water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

2030 NDP
NATIONAL DEVELOPMENT PLAN
Our Future - make it work

CLASSIFICATION OF SIGNIFICANT WATER RESOURCES AND DETERMINATION OF RESOURCE QUALITY OBJECTIVES FOR WATER RESOURCES IN THE USUTU TO MHLATHUZE CATCHMENTS (WP11387)

RQO Workshop, Durban, 22 August 2023

WETLAND RESOURCE QUALITY OBJECTIVES



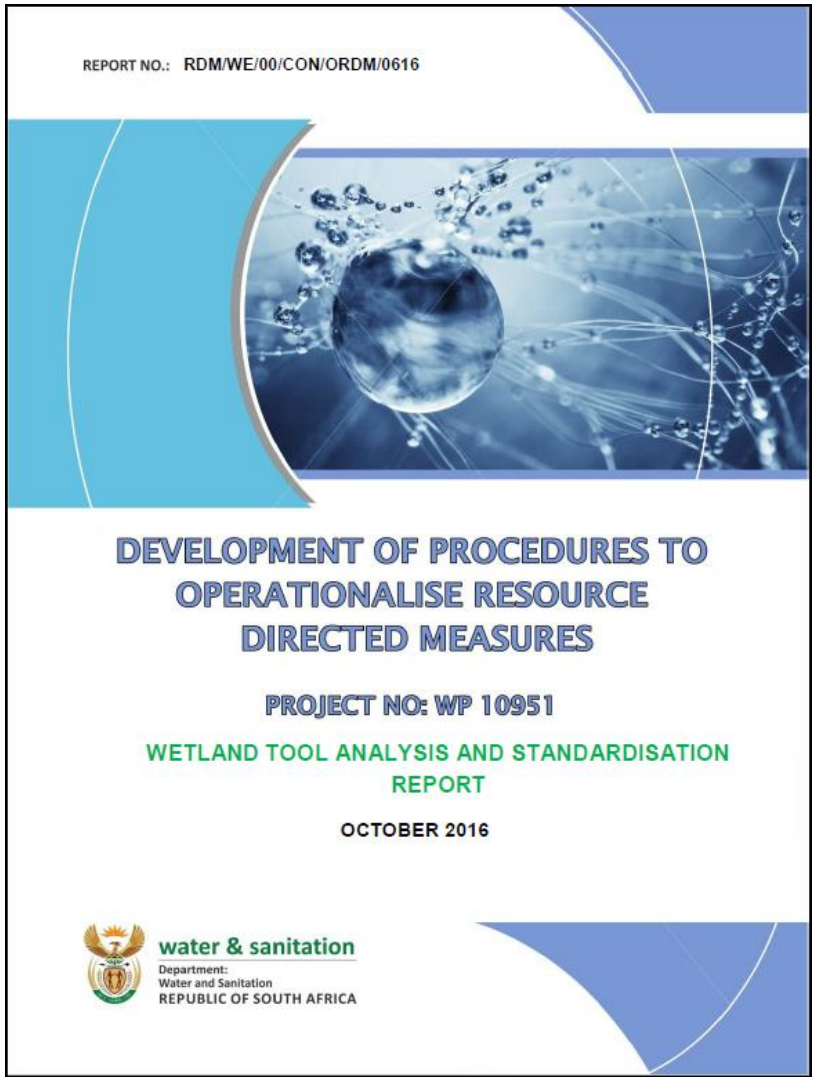
Wetland Resource Quality Objectives

James MacKenzie

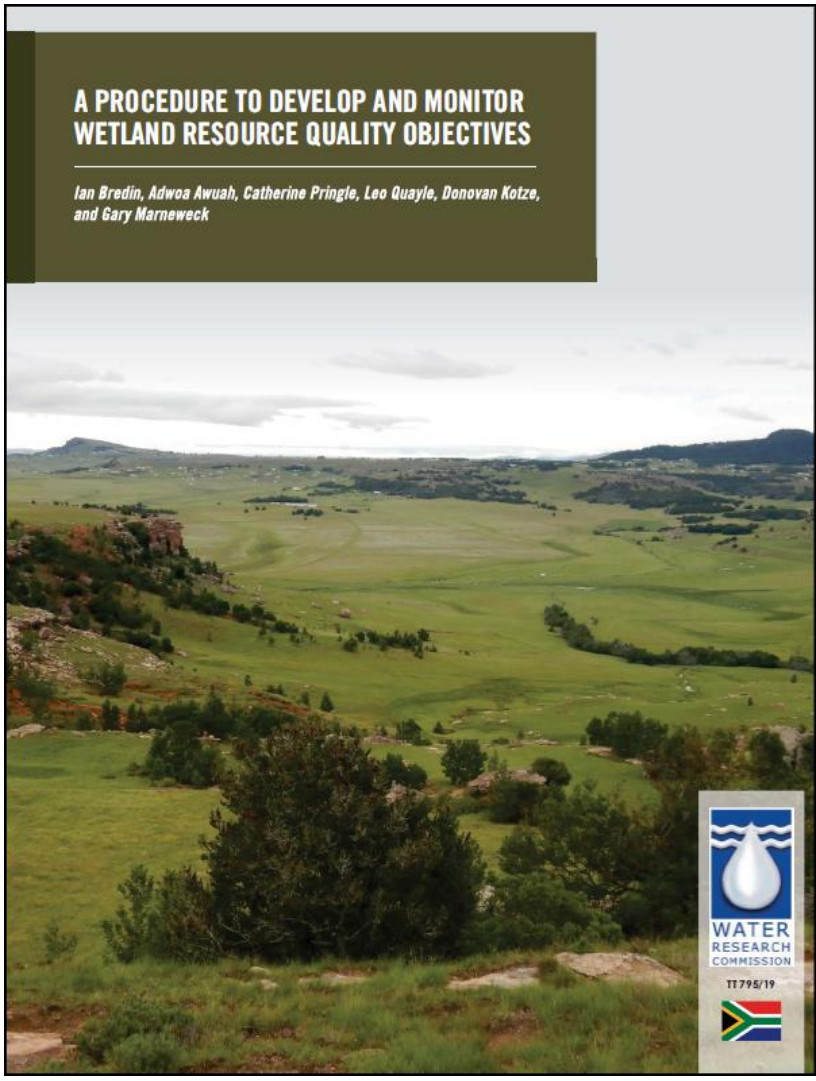
- Outline current literature covering wetland RQOs
- Remind ourselves of the process and accepted methodology
- Recap of completed steps, especially prioritisation
- Use one of the high priority wetlands as a completed example

