Determination of Water Resources Classes and Resource Quality Objectives in the Berg Catchment

Public Meeting 2
Background Information Document
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water & sanitation
Department:
Water and Sanitation
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PURPOSE OF THIS DOCUMENT

The purpose of this Background Information Document (BID) is to:

- Provide an overview of the steps followed to determine the Water Resource Classes and Resource Quality Objectives for the Berg Catchment.
- To present preliminary results of the process that will soon be gazetted for further public review.

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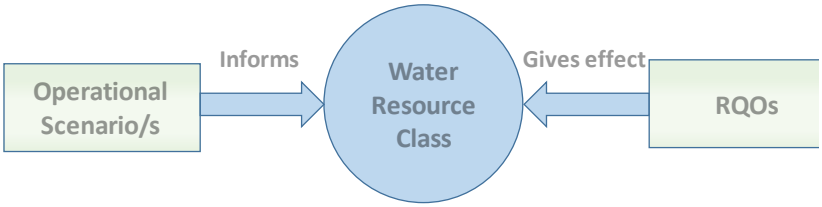
1. BACKGROUND

The National Water Act, 1998 (Act No. 36 of 1998) (NWA), is founded on the principle that the South African Government has overall responsibility and authority over water resource management for the benefit of the public. In order to achieve this objective, Chapter 3 of the NWA provides for the protection of water resources through the implementation of Resource Directed Measures which includes the Classification of water resources, setting the Reserve and determination of Resource Quality Objectives (RQOs).

The Department of Water and Sanitation has identified the need to undertake the classification of significant water resources (rivers, wetlands, estuaries, groundwater and lakes) and the determination of Resource Quality Objectives (RQOs) in the Berg Catchment in accordance with the Water Resource Classification System (WRCS). The process was initiated in May 2016 and gazetting is expected to be initiated in due course. The objective of the process is to determine the Water Resource Classes and RQOs for the Berg Catchment.

The process followed the gazetted 7 steps whereby a Water Resource Class and associated RQOs (seven steps) of a water resource are defined by taking into account the social, economic and ecological landscape in a catchment in order to assess the costs and benefits associated with utilisation versus protection of a water resource. As such, the process is not carried out in isolation, but is integrated within the overall planning for water resource protection, development and use. Potential development or operational scenarios were identified, consequences evaluated, compared and ranked as a means to determine the appropriate balance between water use and protection for deriving the Classes. Operational scenarios, Water Resource Classes and RQOs are inherently linked as operational scenarios inform the Water Resource Class and RQOs gives effect to the class.



2. WATER RESOURCE CLASSES

The Classification Process is a consultative process that allows stakeholders to negotiate a desired Water Resource Class (see Table 1 for descriptions per Class and defining rules for the Berg Catchment). The Class outlines the attributes required of different water resources and reflects the importance given to protection and/or development. The actual process of applying the WRCS guidelines and procedures in order to establish the classes is called the Classification Process. The outcome of the Classification Process is the approved Water Resource Classes. These will then be binding on all authorities or institutions when exercising any power or performing any duty under the NWA.

Table 1: Water Resource Class descriptions

Water Resource Class	Description of use	Dominant Ecological Categories*
I	Minimally used	A and or/B
II	Moderately used	C
III	Heavily used	D

*The Ecological Category (EC) means the assigned ecological condition to a water resource in terms of the deviation of its biophysical components from a pre-development condition. The scale is A (near natural) to F (critically modified).

