwe.	Abstraction (Available Yield)	Discharge		Salts, Nutrients	
Upper Sand	A71-1	A71A	High groundwater use to support economic activities. Hosts Polokwane (i.e., Sand River) wellfields.	Abstraction (Available Yield)	Discharge		Salts, Nutrients	
		A71B	High groundwater use to support economic activities (Several wellfields, groundwater schemes and rural water supply).	Abstraction (Available Yield)	Discharge		Salts, Nutrients	Pathogens
Middle Sand	A71-2	A71C	High groundwater use to support economic activities (agriculture), rural water supply and groundwater schemes.	Abstraction (Available Yield)	Discharge		Salts, Nutrients	
		A71D	High groundwater use to support groundwater schemes and rural water supply.	Abstraction (Available Yield)	Discharge			
		A71H	Moderate groundwater use to support groundwater schemes (Makhado).	Abstraction (Available Yield)			Salts, Nutrients	

Description	GRU	Quat	Description (of prioritised resource units)	Quantity			Quality	
Hout	A71-3	A71E	High groundwater use to support groundwater schemes and rural water supply. GW could play a role in supporting wetlands.	Abstraction (Available Yield)	Discharge		Salts, Nutrients	
		A71F	High groundwater use to support groundwater schemes and rural water supply. GW could play a role in supporting wetlands.	Abstraction (Available Yield)	Discharge		Salts, Nutrients	
		A71G	High groundwater use to support economic activities (agriculture), groundwater schemes and rural water supply.	Abstraction (Available Yield)			Salts, Nutrients	
		A72A	High groundwater use to support economic activities (agriculture), groundwater schemes and rural water supply.	Abstraction (Available Yield)	Discharge		Salts, Nutrients	
Sandbrak	A71-4	A71J	High groundwater use to support economic activities (agriculture) and rural water supply. GW could play a role in supporting wetlands.	Abstraction (Available Yield)			Salts, Nutrients	
		A72B	Moderate groundwater use to support economic activities (agriculture), groundwater schemes and rural water supply.	Abstraction (Available Yield)				
	A71-5	A71K	High groundwater use to support groundwater schemes, rural water supply and Musina (i.e., Limpopo River) wellfield.	Abstraction (Available Yield)	Discharge		Salts, Nutrients	Pathogens
Upper Nzhelele	A80-1	A80A	Low to moderate groundwater use to support groundwater schemes and rural water supply. GW plays a role in supporting wetlands and spring seepages.	Abstraction (Available Yield)	Discharge			
		A80F	Moderate groundwater use to support economic activities (agriculture) and rural water supply. GW could play a role in supporting wetlands. Potential coal mining development.	Abstraction (Available Yield)			Salts, Nutrients	
Lower Nzhelele	A80-2	A80G	Moderate groundwater use to support economic activities (agriculture) and rural water supply. GW could play a role in supporting baseflow and spring seepages.	Abstraction (Available Yield)	Discharge	Low flow in river		

Description	GRU	Quat	Description (of prioritised resource units)	Quantity			Quality	
	A80-3	A80J	Moderate groundwater use to support economic activities (agriculture), groundwater schemes and rural water supply. GW could play a role in supporting wetlands.	Abstraction (Available Yield)	Discharge	Low flow in river		
Upper Luvuvhu	A91-1	A91A	High groundwater use to support groundwater schemes and rural water supply. GW could play a role in supporting baseflow.	Abstraction (Available Yield)	Discharge			
		A91B	Moderate groundwater use to support economic activities (agriculture), groundwater schemes and rural water supply. GW could play a role in supporting baseflow.	Abstraction (Available Yield)	Discharge		Salts, Nutrients	
		A91C	High groundwater use to support economic activities (agriculture), groundwater schemes and rural water supply. GW could play a role in supporting baseflow.	Abstraction (Available Yield)	Discharge		Salts, Nutrients	
		A91E	Low groundwater use to support groundwater schemes and rural water supply. GW could play a role in supporting baseflow.	Abstraction (Available Yield)	Discharge		Salts, Nutrients	
		A91F	Low groundwater use to support groundwater schemes and rural water supply. GW could play a role in supporting baseflow.	Abstraction (Available Yield)	Discharge		Salts, Nutrients	
		A91G	Low groundwater use to support groundwater schemes and rural water supply. GW could play a role in supporting baseflow and wetlands.	Abstraction (Available Yield)	Discharge	Low flow in river	Salts, Nutrients	
Mutale/Luvuvhu	A91-2	A91H	Low groundwater use to support groundwater schemes and rural water supply. GW could play a role in supporting baseflow.	Abstraction (Available Yield)	Discharge	Low flow in river		
		A92B	Low to Moderate groundwater use to support groundwater schemes and rural water supply. GW could play a role in supporting baseflow and wetlands.	Abstraction (Available Yield)	Discharge	Low flow in river		
		A92C	Low to Moderate groundwater use to support groundwater schemes and rural water supply. GW could play a role in supporting baseflow and spring seepages.	Abstraction (Available Yield)	Discharge			

Description	GRU	Quat	Description (of prioritised resource units)	Quantity			Quality	
		A92D	Low to Moderate groundwater use to support groundwater schemes and rural water supply. GW could play a role in supporting baseflow and wetlands.	Abstraction (Available Yield)	Discharge	Low flow in river		
Shingwedzi	B90-1	B90B	Low to Moderate groundwater use to support groundwater schemes and rural water supply.	Abstraction (Available Yield)				
		B90F	Low to Moderate groundwater use to support groundwater schemes and rural water supply. GW could play a role in supporting wetlands.	Abstraction (Available Yield)	Discharge			

5 CONCLUSION

The study area comprising secondary catchments A5 to A9 in the Limpopo WMA and secondary catchment B9 in the Olifants WMA have been delineated into 12 IUAs. Resource units were delineated within each IUA for river, dams, wetlands and groundwater resources and were prioritised using the RUPT to identify resource units which would be important to be monitored to ensure the protection of the water resource in accordance with the defined Water Resource Class of each IUA.

Furthermore, the priority resource units were evaluated, using the Resource Unit Evaluation Tool or a modification of the Tool to establish the sub-components and indicators that may be important to either users or the environment and which should be protected to support the resource dependent activities and/or maintain the integrity and ecological functioning of the water resource.

Draft RQOs and Numerical Limits will be developed for the priority sub-components and indicators in the next step of the RQOs process.

6 REFERENCES

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APPENDIX A

Appendix A 1. River Resource Unit Prioritisation Part 1

	Resource Unit	A71D	A71G	A71H	A71J	A71K	A72A	A72B	A80A	A80B	A80C	A80D	A80E	A80F	A80G	A80H	A80J	A91A	A91B	A91C	A91D	A91E	A91F	A91G	A91H	A91J	A91K	A92A	A92B	A92C	A92D	B90A	B90B	B90C	B90D	B90E	B90F	B90G	B90H
PRIORITIZATION SCORES	Position in IUA	0.25	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.25	0.00	0.25	0.00	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25
	Concern for users	0.17	0.04	0.08	0.04	0.20	0.07	0.02	0.13	0.13	0.13	0.02	0.04	0.04	0.15	0.06	0.11	0.11	0.11	0.19	0.24	0.08	0.06	0.25	0.15	0.05	0.17	0.15	0.16	0.07	0.23	0.12	0.15	0.15	0.12	0.12	0.15	0.12	0.13
	Concern for environment	0.14	0.11	0.19	0.13	0.13	0.16	0.11	0.14	0.17	0.21	0.06	0.03	0.11	0.19	0.17	0.20	0.13	0.17	0.17	0.20	0.19	0.13	0.20	0.21	0.10	0.23	0.16	0.16	0.10	0.21	0.06	0.06	0.06	0.00	0.00	0.11	0.08	0.20
	Management and practical considerations	0.13	0.04	0.09	0.10	0.13	0.07	0.08	0.06	0.18	0.06	0.03	0.00	0.09	0.13	0.09	0.13	0.04	0.22	0.06	0.24	0.22	0.09	0.13	0.09	0.04	0.10	0.06	0.13	0.04	0.13	0.05	0.06	0.04	0.05	0.05	0.06	0.02	0.07
	Total Prioritization Score	0.69	0.19	0.36	0.27	0.70	0.29	0.21	0.34	0.48	0.40	0.12	0.07	0.24	0.72	0.33	0.68	0.27	0.50	0.43	0.68	0.48	0.28	0.83	0.70	0.18	0.75	0.37	0.69	0.20	0.81	0.23	0.27	0.25	0.17	0.17	0.32	0.21	0.66
	Priority Rating	0.8	0.2	0.4	0.3	0.8	0.4	0.3	0.4	0.6	0.5	0.1	0.1	0.3	0.9	0.4	0.8	0.3	0.6	0.5	0.8	0.6	0.3	1.0	0.8	0.2	0.9	0.4	0.8	0.2	1.0	0.3	0.3	0.3	0.2	0.2	0.4	0.3	0.8