LITERATURE

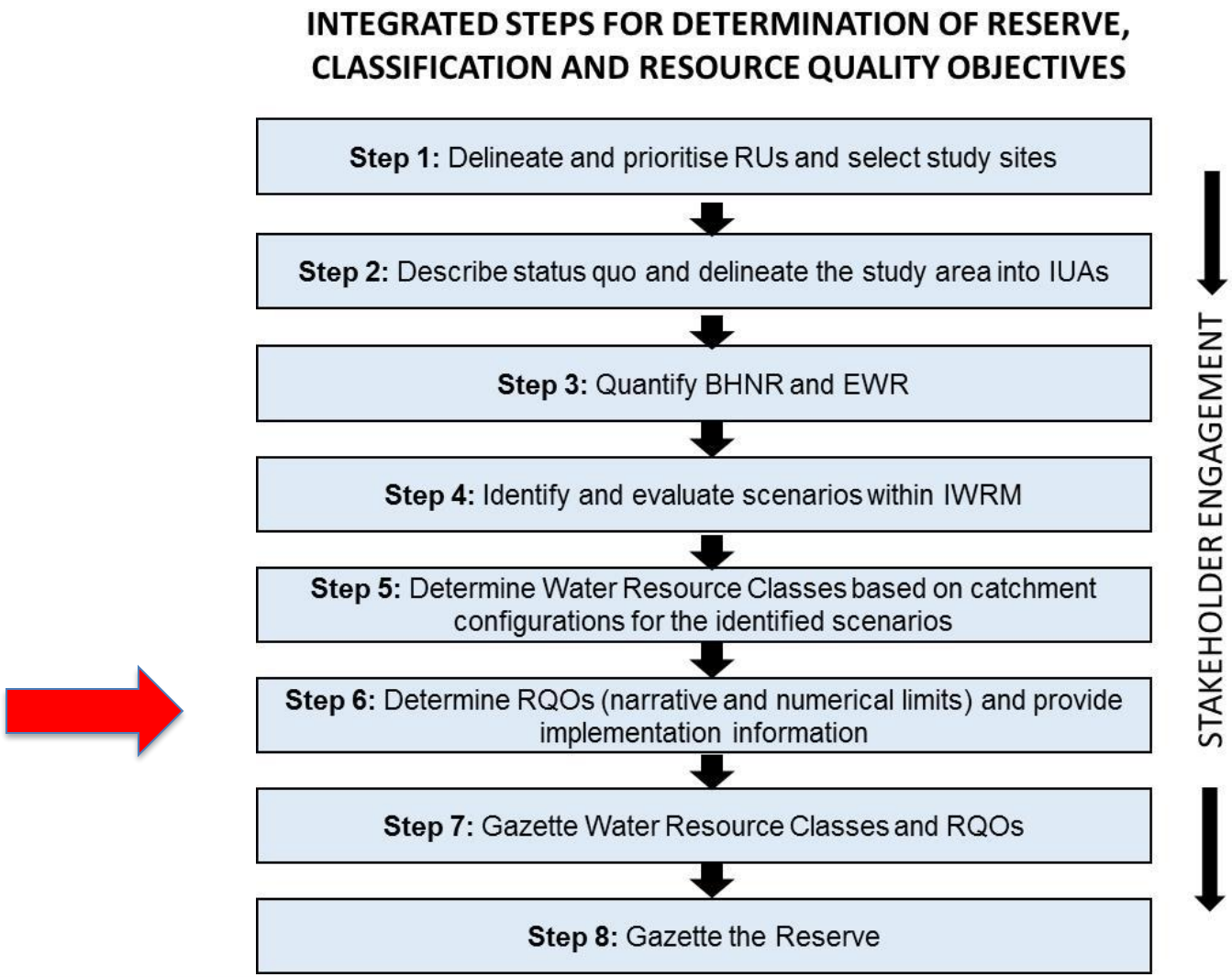
2016 - Ewart-Smith J, Rountree MW and MacKenzie J.



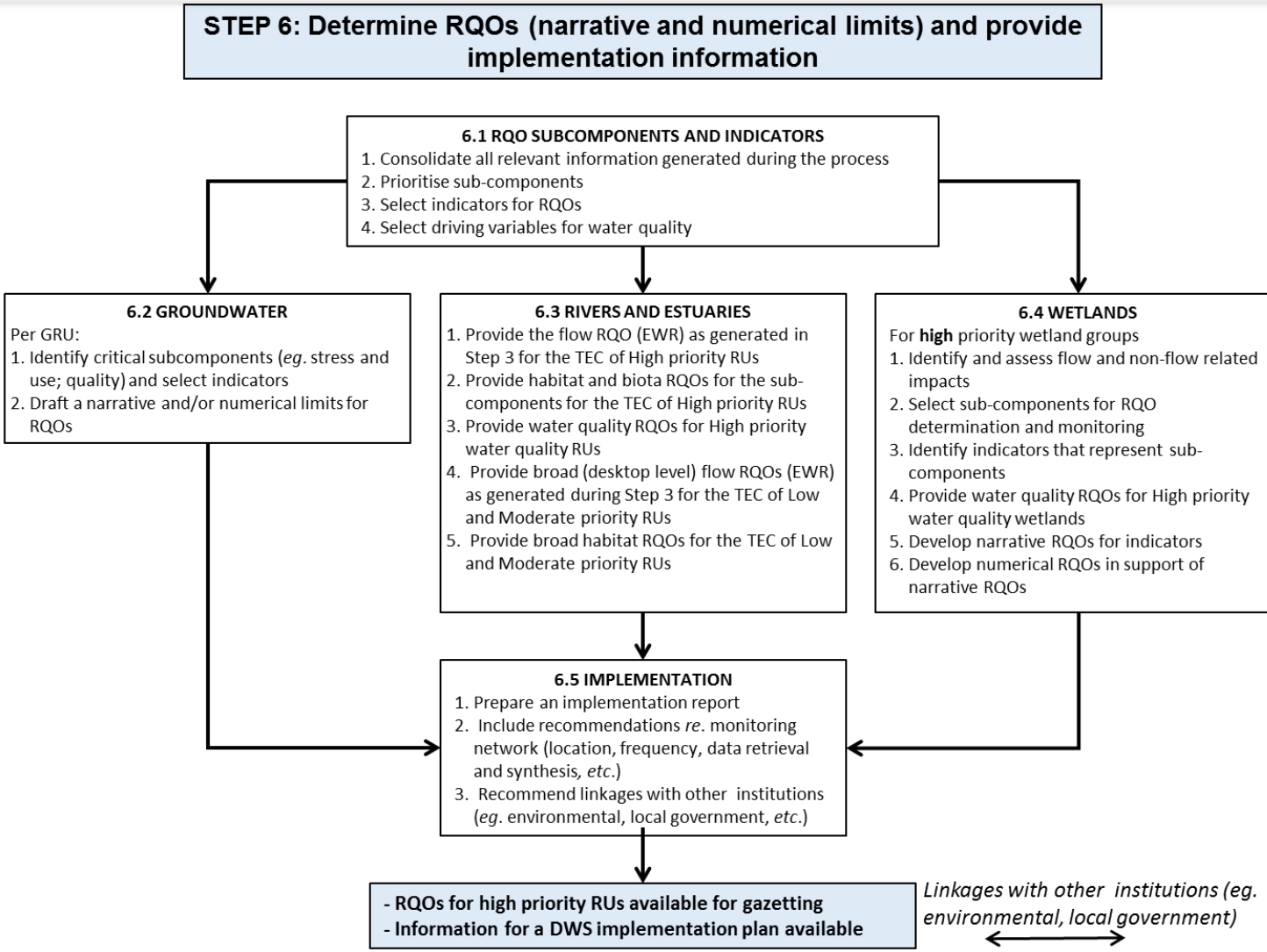
2019 - Ian Bredin, Adwoa Awuah, Catherine Pringle, Leo Quayle, Donovan Kotze, and Gary Marneweck