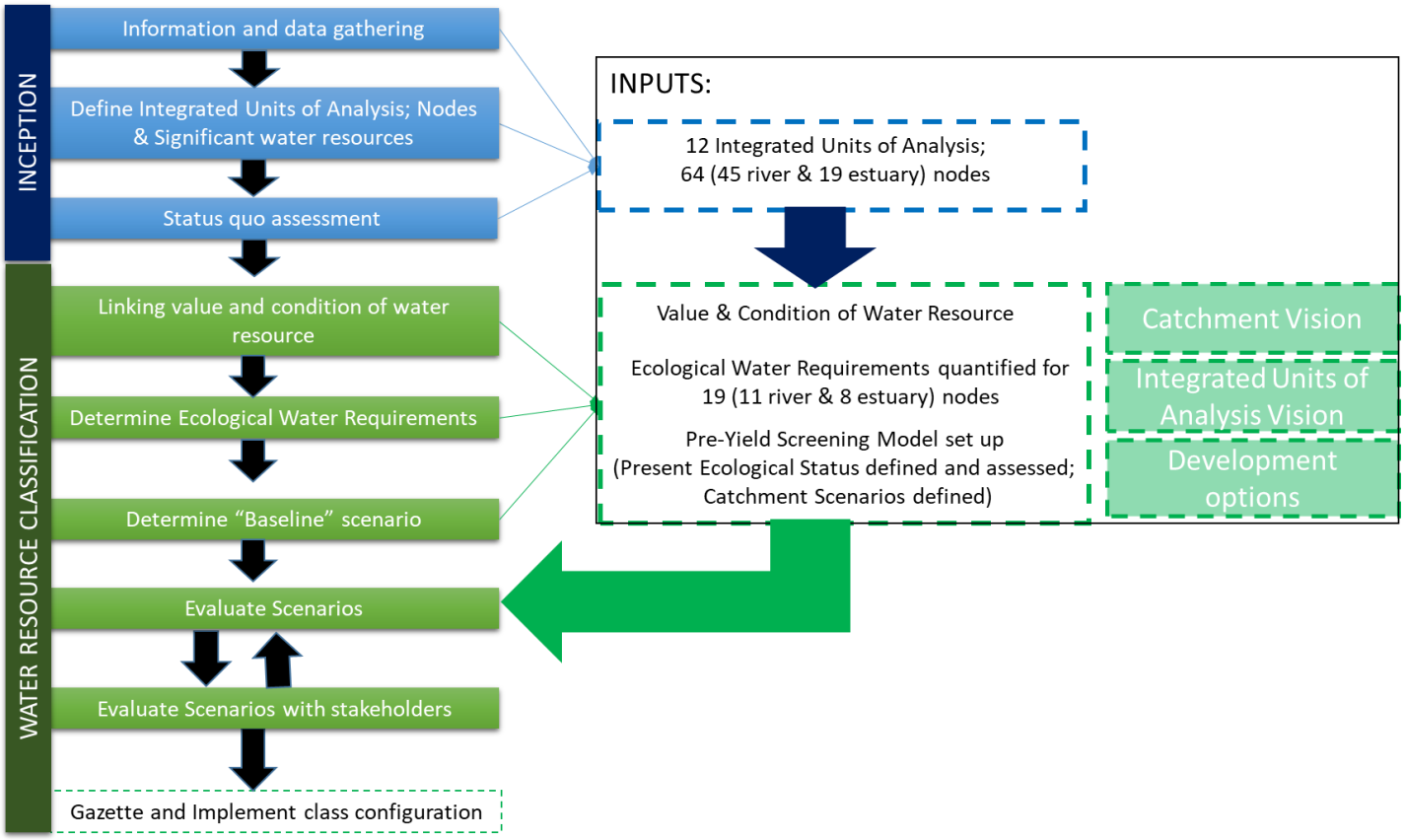


Figure 1: Data inputs to determine the Water Resource Classes

The seven steps followed to determine the Water Resource Classes for the Berg Catchment are as follows:

Step	Description	Output
1	**Delineate the Integrated Units of Analysis (IUAs) and Resource Units, and describe the status quo of the water resource**	The status quo information was used to delineate 12 IUAs, which were used to provide stakeholders with sufficient background to envisage their future "vision" for the significant water resources in each IUA. Resource Units were also defined for rivers, wetlands, estuaries and groundwater. The visioning process was initiated at the 1st Project Steering Committee meeting for each IUA.
2	**Link value and condition of the water resource, and catchment visioning**	
3	**Quantify the Ecological Water Requirements (EWRs) and changes in non-water quality ecosystem goods, services and attributes**	EWRs and findings in terms of non-water quality ecosystem goods, services and attributes were reported on at a Technical Task Group meeting and 2nd PSC meeting. This information was used for the required models and different scenarios in the next step.
4	**Determine an Ecologically Sustainable Base Configuration (ESBC) scenario and establish starter scenarios.**	The balancing tool was set up and the ESBC scenario was run. This provided background information needed to assess and develop scenarios by comparing Reserve requirements to flows of the present day and adjusting the ecological condition at each node when flows are changed. Various scenarios were evaluated and the consequences of these scenarios in terms of ecological, economic and ecological goods services and attributes consequences presented. Scenarios included changes to present operation of the system and future developments. At the 2rd PSC meeting stakeholders evaluated several scenarios with the proposed scenario being the spatially-targeted mix of the environmentally focused scenario (REC) and the development focused scenario (ESBC).
5	**Identify and evaluate scenarios within the integrated water resource management process.**	
6	**Evaluate the scenarios with stakeholders**	
7	**Gazette and implement the Water Resource Classes and RQOs**	To be initiated in February/March 2019.

3. RESOURCE QUALITY OBJECTIVES (RQOs)

RQOs are numerical and/or narrative descriptive statements of conditions which should be met in the receiving water resource, in terms of the overall quality of the resource, in order to ensure that the water resource is protected. The purpose of the RQOs is to establish clear and measurable goals relating to the required state of the relevant water resource. The National Water Act, 1998, stipulates that in determining the RQOs a balance must be sought between the need to protect and sustain the water resources, and the need to develop and use them. The RQOs are intended to give effect to Water Resource Classes determined in each water resource.

Water Resource components relate to the criteria that make up an ecosystem: Water Quantity, Water Quality, Habitat and Biota. Indicators of important sub-components, considered important to either users or the environment, would have RQOs and Numerical Limits developed.

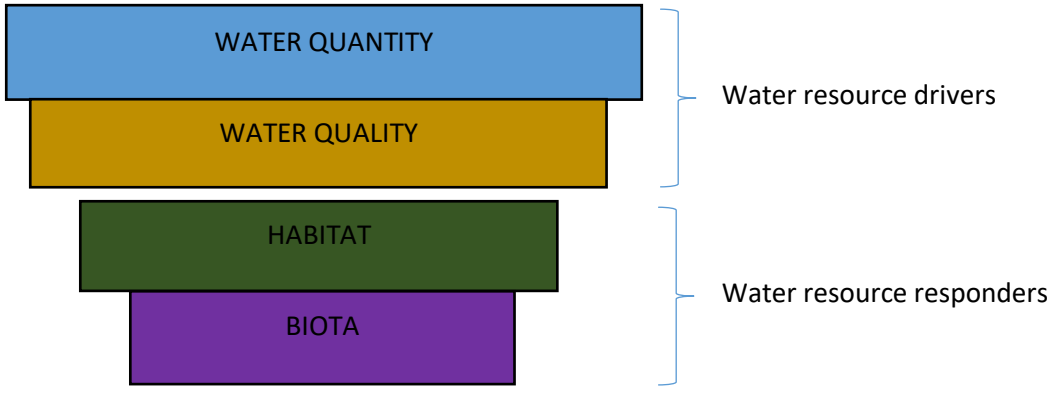


Figure 2: The components of a water resource ecosystem

The seven steps followed to determine the RQOs for the Berg Catchment are as follows:

Step	Description	Output
Steps 1-2 of the RQO process were conducted as part of the WRCS		
3	**Prioritise and select preliminary Resource Units for RQO determination**	The Resource Unit Prioritisation tool was used to prioritise the rivers, estuaries, dams and groundwater resource units. An adapted GIS tool was used to prioritise wetland resource units. Results were as follows: • 20 prioritised river RUs • 7 prioritised estuary RUs • 6 prioritised dam RUs • 24 prioritised wetland RUs • 11 prioritised groundwater RUs
4	**Prioritise sub-components for RQO determination and select indicators**	The Resource Unit Evaluation tool was used to evaluate sub-components and indicators for the rivers, estuaries, dams and groundwater resource units. A conceptual model was used to evaluate prioritised wetland resource units. Results were as follows: • 12 sub-components for river RUs, for example flow as a sub-component of Water Quantity • 13 sub-components for estuary RUs, for example flow as a sub-component of Water Quantity • 9 sub-components for dam RUs, for example flow as a sub-component of Water Quantity • 9 sub-components, for example hydroperiod as a sub-component of Water Quantity • 6 sub-components, for example abstraction as a sub-component of Water Quantity
5	**Develop draft RQOs and numerical limits**	The draft technical report was prepared to present the determined RQOs. The RQOs were presented at one Technical Task Group meeting, one Sector meeting and one Project Steering Committee meeting (3rd PSC meeting). An example of the RQOs and numerical limits determined for high priority river resource units would include the following: • **Quantity:** Low/high flow: Flow RQOs given are a monthly average volumes (MCM) that include maintenance low and high flows combined. • **Quality:** Water quality fitness-for-use categories, ranging from Ideal, Acceptable, and Tolerable. If currently in an Unacceptable category the quality should be improved to at least a Tolerable category or better. Limits based on the South African Water Quality Guidelines are specified for the different categories, for different uses. • **Habitat:** Geomorphology based on GAI/other and Vegetation based on VEGRAI/other • **Biota:** Fish based on FRAI/other and Invertebrates based on MRAI/other
6	**Agree to Resource Units, RQOs and numerical limits with stakeholders**	
7	**Gazette and implement the Water Resource Classes and RQOs**	To be initiated in February/March 2019.

An example of an RQO for a river RU (Bviii11) is as follows:

IUA	River	Node	Component	Sub-component	TEC	Indicator/ measure	RQO
D9 Middle Berg	Pombers River	Bviii11	Quantity	Hydrology	C	Observed flow.	Flows sufficient to maintain the river in a C category.
			Quality	Nutrients		Phosphate (PO_4-P)	River nutrient levels must be maintained in an oligotrophic condition.
						Total inorganic nitrogen (TIN)	Total inorganic nitrogen (TIN)
				Salts		Electrical conductivity (EC)	Salt concentrations need to be maintained at levels that do not adversely affect aquatic ecosystems
				System variables		pH	pH, temperature, and dissolved oxygen are important for the maintenance of ecosystem health.
						Water temperature	
						Dissolved oxygen	
				Toxins		Ammonia	Toxicity levels must not pose a threat to aquatic ecosystems.
						Atrazine	
						Endosulfan	
				Pathogens		E coli	Concentrations of waterborne pathogens should be maintained in an Acceptable category for full contact recreation.
			Habitat	Geomorphology		Geomorphological condition	GAI score should equate to a D/E category
				Riparian vegetation		Vegetation condition	VEGRAI level 3 score should equate to a E category
			Biota	Macroinvertebrates		Macroinvertebrate condition	MIRAI score to be within B Category

4. STAKEHOLDER ENGAGEMENT

This study will determine the management measures required to sustainably manage the Berg Catchment, for the benefit of users as well as the aquatic ecosystem. Since the resources within the catchment relate to stakeholders as a water user it is important that stakeholder engagement is aligned with technical processes. As water users, stakeholders are directly involved in the day to day use of water resources in the area. The on the ground knowledge they have is invaluable to the project and helps ensure that the study team develops holistic water management measures.

A Project Steering Committee guided the activities and provided feedback related to their local knowledge of the study area. Three meetings were held with the PSC members to obtain contributions from various sectors including conservation, agriculture, mining, forestry, local and provincial government and tourism. A focused sector meeting was held for municipalities. Technical Task Group meetings were also held with technical experts in the region to provide feedback related to the technical processed followed.

Previous information on this study can be obtained from the below mentioned link. Should you wish to review these documents and completed study reports, you are welcome to access them on this link.