Appendix A 2. River Resource Unit Prioritisation – Part 2

	Resource Unit	A50A	A50B	A50C	A50D	A50E	A50F	A50G	A50H	A50J	A63C	A61A	A61B	A61C	A61D	A61E	A61F	A61G	A61H	A61J	A62A	A62B	A62C	A62D	A62E	A62F	A62G	A62H	A62J	A63A	A63B	A63D	A63E	A71L	A71A	A71B	A71C	A71E	A71F
PRIORITIZATION SCORES	Position in IUA	0.00	0.25	0.00	0.00	0.00	0.25	0.00	0.25	0.25	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.25	0.25	0.00	0.00	0.00	0.25	0.25	0.00
	Concern for users	0.12	0.06	0.05	0.05	0.06	0.03	0.05	0.06	0.02	0.12	0.08	0.17	0.19	0.11	0.08	0.13	0.08	0.07	0.10	0.05	0.06	0.04	0.03	0.03	0.02	0.05	0.03	0.05	0.16	0.05	0.13	0.13	0.11	0.13	0.05	0.10	0.11	0.12
	Concern for environment	0.20	0.16	0.08	0.11	0.17	0.03	0.16	0.17	0.15	0.15	0.16	0.14	0.19	0.16	0.11	0.16	0.18	0.19	0.13	0.11	0.09	0.13	0.13	0.02	0.10	0.16	0.11	0.11	0.16	0.16	0.10	0.20	0.14	0.18	0.18	0.18	0.14	0.18
	Management and practical considerations	0.10	0.13	0.05	0.13	0.04	0.04	0.07	0.21	0.07	0.10	0.22	0.25	0.05	0.19	0.20	0.18	0.19	0.20	0.20	0.19	0.09	0.07	0.07	0.19	0.07	0.04	0.19	0.06	0.13	0.16	0.25	0.13	0.09	0.18	0.18	0.04	0.19	0.16
	Total Prioritization Score	0.42	0.59	0.17	0.28	0.27	0.35	0.28	0.69	0.49	0.62	0.45	0.56	0.43	0.46	0.39	0.47	0.70	0.45	0.67	0.35	0.25	0.24	0.22	0.24	0.18	0.24	0.34	0.23	0.70	0.37	0.72	0.71	0.34	0.48	0.40	0.56	0.69	0.45
	Priority Rating	0.6	0.8	0.2	0.4	0.4	0.5	0.4	1.0	0.7	0.9	0.6	0.8	0.6	0.6	0.5	0.6	1.0	0.6	0.9	0.5	0.3	0.3	0.3	0.3	0.3	0.3	0.5	0.3	1.0	0.5	1.0	1.0	0.5	0.7	0.6	0.8	1.0	0.6

APPENDIX B

Appendix B 3. River Resource Unit Evaluation

UPPER LEPHALALA RRU-Riv11

Selection of sub-components for RQO determination			Quantity		Quality				Habitat		Biota	
			Low Flows (Maintenance Flows)	High Flows (Floods)	Nutrients	Salts	System variables	Pathogens	Instream habitat	Riparian Habitat	Fish	Aquatic & riparian plant species
Selection guidance	EcoSpec Selection	Importance Rating	VH	H	VL	VL	VL	VL	VH	H	H	H
		Impact Class	M (-)	N/A	H (-)	M (-)	H (-)	M (-)	M (-)	VH (-)	H (-)	VH (-)
		Ecosystem prioritization rating	**Very High**	**Very Low**	**Very Low**	**Very Low**	**Very Low**	**Very Low**	**Very High**	**Very High**	**High**	**Very High**
	UserSpec Selection	Importance Rating	VH	L	M	VL	L	M	VH	VH	M	VH
		Impact Class	M (-)	N/A	H (-)	M (-)	H (-)	M (-)	M (-)	VH (-)	H (-)	VH (-)
		User prioritization rating	**Moderate**	**Very Low**	**Moderate**	**Very Low**	**Low**	**Low**	**Moderate**	**Very High**	**Moderate**	**Very High**
Documenting selection process & rationale		Select for RQO Determination	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
		Rationale for sub-component choice	Monitor low flow levels and variability	Monitor high flow magnitude and frequency	Monitor nutrients and eutrophication potential	Monitor salts with respect to ecosystem impacts	Monitor DO, TSS, Water temp for aquatic ecosystem impacts	Monitor pathogens for recreational impacts.	Monitor habitat diversity and condition	Monitor riparian habitat diversity and condition	Monitor key fish species	Monitor key aquatic & riparian species and AIP
		EcoSpec	Y	Y	Y	Y	Y	Y	y	Y	Y	Y
		UserSpec	Y		Y		Y	Y				
		Integrated Measure										
		Indicators Selected for RQO determination	Discharge	Discharge	PO4-P and TIN	EC/TDS	DO, Water Temp, TSS/Turbidity	E coli & Faecal coliforms	IHI, GAI, VEGRAI	VEGRAI, IHI, GAI	FRAI, Key species	VEGRAI, Key species
		Rationale for indicator selection	Monitor low flow levels and variability	Monitor high flow magnitude and frequency	Phosphates & nitrogen stimulate primary production and can cause eutrophication	Salts affect the osmoregulation of aquatoic organisms	Aquatic organisms are dependent on healthy	Pathogens can cause waterborne diseases	Monitor habitat diversity and condition	Monitor riparian habitat diversity, condition and processes maintaining it	FRAI, species diversity and abundance. Presence of alien species, key species	Monitor key riparian species & requirements for persistence

LEPHALALA RRU_Ri8

Selection of sub-components for RQO determination			Quantity		Quality				Habitat		Biota	
			Low Flows (Maintenance Flows)	High Flows (Floods)	Nutrients	Salts	System variables	Pathogens	Instream habitat	Riparian Habitat	Fish	Aquatic & riparian plant species
Selection guidance	EcoSpec Selection	Importance Rating	L	L	L	L	L	VL	L	M	M	L
		Impact Class	VH (-)	H (-)	H (-)	H (-)	VH (-)	H (-)	VH (-)	VH (-)	VH (-)	VH (-)
		Ecosystem prioritization rating	**Moderate**	**Low**	**Low**	**Low**	**Moderate**	**Very Low**	**Moderate**	**High**	**High**	**Moderate**
	UserSpec Selection	Importance Rating	VH	L	L	M	L	L	L	L	L	VL
		Impact Class	VH (-)	H (-)	H (-)	H (-)	VH (-)	H (-)	VH (-)	VH (-)	VH (-)	VH (-)
		User prioritization rating	**Very High**	**Low**	**Low**	**Moderate**	**Moderate**	**Low**	**Moderate**	**Moderate**	**Moderate**	**Low**
Documenting selection process & rationale		Select for RQO Determination	Y	Y					Y	Y	Y	Y
		Rationale for sub-component choice	Track flows	Track high flows					Monitor instream habitat diversity	Monitor riparian habitat diversity and condition	Monitor key fish species	Monitor key aquatic & riparian species, reduce important alien species
		EcoSpec	Y	Y	Y	Y	Y		Y	Y	Y	Y
		UserSpec	Y		Y	Y	Y	Y			Y	
		Integrated Measure	Y									
		Indicators Selected for RQO determination	Discharge	Discharge	Indicator of eutrophication potential	Indicator of dissolved salts	Indicators of dissolved pxygen and suspended sediments	Indicator of waterborne diseases	GAI, IHI, VEGRAI	VEGRAI, IHI, GAI	FRAI, Key species	VEGRAI, Key species
		Rationale for indicator selection	Monitor low flows	Monitor high flows	PO4-P, TIN	EC/TDS	DO, TSS/turbidity, pH	E coli, Faecal coliforms	Monitor instream habitat diversity and condition	Monitor riparian habitat diversity, condition and processes maintaining it	FRAI, species diversity and abundance. Presence of alien species, key species	Monitor key riparian species & requirements for persistence and trajectory of important alien plants species

OLIFANTSPRUIT RRU-Ri1

Selection of sub-components for RQO determination			Quantity		Quality					Habitat		Biota	
			Low Flows (Maintenance Flows)	High Flows (Floods)	Nutrients	Salts	System variables	Toxics	Pathogens	Instream habitat	Riparian Habitat	Fish	Aquatic & riparian plant species
Selection guidance	EcoSpec Selection	Importance Rating	VH	VH	M	L	L	H	M	VH	VH	VH	VH
		Impact Class	VH (-)	VH (-)	VH (-)	VH (-)	VH (-)	L (-)	VH (-)	VH (-)	VH (-)	VH (-)	VH (-)
		Ecosystem prioritization rating	**Very High**	**Very High**	**High**	**Moderate**	**Moderate**	**Low**	**High**	**Very High**	**Very High**	**Very High**	**Very High**
	UserSpec Selection	Importance Rating	VH	M	L	L	M	VL	M	VH	VH	L	VH
		Impact Class	VH (-)	VH (-)	VH (-)	VH (-)	VH (-)	L (-)	VH (-)	VH (-)	VH (-)	VH (-)	VH (-)
		User prioritization rating	**Very High**	**High**	**Moderate**	**Moderate**	**High**	**Very Low**	**High**	**Very High**	**Very High**	**Moderate**	**Very High**
Documenting selection process & rationale		Select for RQO Determination	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
		Rationale for sub-component choice	Monitor low flow levels and variability	Monitor high flow magnitude and frequency	Eutrophication potential	Ecosystem protection and irrigation maintenance	Maintenance of physical properties	Prevent contamiation with toxins	Protection of human health	Monitor biophysical diversity and condition	Monitor riparian habitat diversity and condition	Monitor key fish species	Monitor key aquatic & riparian species and AIP
		EcoSpec	Y	Y	Y	Y	Y	Y		y	Y	Y	Y
		UserSpec	Y		Y	Y	Y	Y	Y				
		Integrated Measure											
		Indicators Selected for RQO determination	Discharge	Discharge	PO4-P & TIN	EC/TDS	DO, pH, Water temp, TTSS/Turbidity	NTMP approach & variables	E coli & Faecal coliforms	IHI, VEGRAI, GAI	VEGRAI, IHI, GAI, WetHealth for wetlands	FRAI, Key species	VEGRAI, Key species
		Rationale for indicator selection	Monitor low flow levels and variability	Monitor high flow magnitude and frequency	Indicators of eutrophication potential	Indicators of dissolved salts	Indicators of physical water quality properties	Potential toxicity in the water	Indicators of pathogen from human sources	Monitor biophysical diversity and condition	Monitor riparian / wetland habitat diversity, condition and processes maintaining it	FRAI, species diversity and abundance. Presence of alien species, key species	Monitor key riparian / wetland species & requirements for persistence