PROCESS


INTEGRATED STEPS FOR DETERMINATION OF RESERVE, CLASSIFICATION AND RESOURCE QUALITY OBJECTIVES
Step 1: Delineate and prioritise RUs and select study sites
Step 2: Describe status quo and delineate the study area into IUAs
Step 3: Quantify BHNR and EWR
Step 4: Identify and evaluate scenarios within IWRM
Step 5: Determine Water Resource Classes based on catchment configurations for the identified scenarios
Step 6: Determine RQOs (narrative and numerical limits) and provide implementation information
Step 7: Gazette Water Resource Classes and RQOs
Step 8: Gazette the Reserve
STAKEHOLDER ENGAGEMENT

PROCESS


STEP 6: Determine RQOs (narrative and numerical limits) and provide implementation information
6.1 RQO SUBCOMPONENTS AND INDICATORS
1. Consolidate all relevant information generated during the process
2. Prioritise sub-components
3. Select indicators for RQOs
4. Select driving variables for water quality
6.2 GROUNDWATER
Per GRU:
1. Identify critical subcomponents (eg. stress and use; quality) and select indicators
2. Draft a narrative and/or numerical limits for RQOs
6.3 RIVERS AND ESTUARIES
1. Provide the flow RQO (EWR) as generated in Step 3 for the TEC of High priority RUs
2. Provide habitat and biota RQOs for the sub-components for the TEC of High priority RUs
3. Provide water quality RQOs for High priority water quality RUs
4. Provide broad (desktop level) flow RQOs (EWR) as generated during Step 3 for the TEC of Low and Moderate priority RUs
5. Provide broad habitat RQOs for the TEC of Low and Moderate priority RUs
6.4 WETLANDS
For high priority wetland groups
1. Identify and assess flow and non-flow related impacts
2. Select sub-components for RQO determination and monitoring
3. Identify indicators that represent sub-components
4. Provide water quality RQOs for High priority water quality wetlands
5. Develop narrative RQOs for indicators
6. Develop numerical RQOs in support of narrative RQOs
6.5 IMPLEMENTATION
1. Prepare an implementation report
2. Include recommendations re. monitoring network (location, frequency, data retrieval and synthesis, etc.)
3. Recommend linkages with other institutions (eg. environmental, local government, etc.)
- RQOs for high priority RUs available for gazetting
- Information for a DWS implementation plan available
Linkages with other institutions (eg. environmental, local government)

PROCESS

2016

6.4 WETLANDS

For **high** priority wetland groups

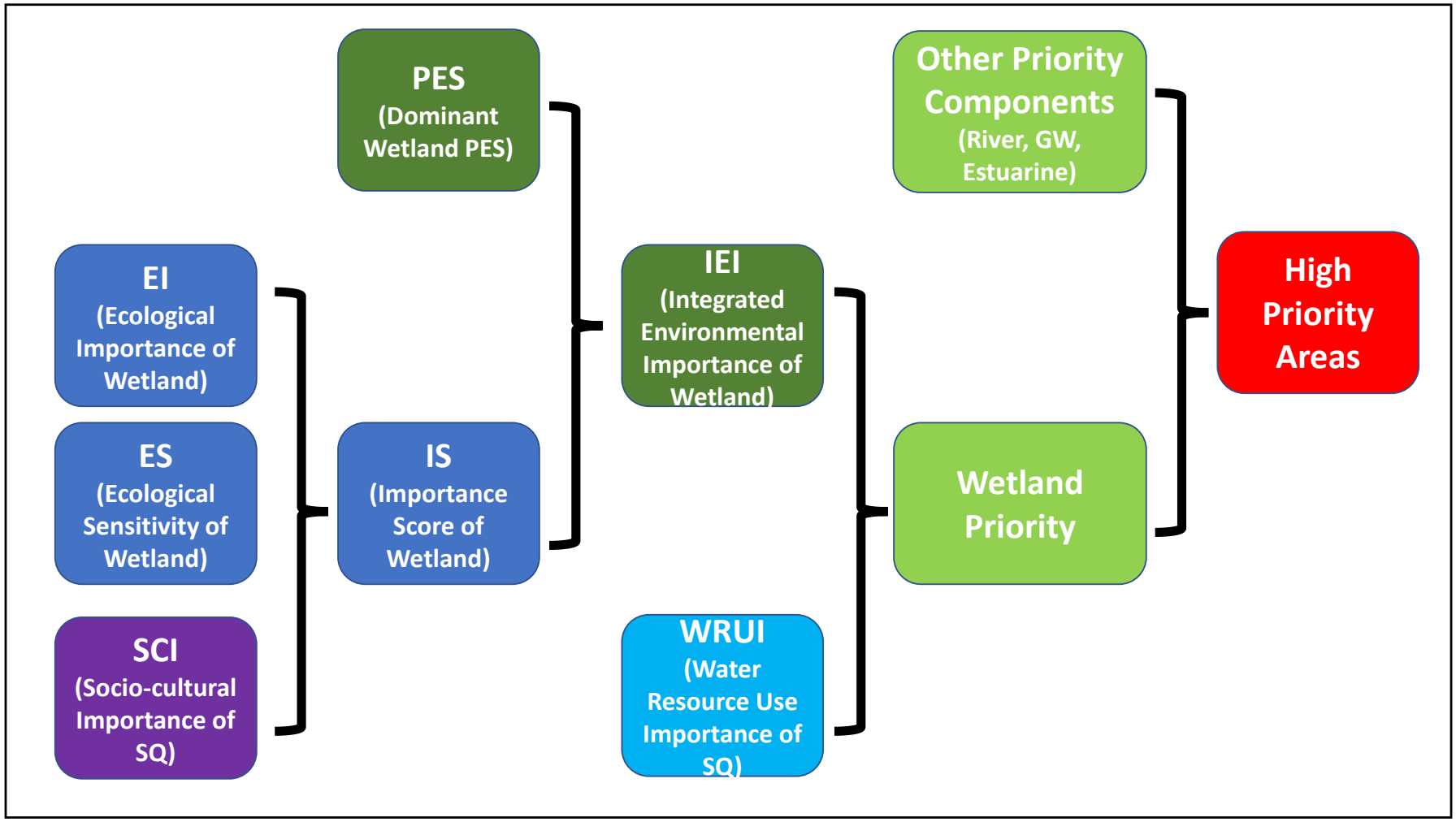
1. Identify and assess flow and non-flow related impacts
2. Select sub-components for RQO determination and monitoring
3. Identify indicators that represent sub-components
4. Provide water quality RQOs for High priority water quality wetlands
5. Develop narrative RQOs for indicators
6. Develop numerical RQOs in support of narrative RQOs