- **DWS documents on the processes can be accessed on DWS website using the following link**: https://www.dwa.gov.za/rdm/Documents.aspx

DEFINITIONS

Components: The state of the river is expressed in terms of biophysical components: · Divers (physico-chemical, geomorphology, hydrology) which provide a particular habitat template; and · Biological responses (fish, riparian vegetation and aquatic invertebrates).

EcoClassification - the term used for Ecological Classification - refers to the determination and categorisation of the Present Ecological State (PES; health or integrity) of various biophysical attributes of rivers compared to the natural or close to natural reference condition.

Ecological Category (EC) is expressed in A to F for each component. Different processes are followed to assign an ecological category (A to F: A = Natural, and F = critically modified) to each component.

Ecological Water Requirements (EWRs) are the quantity and quality of water needed to satisfy the ecology of the river systems, for example habitat and biota.

Ecologically Sustainable Base Scenario (ESBC): the minimum environmental flow scenario that sustains the lowest acceptable ecological condition for water resources basin-wide (i.e. a D ecological category).

Indicators represent trend tracking measurable change in a system over time. Generally, an indicator focuses on a small, manageable set of information that gives a sense of the bigger picture

Integrated Unit of Analysis (IUA): The delineation of IUAs deals with subdivision of the water resources into small manageable management units. Water Resource Classes cannot be assigned for the whole stretch of a river. An IUA is a broad scale homogenous unit that contains several biophysical nodes (or resource units) and can be managed as an entity.

Nodes: modelling points representative of an upstream reach or area of an aquatic ecosystem (rivers, wetlands, estuaries and groundwater) for which a suite of relationships apply.

Numerical limit: Quantitative descriptors of different components of the Resource Unit.

Present Ecological State (PES): the current state of condition of a resource in terms of its various biophysical components, i.e. drivers (physico-chemical, geomorphology, and hydrology and biophysical responses (i.e. fish, riparian vegetation and aquatic invertebrates).

Recommended Ecological Category (REC) is a realistic and practically attainable Ecological Category for a component.

Reserve: the quantity and quality of water needed in a water resource (e.g. estuaries, rivers, lakes, groundwater and wetlands) to sustain basic human needs and protect aquatic ecosystems to ensure ecologically sustainable development and utilisation of the resource.

Resource Quality Objective (RQO): Descriptive broad statements describing overall objectives for the Resource Unit

Resource Unit (RU): grouped areas deemed similar in terms of various characteristics. RUs are used to transfer information between catchments.

Scenario evaluation: the overarching aim of the scenario evaluation process is to find the appropriate balance between the level of environmental protection and the use of the water to sustain socio-economic activities. Scenarios are water resource management options available for a particular water resource that satisfy protection and use and further development and includes the water quality, quantity and distribution requirements to support ecosystem functioning.

Significant Water Resources: Water resources that are deemed to be significant from a water resource use perspective, and/or for which sufficient data exist to enable an evaluation of changes in their ecological condition in response to changes in their quality and quantity of water. Water resources are deemed to be significant based on factors such as, but not limited to, aquatic importance, aquatic ecosystems to protect and socio-economic value.

Spatially Targeted Scenario: In order to give appropriate recognition to spatial variations of priority objectives inside individual IUAs, a spatially-targeted scenario was formulated, resulting in a blend of Targeted Ecological Categories (TEC) for all nodes ranging between the Recommended Ecological Category (REC) and Ecologically Sustainable Base Configuration (ESBC) Scenarios. This was considered as the proposed scenario. Management considerations were also included in order to account for conservation priorities.

Target Ecological Category (TEC): each IUA is allocated a Water Resource Class and a catchment configuration. The catchment configuration consists of biophysical nodes and their ECs. These ECs are referred to as the Target Ecological Category (TEC).

Water Resource Class (WRC): the desired condition or characteristics of a resource along with the degree to which it can be utilized. It may range from minimally to heavily used, depending on social requirements. The Class is a summary condition recommended for a configuration of water resources within an IUA and between IUAs in a catchment.