MOGALAKWENA RRU-Ri5

Selection of sub-components for RQO determination			Quantity		Quality					Habitat		Biota	
			Low Flows (Maintenance Flows)	High Flows (Floods)	Nutrients	Salts	System variables	Toxics	Pathogens	Instream habitat	Riparian Habitat	Fish	Aquatic & riparian plant species
Selection guidance	EcoSpec Selection	Importance Rating	VH	H	M	L	M	H	M	VH	H	VL	H
		Impact Class	VH (-)	VH (-)	VH (-)	VH (-)	VH (-)	VH (-)	VH (-)	VH (-)	VH (-)	VH (-)	VH (-)
		Ecosystem prioritization rating	**Very High**	**Very High**	**Moderate**	**Moderate**	**Moderate**	**Very High**	**High**	**Very High**	**High**	**Low**	**High**
	UserSpec Selection	Importance Rating	VH	M	M	M	M	VH	VH	L	M	M	L
		Impact Class	VH (-)	VH (-)	VH (-)	VH (-)	VH (-)	VH (-)	VH (-)	VH (-)	VH (-)	VH (-)	VH (-)
		User prioritization rating	**Very High**	**High**	**High**	**High**	**High**	**Very High**	**Very High**	**Moderate**	**High**	**High**	**Moderate**
Documenting selection process & rationale		Select for RQO Determination	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
		Rationale for sub-component choice	Monitor low flow levels and variability	Monitor high flow magnitude and frequency	Eutrophication potential	Ecosystem protection	Ecosystem protection	Ecosystem and human health protection	Human health protection	Important habitat for conservation and users	Monitor riparian habitat diversity and condition	Monitor key fish species	Monitor key aquatic & riparian species and AIP
		EcoSpec	y	y	Y	Y	Y	Y		y	y	Y	Y
		UserSpec	y		Y	Y	Y	Y	Y				
		Integrated Measure											
		Indicators Selected for RQO determination	Discharge	Discharge	PO4-P & TIN	EC/TDS	DO, pH, Water temp, TTSS/Turbidity	NTMP approach & variables	E coli & Faecal coliforms	IHI, VEGRAI, GAI	IHI, VEGRAI, GAI	FRAI, Key species	VEGRAI, Key species
		Rationale for indicator selection	Monitor low flow levels and variability	Monitor high flow magnitude and frequency	Indicators of eutrophication potetial	Indicatorsrs of dissolved salts	Indicators of physical water quality properties	Potential toxicity in the water	Indicators of pathogen from huamn sources	Monitor habitat diversity and condition	Monitor habitat diversity and condition	FRAI, species diversity and abundance. Presence of alien species, key species	Monitor key riparian species & requirements for persistence

MOGALAKWENA RI14

Selection of sub-components for RQO determination			Quantity		Quality					Habitat		Biota		
			Low Flows (Maintenance Flows)	High Flows (Floods)	Nutrients	Salts	System variables	Toxics	Pathogens	Instream habitat	Riparian Habitat	Fish	Aquatic & riparian plant species	Aquatic invertebrates
Selection guidance	EcoSpec Selection	Importance Rating	H	M	M	M	M	L	VL	H	M	VH	M	M
		Impact Class	H (-)	H (-)	H (-)	M (-)	VH (-)	L (-)	M (+)	VH (-)	H (-)	M (-)	VH (-)	M (-)
		Ecosystem prioritization rating	**High**	**Moderate**	**Moderate**	**Low**	**High**	**Very Low**	**Very Low**	**Very High**	**Moderate**	**High**	**High**	**Low**
	UserSpec Selection	Importance Rating	VH	L	L	M	L	VL	M	L	VH	VH	VH	VL
		Impact Class	H (-)	H (-)	H (-)	M (-)	VH (-)	L (-)	M (+)	VH (-)	H (-)	M (-)	VH (-)	M (-)
		User prioritization rating	**Very High**	**Low**	**Low**	**Low**	**Moderate**	**Very Low**	**Very Low**	**Moderate**	**High**	**Moderate**	**Very High**	**Very Low**
		Select for RQO Determination	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**
Documenting selection process & rationale		Rationale for sub-component choice							Protection of recreational users and rural users	ecosystem prioritisation rating is very high	Monitor riparian habitat diversity and condition	Monitor key fish species	Monitor key aquatic & riparian species	
		EcoSpec	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**		**Y**	**Y**	**Y**	**Y**	**Y**
		UserSpec	**Y**		**Y**	**Y**			**Y**		**Y**			
		Integrated Measure									**Y**			
		Indicators Selected for RQO determination	Discharge	Discharge	PO4,	EC	DO, pH, TSS	Descriptive	Numerical & descriptive RQO	PES score & category (GAI & IHI)	PES score and category (VEG, Geomorph, IHI)	FRAI, Key species	VEGRAI, key species	PES score and category and key taxa
		Rationale for indicator selection	For EWR, irrigators	to monitor flood habitat maintenance flows						Monitor habitat diversity, condtion and impacts	If meeting the ecospecs you will meet the userspecs for the rural communities. Same indicators for users and ecospecs	FRAI, species diversity and abundance. Presence of alien species, key species	PES score and category and key species, monitor AIP	PES score and category and key taxa

MOGALAKWENA RRU-Rii3

Selection of sub-components for RQO determination			Quantity		Habitat		Biota	
			Low Flows (Maintenance Flows)	High Flows (Floods)	Instream habitat	Riparian Habitat	Fish	Aquatic & riparian plant species
Selection guidance	EcoSpec Selection	Importance Rating	VH	H	H	H	M	H
		Impact Class	VH (-)	L (-)	VH (-)	VH (-)	VH (-)	VH (-)
		Ecosystem prioritization rating	**Very High**	**Low**	**Very High**	**Very High**	**High**	**Very High**
	UserSpec Selection	Importance Rating	VH	M	L	L	L	VL
		Impact Class	VH (-)	L (-)	VH (-)	VH (-)	VH (-)	VH (-)
		User prioritization rating	**Very High**	**Very Low**	**Moderate**	**Moderate**	**Moderate**	**Low**
Documenting selection process & rationale		Select for RQO Determination	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**
		Rationale for sub-component choice	Monitor low flow levels and variability	Monitor high flow magnitude and frequency	Monitor habitat diversity and condition	Monitor riparian habitat diversity and condition	Monitor key fish species	Monitor key aquatic & riparian species, presence of aliens
		EcoSpec	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**
		UserSpec	**Y**					
		Integrated Measure	**Y**					
		Indicators Selected for RQO determination	Discharge	Discharge	GAI, IHI, VEGRAI	GAI, IHI, VEGRAI	FRAI, Key species	VEGRAI, key species
		Rationale for indicator selection	Monitor low flow levels and variability	Monitor high flow magnitude and frequency	Monitor habitat diversity and condition	If meeting the ecospecs you will meet the userspecs for the rural communities. Same indicators for users and ecospecs	FRAI, species diversity and abundance. Presence of alien species, key species	PES score and category and key species, monitor AIP

KALKPAN SE LOOP RRU-Rvi1

Selection of sub-components for RQO determination			Quantity		Quality					Habitat		Biota	
			Low Flows (Maintenance Flows)	High Flows (Floods)	Nutrients	Salts	System variables	Toxics	Pathogens	Instream habitat	Riparian Habitat	Fish	Aquatic & riparian plant species
Selection guidance	EcoSpec Selection	Importance Rating	VL	VL	L	L	L	VL	VL	VL	M	L	M
		Impact Class	N/A	N/A	L (-)	N/A	L (-)	N/A	N/A	N/A	N/A	N/A	L (-)
		Ecosystem prioritization rating	**Very Low**	**Very Low**	**Very Low**	**Very Low**	**Very Low**	**Very Low**	**Very Low**	**Very Low**	**Very Low**	**Very Low**	**Very Low**
	UserSpec Selection	Importance Rating	VH	L	VL	M	L	VL	VL	M	M	M	M
		Impact Class	N/A	N/A	L (-)	N/A	L (-)	N/A	N/A	N/A	N/A	N/A	L (-)
		User prioritization rating	**Very Low**	**Very Low**	**Very Low**	**Very Low**	**Very Low**	**Very Low**	**Very Low**	**Very Low**	**Very Low**	**Very Low**	**Very Low**
Documenting selection process & rationale		Select for RQO Determination											
		Rationale for sub-component choice			Eutrophication potential	Osmoregulation, crop yield reduction, domestic water tastes	Aquatic ecosystem requirements					Monitor key fish species	
		EcoSpec			Y	Y	Y					Y	
		UserSpec			Y	Y						Y	
		Integrated Measure											
		Indicators Selected for RQO determination			PO4-P, TIN	EC/TDS	pH, DO, TSS					FRAI, Key species	
		Rationale for indicator selection			Eutrophication potential	Osmoregulation, crop yield reduction, domestic water tastes	Aquatic ecosystem requirements					Monitor fish species abundance and age class diversity	

KOLOPE RRU-Riv32

Selection of sub-components for RQO determination			Quantity		Quality					Habitat		Biota	
			Low Flows (Maintenance Flows)	High Flows (Floods)	Nutrients	Salts	System variables	Toxics	Pathogens	Instream habitat	Riparian Habitat	Fish	Aquatic & riparian plant species
Selection guidance	EcoSpec Selection	Importance Rating	VH	M	L	L	L	L	L	VH	VH	H	H
		Impact Class	M (+)	M (+)	L (-)	N/A	L (-)	N/A	L (-)	M (+)	N/A	H (+)	M (+)
		Ecosystem prioritization rating	**Low**	**Very Low**	**Very Low**	**Very Low**	**Very Low**	**Very Low**	**Very Low**	**Low**	**Low**	**Very Low**	**Very Low**
	UserSpec Selection	Importance Rating	VH	L	L	VL	L	VL	VL	VH	VH	L	VH
		Impact Class	M (+)	M (+)	L (-)	N/A	L (-)	N/A	L (-)	M (+)	N/A	H (+)	M (+)
		User prioritization rating	**Very Low**	**Very Low**	**Very Low**	**Very Low**	**Very Low**	**Very Low**	**Very Low**	**Very Low**	**Very Low**	**Very Low**	**Very Low**
Documenting selection process & rationale		Select for RQO Determination			**Y**	**Y**	**Y**			**Y**	**Y**	**Y**	**Y**
		Rationale for sub-component choice			Eutrophication potential	Ecosystem protection	Ecosystem protection			Important from a conservation and use perspective	Monitor riparian habitat diversity and condition	Monitor key fish species	Monitor key aquatic & riparian species
		EcoSpec			**Y**	**Y**	**Y**			**Y**	**Y**	**Y**	**Y**
		UserSpec			**Y**	**Y**	**Y**					**Y**	
		Integrated Measure											
		Indicators Selected for RQO determination			PO4-P & TIN	EC/TDS	DO, pH, Water temp, TTSS/Turbidity			IHI, GAI	VEGRAI, IHI, GAI	FRAI, Key species	VEGRAI, Key species
		Rationale for indicator selection			Indicators of eutrophication potetial	Indicators of dissolved salts	Indicators of physical water quality properties			Monitor habitat diversity, condition and impacts to habitat	Monitor riparian habitat diversity, condition and processes maintaining it	FRAI, species diversity and abundance. Presence of alien species, key species	Monitor key riparian species & requirements for persistence