PROCESS

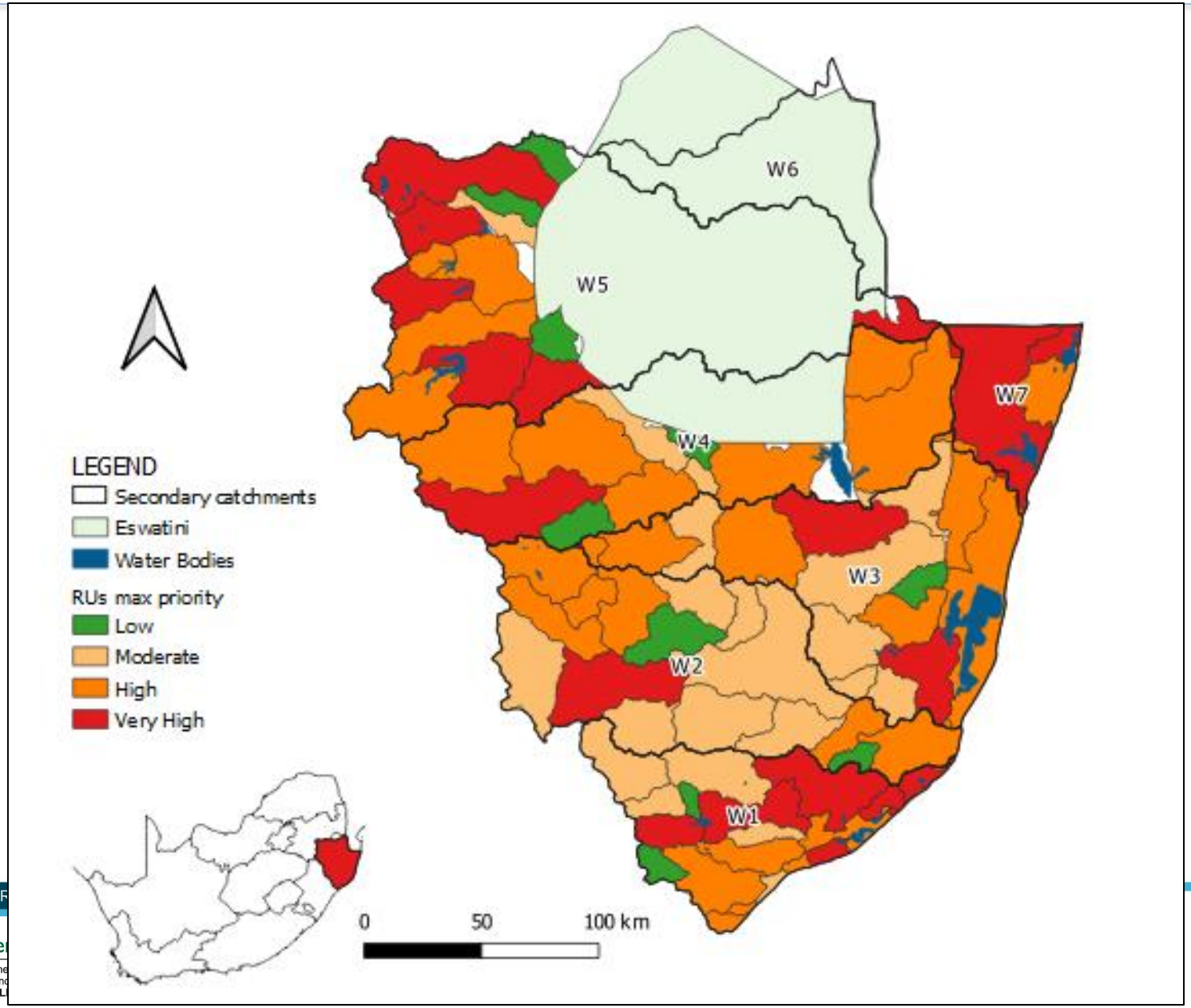
2019

- Step 1: Identify potentially significant wetland resources;
- Step 2: Identify, verify and prioritize wetland resources to inform the delineation of Resource Units;
- Step 3: 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;
- Step 4: Determine sub-components and indicators; and
- Step 5: Set Resource Quality Objectives, and numerical criteria, and provide implementation information

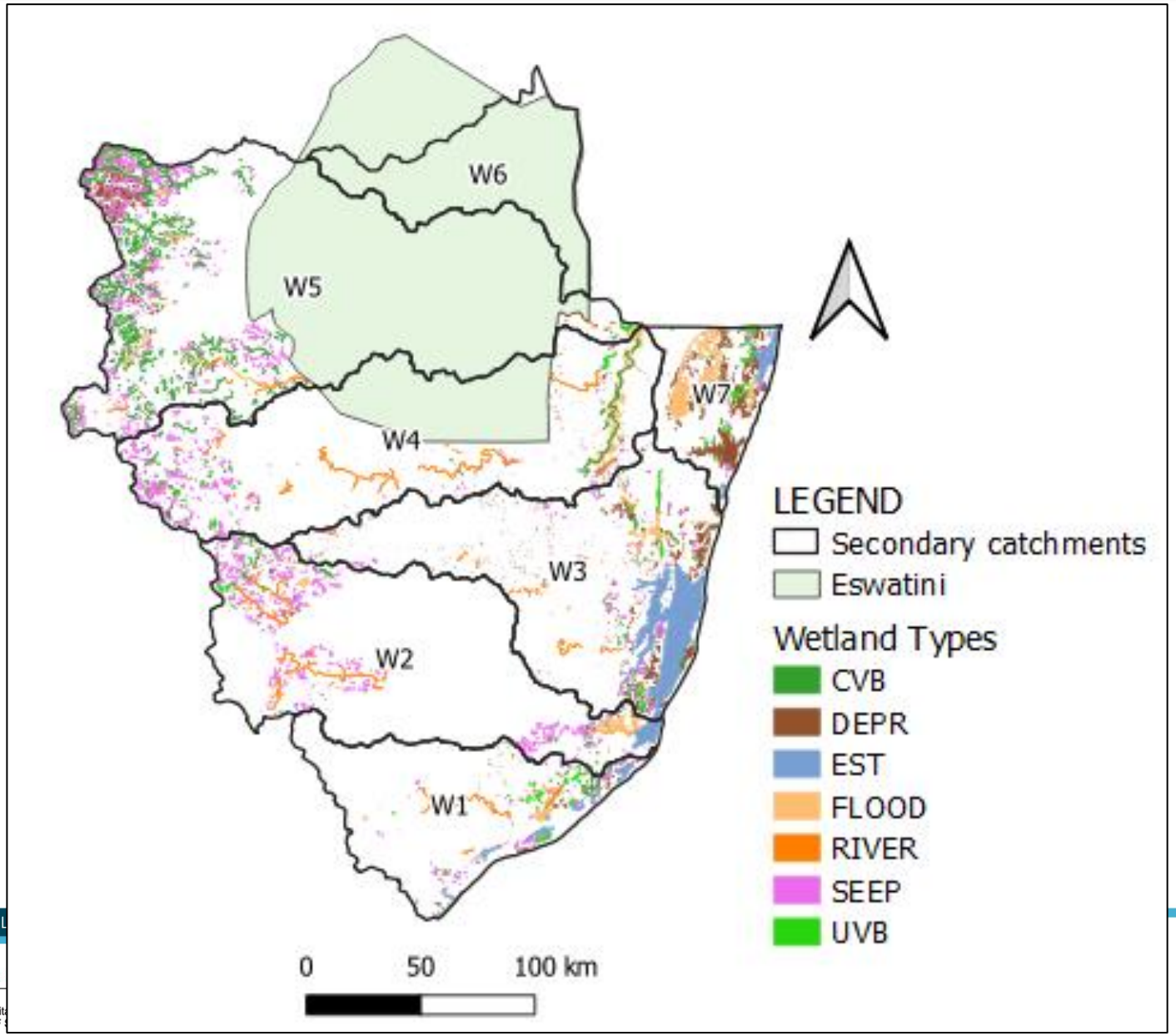
WETLAND PRIORITISATION



WETLAND PRIORITISATION



WETLAND PRIORITISATION



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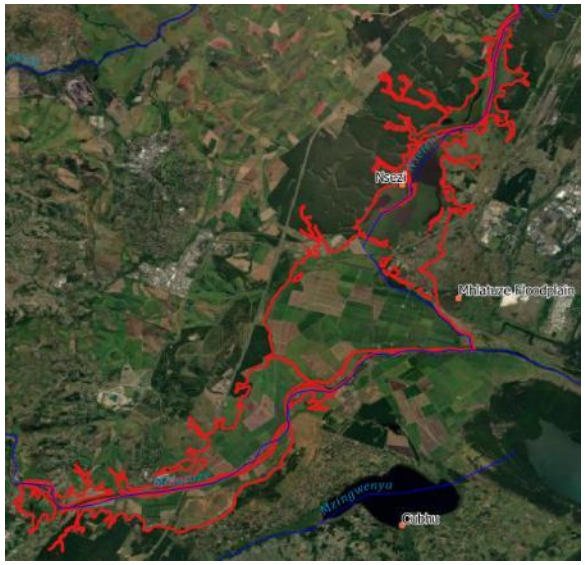
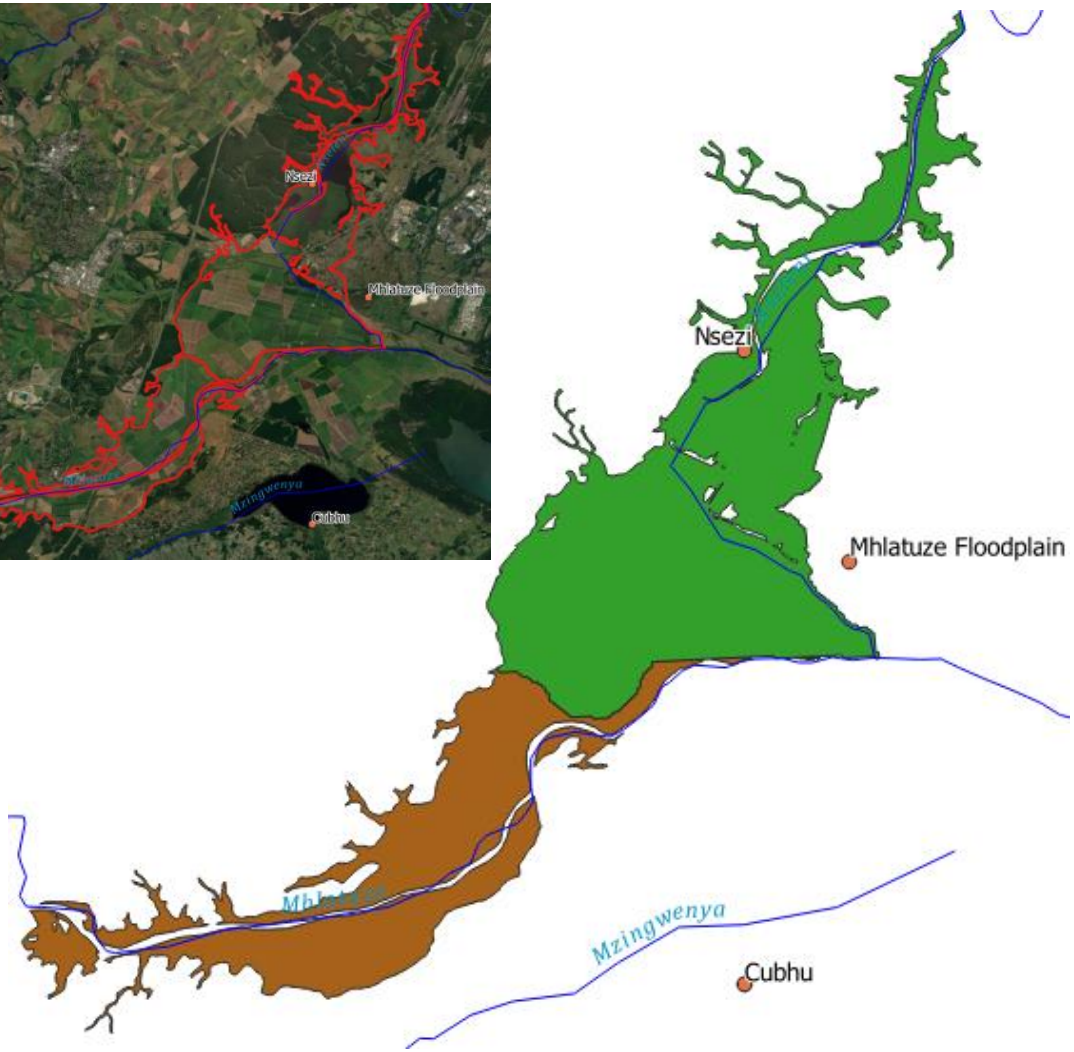
W1 Mhlathuze: 4 Wetland Groups