SAND RRU-Ri20

Selection of sub-components for RQO determination			Quantity		Quality				Habitat		Biota	
			Low Flows (Maintenance Flows)	High Flows (Floods)	Nutrients	Salts	System variables	Pathogens	Instream habitat	Riparian Habitat	Fish	Aquatic & riparian plant species
Selection guidance	EcoSpec Selection	Importance Rating	L	L	L	L	L	VL	L	M	L	M
		Impact Class	VH (-)	L (-)	VH (-)	VH (-)	VH (-)	H (-)	M (-)	M (-)	M (-)	H (-)
		Ecosystem prioritization rating	**Moderate**	**Very Low**	**Moderate**	**Moderate**	**Moderate**	**Very Low**	**Very Low**	**Low**	**Very Low**	**Moderate**
	UserSpec Selection	Importance Rating	VH	VL	L	M	M	M	M	L	VL	L
		Impact Class	VH (-)	L (-)	VH (-)	VH (-)	VH (-)	H (-)	M (-)	M (-)	M (-)	H (-)
		User prioritization rating	**Very High**	**Very Low**	**Moderate**	**High**	**High**	**Moderate**	**Low**	**Very Low**	**Very Low**	**Low**
Documenting selection process & rationale		Select for RQO Determination	Y	y	Y	Y	Y	Y	Y	Y	Y	Y
		Rationale for sub-component choice	Monitor low flow levels and variability	Monitor high flow magnitude and frequency	Eutrophication impacts	Ecosystem & irrigation agriculture impacts	Ecosystem & irrigation agriculture impacts	Protection of human health	Monitor habitat diversity, condition and disturbance	Monitor habitat diversity, condition and disturbance	Monitor key fish species	Monitor key aquatic & riparian species and AIP
		EcoSpec	Y		Y	Y	Y		Y	Y	Y	Y
		UserSpec	Y		Y	Y	Y	Y				
		Integrated Measure										
		Indicators Selected for RQO determination	Discharge	Discharge	PO4-P. TIN	EC/TDS	Water temp, pH, TSS/Turbidity	E coli, Faecal coliforms	PES Score and category using IHI	PES Score and category using IHI	FRAI, Key species	PES Score and category using IHI, Key species
		Rationale for indicator selection	Monitor low flow levels and variability	Monitor high flow magnitude and frequency	Nutrients are indicators of eutrophication potetial	EC & TDS are indicators of dissolved soolids	pH affect metal solubility, water temp affect dissolved oxygen conns, TSS affect water clarity and sediment transport.	E coli & F coliforms are indicators of pathogens from human sources	Monitor habitat diversity, condition and disturbance	Monitor habitat diversity, condition and disturbance	FRAI, species diversity and abundance. Presence of alien species, key species	Monitor key riparian species & requirements for persistence

SAND RRU-Ri25

Selection of sub-components for RQO determination			Quantity		Quality					Habitat		Biota		
			Low Flows (Maintenance Flows)	High Flows (Floods)	Nutrients	Salts	System variables	Toxics	Pathogens	Instream habitat	Riparian Habitat	Fish	Aquatic & riparian plant species	Aquatic Invertebrates
Selection guidance	EcoSpec Selection	Importance Rating	VH	VH	L	L	L	VL	M	H	H	M	H	M
		Impact Class	VH (-)	VH (-)	VH (-)	H (-)	VH (-)	M (-)	VH (-)	VH (-)	VH (-)	VH (-)	VH (-)	VH (-)
		Ecosystem prioritization rating	**Very High**	**Very High**	**Moderate**	**Low**	**Moderate**	**Very Low**	**Moderate**	**Very High**	**High**	**High**	**High**	**High**
	UserSpec Selection	Importance Rating	VH	VH	M	M	L	M	VH	M	VH	L	VH	L
		Impact Class	VH (-)	VH (-)	VH (-)	H (-)	VH (-)	M (-)	VH (-)	VH (-)	VH (-)	VH (-)	VH (-)	VH (-)
		User prioritization rating	**Very High**	**Very High**	**High**	**Moderate**	**Moderate**	**Low**	**Very High**	**High**	**Very High**	**Moderate**	**Very High**	**Moderate**
Documenting selection process & rationale		Select for RQO Determination	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**
		Rationale for sub-component choice			Eutrophication mitigation & future International agreement	Protection of aquatic ecosystems and irrigation fitness for use & future International agreement	Protection of physical properties & future International agreement	Prevention of contamination with toxins co& future International agreement	To understand bacterial WQ changes due to future use	Monitor instream habitat diversity and condtion	Monitor riparian habitat diversity and condition	Monitor key fish species	Monitor key aquatic & riparian species and AIP	Based on current seasonality of system and potential flow changes we need to know the potential responses of the macroinvertebrates
		EcoSpec	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**		**Y**	**Y**	**Y**	**Y**	**Y**
		UserSpec	**Y**	**Y**			**Y**	**Y**	**Y**					
		Integrated Measure												
		Indicators Selected for RQO determination	Discharge	Discharge	PO4-P & TIN	EC/TDS	DO, pH, Water temp, TTSS/Turbidity	NTMP approach & variables	E coli & Faecal coliforms	GAI, IHI, VEGRAI	VEGRAI, IHI, GAI	FRAI, Key species	VEGRAI, Key species	
		Rationale for indicator selection			Indicators of eutrophication potetial	Indicators of dissolved salts	Indicators of physical water quality properties	Potential toxicity in the water	Indicators of pathogen from huamn sources	Monitor drivers and physical habitat for the reach and site	Monitor riparian habitat diversity, condition and processes maintaining it	FRAI, species diversity and abundance. Presence of alien species, key species	Monitor key riparian species & requirements for persistence	MIRAI, SASS, key taxa

NZHELELE Ri27

Selection of sub-components for RQO determination			Quantity		Quality					Habitat		Biota	
			Low Flows (Maintenance Flows)	High Flows (Floods)	Nutrients	Salts	System variables	Toxics	Pathogens	Instream habitat	Riparian Habitat	Fish	Aquatic & riparian plant species
Selection guidance	EcoSpec Selection	Importance Rating	VH	H	L	M	L	H	M	VH	VH	VH	VH
		Impact Class	VH (-)	VH (-)	M (-)	VH (-)	VH (-)	N/A	N/A	VH (-)	VH (-)	VH (-)	VH (-)
		Ecosystem prioritization rating	**Very High**	**Very High**	**Very Low**	**High**	**Moderate**	**Very Low**	**Very Low**	**Very High**	**Very High**	**Very High**	**Very High**
	UserSpec Selection	Importance Rating	VH	L	L	M	L	VH	VH	VH	VH	M	VH
		Impact Class	VH (-)	VH (-)	M (-)	VH (-)	VH (-)	N/A	N/A	VH (-)	VH (-)	VH (-)	VH (-)
		User prioritization rating	**Very High**	**Moderate**	**Very Low**	**High**	**Moderate**	**Very Low**	**Very Low**	**Very High**	**Very High**	**High**	**Very High**
Documenting selection process & rationale		Select for RQO Determination	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**y**	**Y**	**Y**	**Y**
		Rationale for sub-component choice	Monitor low flow levels and flow variability	Monitor high flow magnitude and frequency	Indicator of eutrophication potential	Aquatic ecosystem protection, irrigation agriculture	Aquatic ecosystem protection	Aquatic ecosystem protection against toxins	Human health protection (recreaton and possible subsistence domestic water provision)	Monitor biophysical habitat diversity and condition	Monitor riparian habitat diversity and condition	Monitor key fish species	Monitor key aquatic & riparian species and AIP
		EcoSpec	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**		**y**	**Y**	**Y**	**Y**
		UserSpec	**Y**		**Y**	**Y**	**Y**	**Y**	**Y**			**Y**	
		Integrated Measure											
		Indicators Selected for RQO determination	Discharge	Discharge	PO4-P, TIN (PAI)	EC/TDS (PAI)	pH, DO, TSS (PAI)	NTMP survey indicators	E coli, Faecal coliforms	IHI, GAI, VEGRAI	VEGRAI, IHI, GAI	FRAI, Key species	VEGRAI, Key species
		Rationale for indicator selection	Monitor low flow levels and flow variability	Monitor high flow magnitude and frequency	Eutrophication potential	Osmoregulation, crop yield reduction	Aquatic ecosystem requirements	NTMP survey	Pathogens important for human health protection	Monitor biophysical habitat diversity and condition	Monitor riparian habitat diversity, condition and processes maintaining it	Monitor fish species diversity and abundance	Monitor key riparian species & requirements for persistence

NWANEDI RRU-Ri28

Selection of sub-components for RQO determination			Quantity		Quality					Habitat		Biota	
			Low Flows (Maintenance Flows)	High Flows (Floods)	Nutrients	Salts	System variables	Toxics	Pathogens	Instream habitat	Riparian Habitat	Fish	Aquatic & riparian plant species
Selection guidance	EcoSpec Selection	Importance Rating	VH	H	L	L	L	H	H	VH	H	H	M
		Impact Class	VH (-)	VH (-)	M (+)	H (-)	L (-)	L (-)	N/A	VH (-)	VH (-)	VH (-)	VH (-)
		Ecosystem prioritization rating	**Very High**	**Very High**	**Very Low**	**Low**	**Very Low**	**Low**	**Very Low**	**Very High**	**Very High**	**Very High**	**High**
	UserSpec Selection	Importance Rating	VH	L	L	M	L	VH	VH	L	M	M	M
		Impact Class	VH (-)	VH (-)	M (+)	H (-)	L (-)	L (-)	N/A	VH (-)	VH (-)	VH (-)	VH (-)
		User prioritization rating	**Very High**	**Moderate**	**Very Low**	**Moderate**	**Very Low**	**Low**	**Very Low**	**Moderate**	**High**	**High**	**High**
Documenting selection process & rationale		Select for RQO Determination	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
		Rationale for sub-component choice	Monitor low flow levels and flow variability	Monitor high flow magnitude and frequency	indicator of eutrophication potential	Aquatic ecosystem protection, irrigation agriculture	Aquatic ecosystem protection	Aquatic ecosystem protection against toxins	Aquatic ecosystem protection against toxins	Monitor biophysical habitat diversity and condition	Monitor riparian habitat diversity and condition	Monitor key species, diversity and abundance	Monitor key aquatic & riparian species and AIP
		EcoSpec	y	y	Y	Y	Y	Y		y	Y	Y	Y
		UserSpec	y		Y	Y	Y	Y	Y			Y	
		Integrated Measure											
		Indicators Selected for RQO determination	Discharge	Discharge	PO4-P, TIN (PAI)	EC/TDS (PAI)	pH, DO, TSS (PAI)	NTMP survey indicators	E coli, Faecal coliforms	IHI, GAI and VEGRAI	VEGRAI, IHI, GAI	FRAI, Key species	VEGRAI, Key species
		Rationale for indicator selection	Monitor low flow levels and flow variability	Monitor high flow magnitude and frequency	Eutrophication potential	Osmoregulation, crop yield reduction	Aquatic ecosystem requirements	NTMP survey	Pathogens important for human health protection	Monitor biophysical habitat diversity and condition	Monitor riparian habitat diversity, condition and processes maintaining it	Monitor fish species diversity and abundance	Monitor key riparian species & requirements for persistence