Group	SQ	SQ Name	Wetland description / note
1	W12E-03475	Mhlatuze	**Riverine wetlands** along the Mhlathuze River leading into the Mhlathze swamp system, including Lake Mpangeni.
2	W12H-03459	Nseleni	Floodplains along lower reaches of Nseleni, including Nsezi and portions of the **Mhlathuze floodplain**. For the sake of completeness, the remainder of the floodplain along the Mhlatuze (W12F-03494) was also included in the assessment. Wetland area of assessment was 4809 Ha.
3	W12J-03411		**Depressions and seeps surrounding the Nlabane** estuary. Wetland area of assessment was 547 Ha.
4	W12J-03392 W12J-03403 W12J-03450	Mpisini Nundwane	Extensive channelled and unchanneled valley bottom wetlands leading into Richard's Bay Estuary, includes **Mzingazi**. Mzingazi was historically part of the Richard's Bay estuary, but a weir was built between the lake and the connection to the ocean which results in the lake currently being a freshwater system. Wetland area of assessment was 1689 Ha.

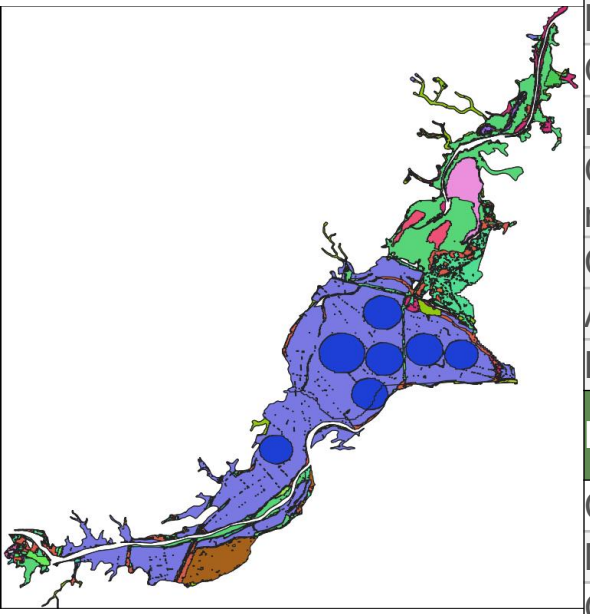
W1: Mhlathuze Floodplain





HGM 1: Floodplain	
Ecological Integrity Score:	43.5
Ecological Category:	D
Area (Ha):	3147.8
HGM 2: Floodplain	
Ecological Integrity Score:	21.8
Ecological Category:	E/F
Area (Ha):	1661.2
WETLAND PES	
Ecological Integrity Score:	36.0
Ecological Category:	E
Area (Ha):	4809.0
WETLAND REC	
Ecological Integrity Score:	42.0
Ecological Category:	D

W1: Mhlathuze Floodplain Impacts



HGM 1: Floodplain (2018 NLC Class Name)	Cover (% wetland area)
Cultivated Commercial Sugarcane Non-Pivot (all other)	34.8
Herbaceous Wetlands (previous mapped extent)	17.8
Cultivated Commercial Sugarcane Pivot Irrigated	16.1
Natural Grassland	8.3
Contiguous Low Forest & Thicket (combined classes)	6.0
Natural Lakes	3.8
Contiguous (indigenous) Forest (combined very high, high, medium)	3.7
Contiguous & Dense Planted Forest (combined classes)	3.4
Artificial Dams (incl. canals)	1.6
Dense Forest & Woodland (35 - 75% cc)	1.4

HGM 2: Floodplain (2018 NLC Class Name)	Cover (% wetland area)
Cultivated Commercial Sugarcane Non-Pivot (all other)	59.8
Mines: Waste (Tailings) & Resource Dumps	9.9
Contiguous Low Forest & Thicket (*combined classes*)	6.8
Herbaceous Wetlands (previous mapped extent)	6.4
Cultivated Commercial Sugarcane Pivot Irrigated	5.3
Natural Grassland	4.5
Dense Forest & Woodland (35 - 75% cc)	2.4
Contiguous & Dense Planted Forest (*combined classes*)	1.3
Subsistence / Small-Scale Annual Crops	1.0
Herbaceous Wetlands (currently mapped)	0.7

EWR: Measures to achieve the REC

RU	Wetland Name	Includes SQs	PES	EI	ES	Trajectory	REC	How to achieve the REC	TEC
W1 Mhlatuze									
W12-8	Mhlathuze Floodplain	W12H-03459 W12F-03494	E	VERY HIGH	VERY HIGH	↓	D	Reduce / control sugarcane cultivation	D
W12-9	Nlabane Wetlands	W12J-03411	D	VERY HIGH	VERY HIGH	↓	C/D	Reduce / control forestry (by 10%)	C/D
W12-10	Lake Mzingazi	W12J-03489	D/E	VERY HIGH	VERY HIGH	↓	D	Control expansion of forestry and residential development, improve water quality, reduce / control gill netting (fish & birds), mitigate upstream / downstream connectivity (fish ladder).	D
W12-10	Mzingazi (CVB)	W12J-03392 W12J-03493 W12J-03403 W12J-03450	C	VERY HIGH	VERY HIGH	→	C	Control expansion of forestry and residential development.	C

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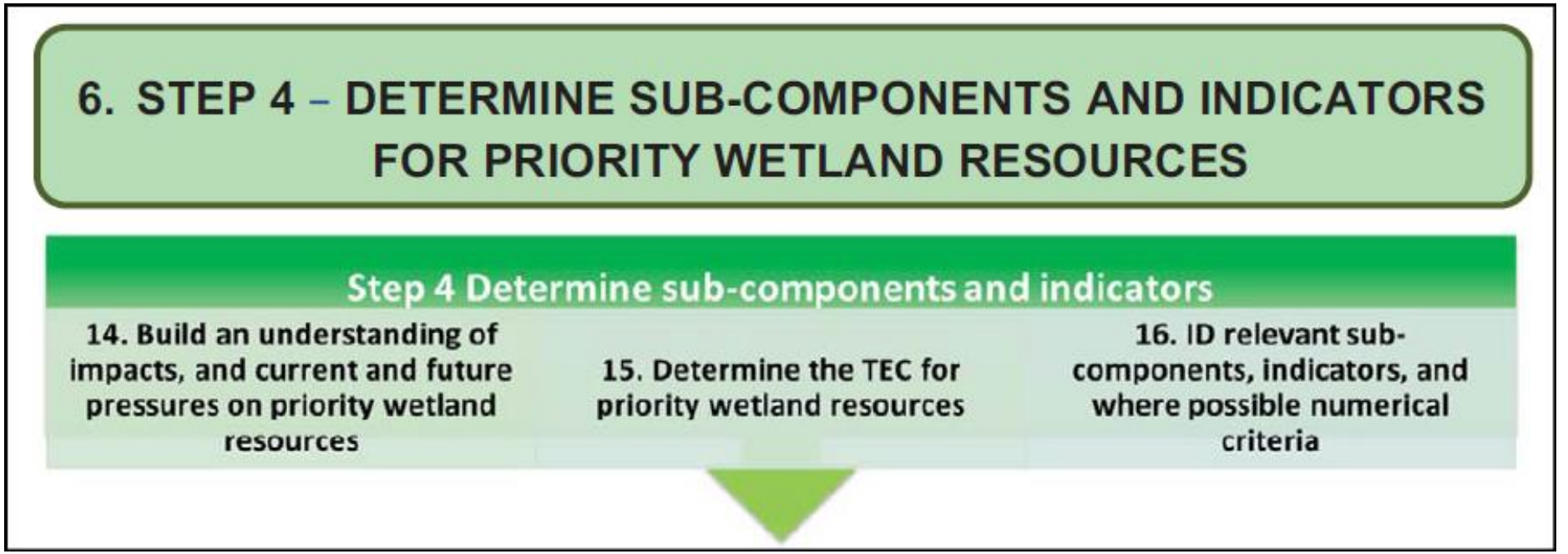
PROCESS: Step 4



PROCESS: Components & sub-components

Components	Sub-components
Quantity	Water inputs
	Water distribution and retention patterns
Quality	Nutrients
	Salts
	System variables
	Toxics
	Microbial determinands
Habitat	Present Ecological State (PES)
	Geomorphology
	Wetland Vegetation
Biota	Fish
	Plant species
	Mammals
	Birds
	Amphibians & reptiles
	Periphyton
	Aquatic Invertebrates
	Diatoms

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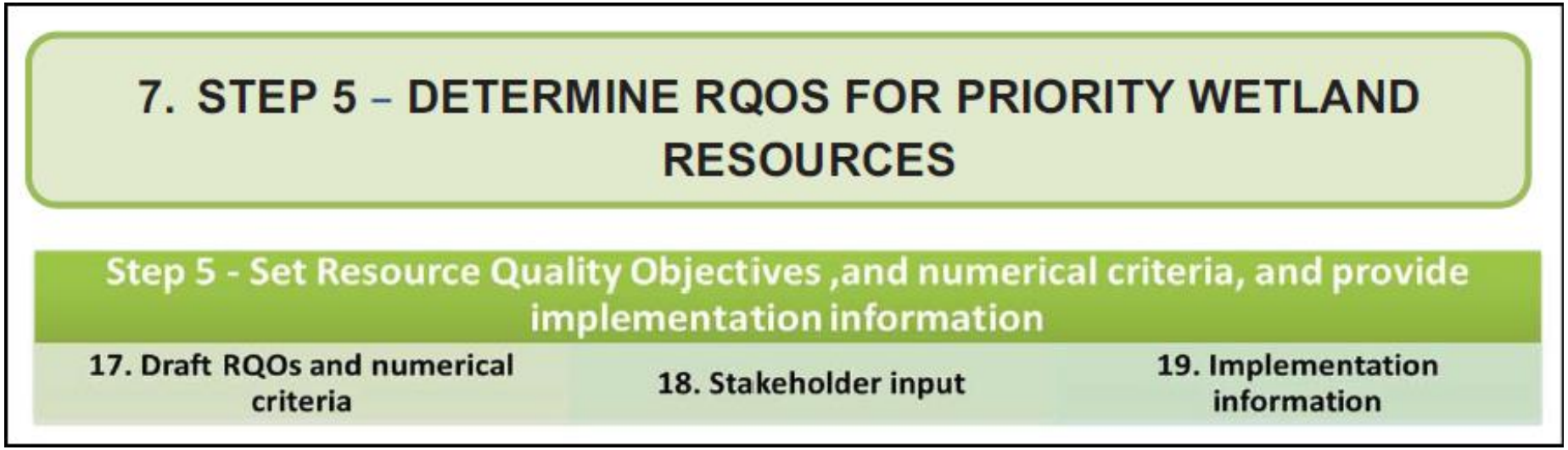
PROCESS: Step 5



PROCESS: generic examples

Component	Sub-component	Indicator	RQO	
			Narrative	Numerical
Water quantity	Flow or inundation regime	Flow (water quantity) or inundation regime is sufficient to maintain the current PES	Water quantity (i.e. flow and inundation regime) must maintain wetlands in good condition where practical.	
	Species sensitive to flow	Flow (water quantity) or inundation regime is sufficient to maintain the current ES	Water quantity (i.e. flow and inundation regime) must maintain populations of flow sensitive wetland species known to occur	
Water quality	Chemistry and sediments	Water quality is sufficient to maintain the current PES	Water quantity (i.e. chemistry and sediments) must maintain wetlands in good condition.	
	Species sensitive to flow	Water quality is sufficient to maintain the current ES	Water quality (i.e. chemistry and sediments) must maintain populations of flow sensitive wetland species known to occur	

PROCESS: generic examples

Component	Sub-component	Indicator	RQO	
			Narrative	Numerical
Habitat	Integrity and condition	PES	The PES category of wetlands within each SQ must be maintained.	The PES score must be at least equal to the minimum value for the category: >92 for A, > 87.4 for A/B, > 82 for B, > 77.4 for B/C, > 62 for C, > 57.4 for C/D and > 42 for D.