MUTSHINDUDI RRU-Ri30

Selection of sub-components for RQO determination			Quantity		Quality					Habitat		Biota	
			Low Flows (Maintenance Flows)	High Flows (Floods)	Nutrients	Salts	System variables	Toxics	Pathogens	Instream habitat	Riparian Habitat	Fish	Aquatic & riparian plant species
Selection guidance	EcoSpec Selection	Importance Rating	M	L	L	L	L	M	VL	M	L	M	L
		Impact Class	VH (-)	VH (-)	VH (-)	VH (-)	VH (-)	M (-)	VH (-)	VH (-)	VH (-)	VH (-)	VH (-)
		Ecosystem prioritization rating	**High**	**Moderate**	**Moderate**	**Moderate**	**Moderate**	**Low**	**Low**	**High**	**Moderate**	**High**	**Moderate**
	UserSpec Selection	Importance Rating	VH	L	M	M	L	VH	VH	M	M	L	L
		Impact Class	VH (-)	VH (-)	VH (-)	VH (-)	VH (-)	M (-)	VH (-)	VH (-)	VH (-)	VH (-)	VH (-)
		User prioritization rating	**Very High**	**Moderate**	**High**	**High**	**Moderate**	**Moderate**	**Very High**	**High**	**High**	**Moderate**	**Moderate**
Documenting selection process & rationale		Select for RQO Determination	Y	Y						Y	Y	Y	Y
		Rationale for sub-component choice	Monitor low flow levels and flow variability	Monitor high flow magnitude, frequency and timing	Indicator of eutrophication potential	Aquatic ecosystem protection, subsistance agriculture & domestic water supply	Aquatic ecosystem protection	Indicator of agrochemical use (pesticides & herbicides)	Human health protection	Monitor biophysical habitat diversity and condition	Monitor riparian habitat diversity and condition	Monitor key fish species	Monitor key aquatic & riparian species and AIP
		EcoSpec	Y		Y	Y	Y	Y		y	Y	Y	Y
		UserSpec	Y		Y	Y	Y	Y	Y			Y	
		Integrated Measure											
		Indicators Selected for RQO determination	Discharge	Discharge	PO4-P, TIN	EC/TDS	pH, DO, TSS, Water temperature	Indicators monitored by the NTMP	E coli, Faecal coliforms	GAI, IHI, VEGRAI	VEGRAI, IHI, GAI	FRAI, Key species	VEGRAI, Key species
		Rationale for indicator selection	Monitor low flow levels and flow variability	Monitor high flow magnitude, frequency and timing	Eutrophication potential	Osmoregulation, crop yield reduction, domestic water tastes	Aquatic ecosystem requirements, bulk water supply	Protection of aquatic ecosystems	Pathogens important for human health protection	Monitor biophysical habitat diversity and condition	Monitor riparian habitat diversity, condition and processes maintaining it	Monitor fish species diversity and abundance	Monitor key riparian species & requirements for persistence

LATONYANDA RRU-Riii6

Selection of sub-components for RQO determination			Quantity		Quality					Habitat		Biota	
			Low Flows (Maintenance Flows)	High Flows (Floods)	Nutrients	Salts	System variables	Toxics	Pathogens	Instream habitat	Riparian Habitat	Fish	Aquatic & riparian plant species
Selection guidance	EcoSpec Selection	Importance Rating	VH	H	L	L	M	M	L	H	M	H	M
		Impact Class	VH (-)	VH (-)	M (-)	L (-)	VH (-)	H (-)	H (-)	VH (-)	VH (-)	VH (-)	VH (-)
		Ecosystem prioritization rating	**Very High**	**Very High**	**Very Low**	**Very Low**	**High**	**Moderate**	**Low**	**Very High**	**High**	**Very High**	**High**
	UserSpec Selection	Importance Rating	VH	L	L	M	L	VH	VH	L	VH	M	M
		Impact Class	VH (-)	VH (-)	M (-)	L (-)	VH (-)	H (-)	H (-)	VH (-)	VH (-)	VH (-)	VH (-)
		User prioritization rating	**Very High**	**Moderate**	**Very Low**	**Very Low**	**Moderate**	**High**	**High**	**Moderate**	**Very High**	**High**	**High**
Documenting selection process & rationale		Select for RQO Determination	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
		Rationale for sub-component choice	Monitor low flow level and variability	Monitor high flow magnitude and frequency	Eutrophication potential	Aquatic ecosystem protection, subsistance agriculture & domestic water supply	Aquatic ecosystem protection	Aquatic ecosystem and rural users protection	Human health protection	Monitor habitat diversity and condition	Monitor riparian habitat diversity and condition	Monitor key fish species	Monitor key aquatic & riparian species
		EcoSpec	Y	Y	Y	Y	Y	Y		y	Y	Y	Y
		UserSpec	Y		Y	Y	Y	Y	Y			Y	
		Integrated Measure	Y										
		Indicators Selected for RQO determination	Discharge	Discharge	PO4-P, TIN	EC/TDS	pH, DO, TSS	NTMP survey indicators	E coli, Faecal coliforms	IHI, VEGRAI and GAI	IHI, VEGRAI and GAI	FRAI, Key species	VEGRAI, Key species
		Rationale for indicator selection	Monitor low flow level and variability	Monitor high flow magnitude and frequency	Eutrophication potential	Osmoregulation, crop yield reduction, domestic water tastes	Aquatic ecosystem requirements	Aquatic ecosystem protection	Pathogens important for human health protection	Monitor habitat diversity and condition	Monitor riparian habitat diversity, condition and processes maintaining it	Monitor fish species diversity and abundance	Monitor key riparian species & requirements for persistence and trajectory of important alien species

MUTALE RRU-Ri33

Selection of sub-components for RQO determination			Quantity		Quality					Habitat		Biota	
			Low Flows (Maintenance Flows)	High Flows (Floods)	Nutrients	Salts	System variables	Toxics	Pathogens	Instream habitat	Riparian Habitat	Fish	Aquatic & riparian plant species
Selection guidance	EcoSpec Selection	Importance Rating	H	H	L	L	L	H	M	H	H	H	H
		Impact Class	VH (-)	H (-)	M (-)	H (-)	VH (-)	N/A	H (-)	VH (-)	VH (-)	VH (-)	VH (-)
		Ecosystem prioritization rating	**Very High**	**High**	**Very Low**	**Low**	**Moderate**	**Very Low**	**Moderate**	**Very High**	**Very High**	**Very High**	**Very High**
	UserSpec Selection	Importance Rating	VL	VL	L	M	L	VH	VH	L	M	M	L
		Impact Class	VH (-)	H (-)	M (-)	H (-)	VH (-)	N/A	H (-)	VH (-)	VH (-)	VH (-)	VH (-)
		User prioritization rating	**Low**	**Very Low**	**Very Low**	**Moderate**	**Moderate**	**Very Low**	**High**	**Moderate**	**High**	**High**	**Moderate**
Documenting selection process & rationale		Select for RQO Determination	Y	Y	Y	Y	Y		Y	Y	Y	Y	Y
		Rationale for sub-component choice	Monitor baseflows and variability	Monitor flow magnitude and frequency	Indicator of eutrophication potential	Aquatic ecosystem protection, subsistance agriculture & domestic water supply	Aquatic ecosystem protection		Human health protection	Monitor instream habitat diversity and condition	Monitor riparian habitat diversity and condition	Monitor key fish species	Monitor key aquatic & riparian species
		EcoSpec	Y	Y	Y	Y	Y	Y		Y	Y	Y	Y
		UserSpec	Y		Y	Y	Y		Y			Y	
		Integrated Measure										Y	
		Indicators Selected for RQO determination	Discharge	Discharge	PO4-P, TIN	EC/TDS	pH, DO, TSS	NTMP survey indicators	E coli, Faecal coliforms	GAI, IHI, VEGRAI	VEGRAI, IHI, GAI	FRAI, key species	VEGRAI, Key species
		Rationale for indicator selection	Monitor baseflows and variability	Monitor flow magnitude and frequency	Eutrophication potential	Osmoregulation, crop yield reduction, domestic water tastes	Aquatic ecosystem requirements	NTMP survey	Pathogens important for human health protection	Monitor instream habitat diversity, condition and processes maintaining it	Monitor riparian habitat diversity, condition and processes maintaining it	Monitor fish species diversity and abundance	Monitor key riparian species & requirements for persistence