PROCESS: generic examples

Component	Sub-component	Indicator	RQO	
			Narrative	Numerical
Habitat / Biota	Species / habitats sensitive to flow	ES	Known or listed species or habitats sensitive to flow should be protected and the ES for each SQ should be maintained	
Habitat / Biota	Threatened, endangered or endemic species, threatened habitats	EI	Known threatened, endangered or endemic wetland species should be protected and the EI for each SQ should be maintained	

PROCESS: generic examples

Component	Sub-component	Indicator	RQO	
			Narrative	Numerical
Biota	taxon richness	Habitat condition is sufficient to maintain the current PES.	Wetland species diversity and community health should be maintained.	
Ecosystem services	Importance, sensitivity and demand	EIS	The ecosystem services of wetlands in a SQ must be maintained. A measure of this is the EIS, the category of which, must remain the same (or improve) within each.	

RQOs: Mhlathuze Floodplains

Component	Subcomponent	Indicator	RQO	
			Narrative	Numerical
Wetland Inventory	Wetland classification	HGM type	Both wetland HGMs should remain floodplains, one along the Nseleni River and one along the Mhlathuze River at their confluence	N/A
	Wetland extent	Wetland area (Ha)	Pending more detailed review of the current wetland delineation (NWM5, 2018), the total extent of the wetland complex should not decrease.	Pending more detailed review of the current wetland delineation (NWM5, 2018), the total extent of the wetland complex should be maintained at 4809 Ha.

RQOs: Mhlathuze Floodplains

Component	Subcomponent	Indicator	RQO	
			Narrative	Numerical
Water quantity	Water Inputs	Hydrology	Floods are necessary to inundate the floodplain thereby providing the wetting regime required for supporting the floodplain vegetation. The quantity and timing of inputs, and the distribution and retention patterns within the wetland must be maintained to avoid the loss of wetland hydrological function.	The EWR determined for the upstream Nseleni and Mlhathuze rivers should be implemented.
	Water distribution and retention patterns	Flooding by damming with the wetland	The current extent of damming within the wetland complex should not be permitted to increase.	The extent of damming within the delineated wetland area shall not exceed 51 Ha.

RQOs: Mhlathuze Floodplains

Component	Subcomponent	Indicator	RQO	
			Narrative	Numerical
Habitat	Wetland vegetation	Extent of natural grassland within the wetland complex (land cover classes 12-13; NLC, 2020)	The current extent of natural grassland within the wetland should not decline.	The current extent of natural grassland within the wetland should not decline 7% (335 Ha).
		Extent of natural wooded land within the wetland complex (land cover classes 1-4, 2020)	The current extent of natural wooded land within the wetland should not decline.	The current extent of natural wooded land within the wetland should not decline below 10% (508 Ha).
		Extent of planted forest within the wetland complex (land cover classes 5-7, 2020)	The current extent of planted forest within the wetland should not increase.	The current extent of planted forest within the wetland should not increase above 2.7% (132 Ha).

RQOs: Mhlathuze Floodplains

Component	Subcomponent	Indicator	RQO	
			Narrative	Numerical
Habitat	Habitat fragmentation with the wetland delineation	Land cover classes denoted to mines and quarries (classes 68-72, 2020)	Wetland habitat loss or fragmentation due to mining activities should not be permitted to increase in extent within the wetland complex.	The aerial extent of mining activities within the delineated wetland area shall not exceed 3.6% (170 Ha).
		Land cover classes denoted to cultivated areas (classes 32-46 & 73, 2020)	Wetland habitat loss due to direct agricultural activities and croplands should not be permitted to increase in extent within the wetland complex.	The aerial extent of agricultural activities and croplands within the delineated wetland area shall not exceed 56% (PES) or 50% (TEC).
		Land cover classes denoted to built-up areas and infrastructure (classes 47-67, 2020)	Wetland habitat loss or fragmentation due to infrastructure and built-up areas, including canals, furrows and trenching should not be permitted to increase in extent with the wetland complex. Additional development of infrastructure should not be permitted within the wetland complex.	The aerial extent of built-up areas and infrastructure, including canals, furrows and trenching, within the delineated wetland area shall not exceed 1% (36 Ha).

RQOs: Mhlathuze Floodplains

Component	Subcomponent	Indicator	RQO	
			Narrative	Numerical
Habitat	Present Ecological State (PES)	Wetland PES score and category	The overall wetland PES should be improved from an E (PES) to a D (TEC).	The overall wetland PES score should be improved to at least 42%.
Habitat / Biota	Ecological sensitivity (ES)	Species / habitats sensitive to flow	The ES of the wetland complex should be maintained as "Very High".	An ES score >=4 should be maintained
	Ecological importance (EI)	Threatened, endangered or endemic species; threatened habitat types	The EI of the wetland complex should be maintained as "Very High".	An EI score >=4 should be maintained

RQOs: Mhlathuze Floodplains

Component	Subcomponent	Indicator	RQO	
			Narrative	Numerical
Biota	Endangered crane species	Counts of the number of breeding pairs of crane species.	Water quantity, vegetation condition and land use practices must be maintained so as to not cause any population decline.	Data counts are restricted, available on request.
	Waterbird species	Wetland is within 500m of a threatened waterbird point locality.	Water quantity, quality, vegetation condition and land use practices must be maintained so as to not cause any decline in waterbird population/s.	No numerical data available.
Water quality	River sub-components from the Nseleni and Mhlathuze rivers apply	River indicators from the Nseleni and Mhlathuze rivers apply	River RQOs from the Nseleni and Mhlathuze rivers apply	