MUTALE RRU-Ri34

Selection of sub-components for RQO determination			Quantity		Quality					Habitat		Biota		
			Low Flows (Maintenance Flows)	High Flows (Floods)	Nutrients	Salts	System variables	Toxics	Pathogens	Instream habitat	Riparian Habitat	Fish	Aquatic & riparian plant species	Aquatic Invertebrates
Selection guidance	EcoSpec Selection	Importance Rating	VH	H	M	L	M	H	L	VH	H	H	H	H
		Impact Class	VH (-)	VH (-)	VH (-)	H (-)	VH (-)	L (-)	VH (-)	VH (-)	VH (-)	VH (-)	VH (-)	VH (-)
		Ecosystem prioritization rating	**Very High**	**Very High**	**High**	**Low**	**High**	**Low**	**Moderate**	**Very High**	**Very High**	**Very High**	**Very High**	**Very High**
	UserSpec Selection	Importance Rating	VH	L	L	L	M	VH	VH	M	M	M	M	M
		Impact Class	VH (-)	VH (-)	VH (-)	H (-)	VH (-)	L (-)	VH (-)	VH (-)	VH (-)	VH (-)	VH (-)	VH (-)
		User prioritization rating	**Very High**	**Moderate**	**Moderate**	**Low**	**High**	**Low**	**Very High**	**High**	**High**	**High**	**High**	**High**
Documenting selection process & rationale		Select for RQO Determination	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
		Rationale for sub-component choice	Monitor low flow level and variability	Monitor high flow magnitude and frequency	Nutrients and eutrophication potential	Domestic water supply & osmoregulation of aquatic organisms	Ecosystem health and domestic water supply	Aquatic ecosystem health	Domestic water supply & recreation	Monitor habitat diversity and condition	Monitor riparian habitat diversity and condition	Monitor key fish species	Monitor key aquatic & riparian species	Monitor Key taxa and to ensure EC is maintained
		EcoSpec	Y	Y	Y	Y	Y	Y		Y	Y	Y	Y	Y
		UserSpec	Y		Y	Y	Y	Y	Y	y				
		Integrated Measure												
		Indicators Selected for RQO determination	Discharge	Discharge	PO4-P & TIN	EC / TDS	DO, pH, TSS, Water temperature	Agrochemicals	E coli & F coliforms	IHI, VEGRAI, GAI	VEGRAI, IHI, GAI	FRAI, Key species	VEGRAI, Key species	MIRAI, SASS Total Score and ASPT, Key taxa
		Rationale for indicator selection	Monitor low flow level and variability	Monitor high flow magnitude and frequency	Eutrophication potential	Measure of dissolved salts	Measures of dissolved oxygen, suspended solids, pH & water temperature	Potential toxic substances	Pathogens important to protrct human health	Monitor habitat diversity and condition	Monitor riparian habitat diversity, condition and processes maintaining it	FRAI, species diversity and abundance. Presence of alien species, key species	Monitor key riparian species & requirements for persistence	MIRAI, SASS Total Score and ASPT, Key taxa

LUVUVHU RRU-Ri32

Selection of sub-components for RQO determination			Quantity		Quality					Habitat		Biota	
			Low Flows (Maintenance Flows)	High Flows (Floods)	Nutrients	Salts	System variables	Toxics	Pathogens	Instream habitat	Riparian Habitat	Fish	Aquatic & riparian plant species
Selection guidance	EcoSpec Selection	Importance Rating	VH	H	L	L	M	H	M	VH	VH	H	H
		Impact Class	VH (-)	VH (-)	VH (-)	M (-)	VH (-)	M (+)	VH (-)	VH (-)	VH (-)	N/A	VH (-)
		Ecosystem prioritization rating	**Very High**	**Very High**	**Moderate**	**Very Low**	**High**	**Very Low**	**High**	**Very High**	**Very High**	**Very Low**	**Very High**
	UserSpec Selection	Importance Rating	VH	VH	L	L	M	VH	VH	M	VH	M	M
		Impact Class	VH (-)	VH (-)	VH (-)	M (-)	VH (-)	M (+)	VH (-)	VH (-)	VH (-)	N/A	VH (-)
		User prioritization rating	**Very High**	**Very High**	**Moderate**	**Very Low**	**High**	**Very Low**	**Very High**	**High**	**Very High**	**Very Low**	**High**
Documenting selection process & rationale		Select for RQO Determination	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
		Rationale for sub-component choice	Monitoring low flow levels and variability	Monitor high flow magnitude and frequency	Eutrophication potetial	Ecosystem health, subsistence irrigation, water provision	Ecosystem health, domestic water supply	Ecosystem health, domestic water supply	Protection of recreation & domestic water supply	Monitor instream habitat diversity and condition	Monitor riparian habitat diversity and condition	Monitor key fish species	Monitor key aquatic & riparian species
		EcoSpec	Y	Y	Y	Y	Y	Y		Y	Y	Y	Y
		UserSpec	Y		Y	Y	Y	Y	Y	Y			
		Integrated Measure	Y							Y			
		Indicators Selected for RQO determination	Discharge	Discharge	PO4-P, TIN	EC/TDS	DO, TSS, pH	NTMP constituents	E coli, F coliforms	GAI, IHI, VEGRAI	VEGRAI, IHI, GAI	FRAI, Key species	VEGRAI, Key species
		Rationale for indicator selection	Monitoring low flow levels and variability	Monitor high flow magnitude and frequency	Measure of eutrophication potential	Measure of dissolved salts	Measures of dissolved oxygen, suspended solids, alkalinity/acidicty	Measure of toxic substances	Indicators of pathogens from human origin	Monitor instream habitat diversity and condition	Monitor riparian habitat diversity, condition and processes maintaining it	FRAI, species diversity and abundance. Presence of alien species, key species	Monitor key riparian species & requirements for persistence

LUVUVHU RRU-Ri36

Selection of sub-components for RQO determination			Quantity		Habitat		Biota	
			Low Flows (Maintenance Flows)	High Flows (Floods)	Instream habitat	Riparian Habitat	Fish	Aquatic & riparian plant species
Selection guidance	EcoSpec Selection	Importance Rating	VH	H	H	VH	VH	H
		Impact Class	L (-)	N/A	L (-)	L (-)	L (-)	N/A
		Ecosystem prioritization rating	**Moderate**	**Very Low**	**Low**	**Moderate**	**Moderate**	**Very Low**
	UserSpec Selection	Importance Rating	VH	M	VH	VH	VH	VH
		Impact Class	L (-)	N/A	L (-)	L (-)	L (-)	N/A
		User prioritization rating	**Moderate**	**Very Low**	**Low**	**Low**	**Low**	**Very Low**
Documenting selection process & rationale		Select for RQO Determination	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**
		Rationale for sub-component choice	Monitor low flows and flow variability	Monitor high flow levels and frequency	Monitor instream habitat diversity and condition	Monitor riparian habitat diversity and condition	Monitor key fish species	Monitor key aquatic & riparian species
		EcoSpec	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**
		UserSpec	**Y**		**Y**			
		Integrated Measure	**Y**		**Y**			
		Indicators Selected for RQO determination	Discharge	Discharge	GAI, IHI, VEGRAI	VEGRAI, IHI, GAI	FRAI, Key species	VEGRAI, Key species
		Rationale for indicator selection	Monitor low flows and flow variability	Monitor high flow levels and frequency	Monitor instream habitat diversity and condition	Monitor riparian habitat diversity, condition and processes maintaining it	FRAI, species diversity and abundance. Presence of alien species, key species	Monitor key riparian species & requirements for persistence

SHINGWEDZI RRU-Ri37

Selection of sub-components for RQO determination			Quantity		Quality					Habitat		Biota	
			Low Flows (Maintenance Flows)	High Flows (Floods)	Nutrients	Salts	System variables	Toxics	Pathogens	Instream habitat	Riparian Habitat	Fish	Aquatic & riparian plant species
Selection guidance	EcoSpec Selection	Importance Rating	VH	H	M	L	L	H	VL	H	VH	VH	VH
		Impact Class	M (-)	M (-)	H (-)	H (-)	VH (-)	L (-)	H (-)	VH (-)	VH (-)	VH (-)	VH (-)
		Ecosystem prioritization rating	**Very High**	**Moderate**	**Moderate**	**Low**	**Moderate**	**Low**	**Very Low**	**Very High**	**Very High**	**Very High**	**Very High**
	UserSpec Selection	Importance Rating	VH	VH	M	L	M	VH	M	VH	VH	VH	VH
		Impact Class	M (-)	M (-)	H (-)	H (-)	VH (-)	L (-)	H (-)	VH (-)	VH (-)	VH (-)	VH (-)
		User prioritization rating	**High**	**High**	**Moderate**	**Low**	**High**	**Low**	**Moderate**	**Very High**	**Very High**	**Very High**	**Very High**
Documenting selection process & rationale		Select for RQO Determination	Y	Y	y	Y	y	Y	Y	Y	Y	Y	Y
		Rationale for sub-component choice	Monitor low flow levels and variability	Monitor high flow magnitude, frequency and timing	Monitor eutrophication potential	Drinking water, osmoregulation of aquatic organisms	Water clarity, water safety concerns, aquatic ecosystem requirements	Concerns about agrochemicals &trace metals from mine seepage	Human health and water safety	Monitor habitat diversity and condition	Monitor riparian habitat diversity and condition	Monitor key fish species	Monitor key aquatic & riparian species and AIP
		EcoSpec	y	y	Y	Y	Y	Y		y	Y	Y	Y
		UserSpec	y		Y		Y	Y	Y				
		Integrated Measure											
		Indicators Selected for RQO determination	Discharge	Discharge	PO4-P, TIN	EC/TDS	DO, Water Temp, pH, TSS	Toxic substances of NTMP, Heavy metals	E coli, Faecal colifaorms	IHI, GAI, VEGRAI	VEGRAI, IHI, GAI	FRAI, Key species	VEGRAI, Key species
		Rationale for indicator selection	Monitor low flow levels and variability	Monitor high flow magnitude, frequency and timing	Excess nutrients cause eutrophication and related probels	Salts affect the osmoregulation of aquatc organisms and tastes in treated drinking water	DO& water temp impact aquatic organisms, TSS block gills of fish and other organisms, pH affect solubility of metals	No toxins should be present in the water	Pathogens can cause outbreak of waterborne diseases.	Monitor habitat diversity and condition	Monitor riparian habitat diversity, condition and processes maintaining it	FRAI, species diversity and abundance. Presence of alien species, key species	Monitor key riparian species & requirements for persistence

LEPHALALA RRU-Riii3

Selection of sub-components for RQO determination

			Quantity		Habitat		Biota		
			Low Flows (Maintenance Flows)	High Flows (Floods)	Instream habitat	Riparian Habitat	Fish	Aquatic & riparian plant species	Aquatic Invertebrates
Selection guidance	EcoSpec Selection	Importance Rating	M	M	M	M	M	M	M
		Impact Class	M (-)	N/A	L (-)	H (-)	L (-)	H (-)	H (-)
		Ecosystem prioritization rating	**Low**	**Very Low**	**Very Low**	**Moderate**	**Very Low**	**Moderate**	**Moderate**
	UserSpec Selection	Importance Rating	VH	VL	VL	VL	VL	VL	VL
		Impact Class	M (-)	N/A	L (-)	H (-)	L (-)	H (-)	H (-)
		User prioritization rating	**Moderate**	**Very Low**	**Very Low**	**Very Low**	**Very Low**	**Very Low**	**Very Low**
Documenting selection process & rationale		Select for RQO Determination	Y	Y	Y	Y	Y	Y	Y
		Rationale for sub-component choice	Monitor low flow levels and variability	Monitor high flow magnitude and frequency	Monitor habitat diversity and condition	Monitor riparian habitat diversity, condition and processes maintaining it	Monitor key fish species	Monitor key aquatic and riparian species and AIP	Monitor key species
		EcoSpec	Y	Y	Y	Y	Y	Y	Y
		UserSpec	Y						
		Integrated Measure							
		Indicators Selected for RQO determination	Discharge	Discharge	IHI, VEGRAI	VEGRAI, IHI	FRAI, Key species	VEGRAI, Key species	MIRAI, SASS5 Total Score and ASPT
		Rationale for indicator selection	Monitor low flow levels and variability	Monitor high flow magnitude and frequency	Monitor habitat diversity and condition	Monitor riparian habitat diversity, condition and processes maintaining it	Monitor the species diversity and condition	Monitor the Species richness and condition	Monitor the species diversity and condition

STERK RRU_Ri4

Selection of sub-components for RQO determination

			Quantity		Habitat		Biota		
			Low Flows (Maintenance Flows)	High Flows (Floods)	Instream habitat	Riparian Habitat	Fish	Aquatic & riparian plant species	Aquatic Invertebrates
Selection guidance	EcoSpec Selection	Importance Rating	M	M	M	M	M	M	M
		Impact Class	VH (-)	H (-)	M (-)	M (-)	L (-)	L (-)	M (-)
		Ecosystem prioritization rating	**High**	**Moderate**	**Low**	**Low**	**Very Low**	**Very Low**	**Low**
	UserSpec Selection	Importance Rating	VH	M	VL	L	VL	VL	L
		Impact Class	VH (-)	H (-)	M (-)	M (-)	L (-)	L (-)	M (-)
		User prioritization rating	**Very High**	**Moderate**	**Very Low**	**Very Low**	**Very Low**	**Very Low**	**Very Low**
Documenting selection process & rationale		Select for RQO Determination							
		Rationale for sub-component choice	Monitor low flow levels and variability	Monitor high flow magnitude and frequency	Monitor habitat diversity and condition	Monitor riparian habitat diversity, condition and processes maintaining it	Monitor key fish species	Monitor key aquatic and riparian species and AIP	Monitor key species
		EcoSpec	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**
		UserSpec	**Y**	**Y**					
		Integrated Measure							
		Indicators Selected for RQO determination	Discharge	Discharge	IHI, VEGRAI	IHI, VEGRAI	FRAI, Key species	VEGRAI, Key species	MIRAI, SASS5 Total Score and ASPT
		Rationale for indicator selection	Monitor low flow levels and variability	Monitor high flow magnitude and frequency	Monitor habitat diversity and condition	Monitor riparian habitat diversity, condition and processes maintaining it	Monitor the species diviersity and condition	Monitor the Species richness and condition	Monitor the species diviersity and condition

NYL RRU_Ri1-1

Selection of sub-components for RQO determination

			Quantity		Habitat		Biota		
			Low Flows (Maintenance Flows)	High Flows (Floods)	Instream habitat	Riparian Habitat	Fish	Aquatic & riparian plant species	Aquatic Invertebrates
Selection guidance	EcoSpec Selection	Importance Rating	H	H	M	M	H	H	H
		Impact Class	M (-)	N/A	M (-)	M (-)	L (-)	M (-)	L (-)
		Ecosystem prioritization rating	**Moderate**	**Very Low**	**Low**	**Low**	**Very Low**	**Moderate**	**Very Low**
	UserSpec Selection	Importance Rating	VL	VL	VL	VL	VL	VL	VL
		Impact Class	M (-)	N/A	M (-)	M (-)	L (-)	M (-)	L (-)
		User prioritization rating	**Very Low**	**Very Low**	**Very Low**	**Very Low**	**Very Low**	**Very Low**	**Very Low**
Documenting selection process & rationale		Select for RQO Determination							
		Rationale for sub-component choice	Monitor low flow levels and variability	Monitor high flow magnitude and frequency	Monitor habitat diversity and condition	Monitor riparian habitat diversity, condition and processes maintaining it	Monitor key fish species	Monitor key aquatic and riparian species and AIP	Monitor key species
		EcoSpec	Y	Y	Y	Y	Y	Y	Y
		UserSpec							
		Integrated Measure							
		Indicators Selected for RQO determination	Discharge	Discharge	IHI, VEGRAI	IHI, VEGRAI	FRAI, Key species	VEGRAI, Key species	MIRAI, SASS5 Total Score and ASPT
		Rationale for indicator selection	Monitor low flow levels and variability	Monitor high flow magnitude and frequency	Monitor habitat diversity and condition	Monitor riparian habitat diversity, condition and processes maintaining it	Monitor the species diviersity and condition	Monitor the Species richness and condition	Monitor the species diviersity and condition

MOGALAKWENA RRU-Ri3

Selection of sub-components for RQO determination			Quantity		Habitat		Biota		
			Low Flows (Maintenance Flows)	High Flows (Floods)	Instream habitat	Riparian Habitat	Fish	Aquatic & riparian plant species	Aquatic Invertebrates
Selection guidance	EcoSpec Selection	Importance Rating	L	L	L	L	L	L	L
		Impact Class	L (-)	H (-)	L (-)	H (-)	L (-)	L (-)	L (-)
		Ecosystem prioritization rating	**Very Low**	**Low**	**Very Low**	**Low**	**Very Low**	**Very Low**	**Very Low**
	UserSpec Selection	Importance Rating	L	L	M	M	L	L	L
		Impact Class	L (-)	H (-)	L (-)	H (-)	L (-)	L (-)	L (-)
		User prioritization rating	**Very Low**	**Low**	**Very Low**	**Moderate**	**Very Low**	**Very Low**	**Very Low**
Documenting selection process & rationale		Select for RQO Determination							
		Rationale for sub-component choice	Monitor low flow levels and variability	Monitor high flow magnitude and frequency	Monitor habitat diversity and condition	Monitor riparian habitat diversity, condition and processes maintaining it	Monitor key fish species	Monitor key aquatic and riparian species and AIP	Monitor key species
		EcoSpec	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**
		UserSpec				**Y**			
		Integrated Measure							
		Indicators Selected for RQO determination	Discharge	Discharge	IHI, VEGRAI	IHI, VEGRAI	FRAI, Key species	VEGRAI, Key species	MIRAI, SASS5 Total Score and ASPT
		Rationale for indicator selection	Monitor low flow levels and variability	Monitor high flow magnitude and frequency	Monitor habitat diversity and condition	Monitor riparian habitat diversity, condition and processes maintaining it	Monitor the species diviersity and condition	Monitor the Species richness and condition	Monitor the species diviersity and condition

STINKWATER RRU_Rvi2

Selection of sub-components for RQO determination

			Quantity		Habitat		Biota		
			Low Flows (Maintenance Flows)	High Flows (Floods)	Instream habitat	Riparian Habitat	Fish	Aquatic & riparian plant species	Aquatic Invertebrates
Selection guidance	EcoSpec Selection	Importance Rating	M	M	VL	VL	VL	M	VL
		Impact Class	H (-)	N/A	N/A	N/A	N/A	N/A	L (-)
		Ecosystem prioritization rating	**Moderate**	**Very Low**	**Very Low**	**Very Low**	**Very Low**	**Very Low**	**Very Low**
	UserSpec Selection	Importance Rating	M	M	VL	VL	VL	VL	VL
		Impact Class	H (-)	N/A	N/A	N/A	N/A	N/A	L (-)
		User prioritization rating	**Moderate**	**Very Low**	**Very Low**	**Very Low**	**Very Low**	**Very Low**	**Very Low**
Documenting selection process & rationale		Select for RQO Determination							
		Rationale for sub-component choice	Monitor low flow levels and variability	Monitor high flow magnitude and frequency	Monitor habitat diversity and condition	Monitor riparian habitat diversity, condition and processes maintaining it	Monitor key fish species	Monitor key aquatic and riparian species and AIP	Monitor key species
		EcoSpec	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**
		UserSpec	**Y**						
		Integrated Measure							
		Indicators Selected for RQO determination	Discharge	Discharge	IHI, VEGRAI	IHI, VEGRAI	FRAI, Key species	VEGRAI, Key species	Key taxa and abundance
		Rationale for indicator selection	Monitor low flow levels and variability	Monitor high flow magnitude and frequency	Monitor habitat diversity and condition	Monitor riparian habitat diversity, condition and processes maintaining it	Monitor the species diviersity and condition	Monitor the Species richness and condition	Monitor the species diviersity and condition

SAND RRU_Ri2

Selection of sub-components for RQO determination			Quantity		Habitat		Biota		
			Low Flows (Maintenance Flows)	High Flows (Floods)	Instream habitat	Riparian Habitat	Fish	Aquatic & riparian plant species	Aquatic Invertebrates
Selection guidance	EcoSpec Selection	Importance Rating	VL	VL	VL	VL	VL	VL	VL
		Impact Class	VH (-)	H (-)	L (-)	L (-)	L (-)	N/A	L (-)
		Ecosystem prioritization rating	**Low**	**Very Low**	**Very Low**	**Very Low**	**Very Low**	**Very Low**	**Very Low**
	UserSpec Selection	Importance Rating	VH	VH	VL	VL	VL	VL	VL
		Impact Class	VH (-)	H (-)	L (-)	L (-)	L (-)	N/A	L (-)
		User prioritization rating	**Very High**	**Very High**	**Very Low**	**Very Low**	**Very Low**	**Very Low**	**Very Low**
Documenting selection process & rationale		Select for RQO Determination							
		Rationale for sub-component choice	Monitor low flow levels and variability	Monitor high flow magnitude and frequency	Monitor habitat diversity and condition	Monitor riparian habitat diversity, condition and processes maintaining it	Monitor key fish species	Monitor key aquatic and riparian species and AIP	Monitor key species
		EcoSpec	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**
		UserSpec	**Y**	**Y**					
		Integrated Measure							
		Indicators Selected for RQO determination	Discharge	Discharge	IHI, VEGRAI	IHI, VEGRAI	FRAI, Key species	VEGRAI, Key species	MIRAI, SASS5 Total Score and ASPT
		Rationale for indicator selection	Monitor low flow levels and variability	Monitor high flow magnitude and frequency	Monitor habitat diversity and condition	Monitor riparian habitat diversity, condition and processes maintaining it	Monitor the species diviersity and condition	Monitor the Species richness and condition	Monitor the species diviersity and condition

Selection of sub-components for RQO determination			Quantity		Habitat		Biota		
			Low Flows (Maintenance Flows)	High Flows (Floods)	Instream habitat	Riparian Habitat	Fish	Aquatic & riparian plant species	Aquatic Invertebrates
Selection guidance	EcoSpec Selection	Importance Rating	H	H	H	H	H	H	H
		Impact Class	VH (-)	VH (-)	N/A	VH (-)	M (-)	VH (-)	L (-)
		Ecosystem prioritization rating	**Very High**	**Very High**	**Very Low**	**Very High**	**Moderate**	**Very High**	**Low**
	UserSpec Selection	Importance Rating	L	L	VL	L	L	VL	VL
		Impact Class	VH (-)	VH (-)	N/A	VH (-)	M (-)	VH (-)	L (-)
		User prioritization rating	**Moderate**	**Moderate**	**Very Low**	**Moderate**	**Very Low**	**Low**	**Very Low**
Documenting selection process & rationale		Select for RQO Determination							
		Rationale for sub-component choice	Monitor low flow levels and variability	Monitor high flow magnitude and frequency	Monitor habitat diversity and condition	Monitor riparian habitat diversity, condition and processes maintaining it	Monitor key fish species	Monitor key aquatic and riparian species and AIP	Monitor key species
		EcoSpec	Y	Y	Y	Y	Y	Y	Y
		UserSpec	Y	Y		Y			
		Integrated Measure							
		Indicators Selected for RQO determination	Discharge	Discharge	IHI, VEGRAI	IHI, VEGRAI	FRAI, Key species	VEGRAI, Key species	MIRAI, SASS5 Total Score and ASPT
		Rationale for indicator selection	Monitor low flow levels and variability	Monitor high flow magnitude and frequency	Monitor habitat diversity and condition	Monitor riparian habitat diversity, condition and processes maintaining it	Monitor the species diversity and condition	Monitor the Species richness and condition	Monitor the species diversity and condition

NZHELELE RRU_Ri26

Selection of sub-components for RQO determination			Quantity		Habitat		Biota		
			Low Flows (Maintenance Flows)	High Flows (Floods)	Instream habitat	Riparian Habitat	Fish	Aquatic & riparian plant species	Aquatic Invertebrates
Selection guidance	EcoSpec Selection	Importance Rating	H	H	H	H	M	VL	M
		Impact Class	VH (-)	VH (-)	L (-)	L (-)	L (-)	N/A	L (-)
		Ecosystem prioritization rating	**Very High**	**Very High**	**Low**	**Low**	**Very Low**	**Very Low**	**Very Low**
	UserSpec Selection	Importance Rating	VH	VH	VL	VL	VL	VL	VL
		Impact Class	VH (-)	VH (-)	L (-)	L (-)	L (-)	N/A	L (-)
		User prioritization rating	**Very High**	**Very High**	**Very Low**	**Very Low**	**Very Low**	**Very Low**	**Very Low**
Documenting selection process & rationale		Select for RQO Determination							
		Rationale for sub-component choice	Monitor low flow levels and variability	Monitor high flow magnitude and frequency	Monitor habitat diversity and condition	Monitor riparian habitat diversity, condition and processes maintaining it	Monitor key fish species	Monitor key aquatic and riparian species and AIP	Monitor key species
		EcoSpec	Y	Y	Y	Y	Y	Y	Y
		UserSpec	Y	Y					
		Integrated Measure							
		Indicators Selected for RQO determination	Discharge	Discharge	IHI, VEGRAI	IHI, VEGRAI	FRAI, Key species	VEGRAI, Key species	MIRAI, SASS5 Total Score and ASPT
		Rationale for indicator selection	Monitor low flow levels and variability	Monitor high flow magnitude and frequency	Monitor habitat diversity and condition	Monitor riparian habitat diversity, condition and processes maintaining it	Monitor the species diviersity and condition	Monitor the Species richness and condition	Monitor the species diviersity and condition

TSHISHIRU RRU_Riv33

Selection of sub-components for RQO determination			Quantity		Habitat		Biota		
			Low Flows (Maintenance Flows)	High Flows (Floods)	Instream habitat	Riparian Habitat	Fish	Aquatic & riparian plant species	Aquatic Invertebrates
Selection guidance	EcoSpec Selection	Importance Rating	L	L	L	L	L	L	L
		Impact Class	L (-)	L (-)	L (-)	L (-)	L (-)	N/A	L (-)
		Ecosystem prioritization rating	**Very Low**	**Very Low**	**Very Low**	**Very Low**	**Very Low**	**Very Low**	**Very Low**
	UserSpec Selection	Importance Rating	L	L	VL	VL	VL	VL	VL
		Impact Class	L (-)	L (-)	L (-)	L (-)	L (-)	N/A	L (-)
		User prioritization rating	**Very Low**	**Very Low**	**Very Low**	**Very Low**	**Very Low**	**Very Low**	**Very Low**
Documenting selection process & rationale		Select for RQO Determination							
		Rationale for sub-component choice	Monitor low flow levels and variability	Monitor high flow magnitude and frequency	Monitor habitat diversity and condition	Monitor riparian habitat diversity, condition and processes maintaining it	Monitor key fish species	Monitor key aquatic and riparian species and AIP	Monitor key species
		EcoSpec	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**
		UserSpec							
		Integrated Measure							
		Indicators Selected for RQO determination	Discharge	Discharge	IHI, VEGRAI	IHI, VEGRAI	FRAI, Key species	VEGRAI, Key species	MIRAI, SASS5 Total Score and ASPT
		Rationale for indicator selection	Monitor low flow levels and variability	Monitor high flow magnitude and frequency	Monitor habitat diversity and condition	Monitor riparian habitat diversity, condition and processes maintaining it	Monitor the species diviersity and condition	Monitor the Species richness and condition	Monitor the species diviersity and condition

MUTALE RRU_Rvii33

Selection of sub-components for RQO determination

			Quantity		Habitat		Biota		
			Low Flows (Maintenance Flows)	High Flows (Floods)	Instream habitat	Riparian Habitat	Fish	Aquatic & riparian plant species	Aquatic Invertebrates
Selection guidance	EcoSpec Selection	Importance Rating	VH	VH	VH	VH	H	H	H
		Impact Class	N/A	L (-)	N/A	N/A	N/A	N/A	N/A
		Ecosystem prioritization rating	**Low**	**Moderate**	**Low**	**Low**	**Very Low**	**Very Low**	**Very Low**
	UserSpec Selection	Importance Rating	VH	L	VL	VL	VL	VL	VL
		Impact Class	N/A	L (-)	N/A	N/A	N/A	N/A	N/A
		User prioritization rating	**Very Low**	**Very Low**	**Very Low**	**Very Low**	**Very Low**	**Very Low**	**Very Low**
Documenting selection process & rationale		Select for RQO Determination							
		Rationale for sub-component choice	Monitor low flow levels and variability	Monitor high flow magnitude and frequency	Monitor habitat diversity and condition	Monitor riparian habitat diversity, condition and processes maintaining it	Monitor key fish species	Monitor key aquatic and riparian species and AIP	Monitor key species
		EcoSpec	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**
		UserSpec							
		Integrated Measure							
		Indicators Selected for RQO determination	Discharge	Discharge	IHI, VEGRAI	IHI, VEGRAI	FRAI, Key species	VEGRAI, Key species	MIRAI, SASS5 Total Score and ASPT
		Rationale for indicator selection	Monitor low flow levels and variability	Monitor high flow magnitude and frequency	Monitor habitat diversity and condition	Monitor riparian habitat diversity, condition and processes maintaining it	Monitor the species diviersity and condition	Monitor the Species richness and condition	Monitor the species diviersity and condition

MPHONGOLO RRU_Riv28

Selection of sub-components for RQO determination			Quantity		Habitat		Biota		
			Low Flows (Maintenance Flows)	High Flows (Floods)	Instream habitat	Riparian Habitat	Fish	Aquatic & riparian plant species	Aquatic Invertebrates
Selection guidance	EcoSpec Selection	Importance Rating	VH	VH	VH	VH	VH	VH	VH
		Impact Class	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		Ecosystem prioritization rating	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**
	UserSpec Selection	Importance Rating	VH	VH	VH	VH	VH	VH	VH
		Impact Class	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		User prioritization rating	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**	**Low**
Documenting selection process & rationale		Select for RQO Determination							
		Rationale for sub-component choice	Monitor low flow levels and variability	Monitor high flow magnitude and frequency	Monitor habitat diversity and condition	Monitor riparian habitat diversity, condition and processes maintaining it	Monitor key fish species	Monitor key aquatic and riparian species and AIP	Monitor key species
		EcoSpec	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**	**Y**
		UserSpec							
		Integrated Measure							
		Indicators Selected for RQO determination	Discharge	Discharge	IHI, VEGRAI	IHI, VEGRAI	FRAI, Key species	VEGRAI, Key species	MIRAI, SASS5 Total Score and ASPT
		Rationale for indicator selection	Monitor low flow levels and variability	Monitor high flow magnitude and frequency	Monitor habitat diversity and condition	Monitor riparian habitat diversity, condition and processes maintaining it	Monitor the species diviersity and condition	Monitor the Species richness and condition	Monitor the species diviersity and condition