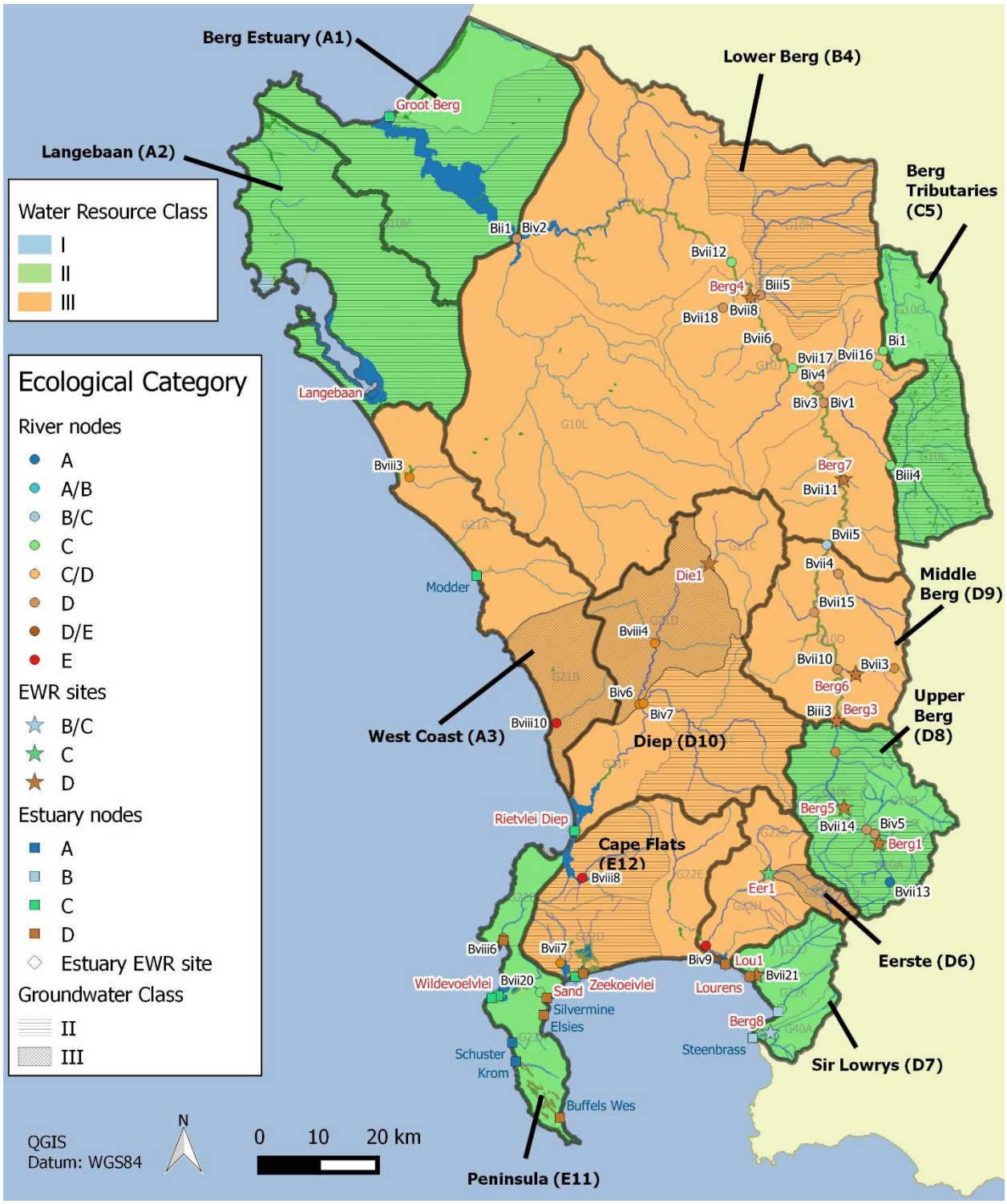


Figure 3 ***Summary of draft Water Resource Classes for the Berg Catchment***

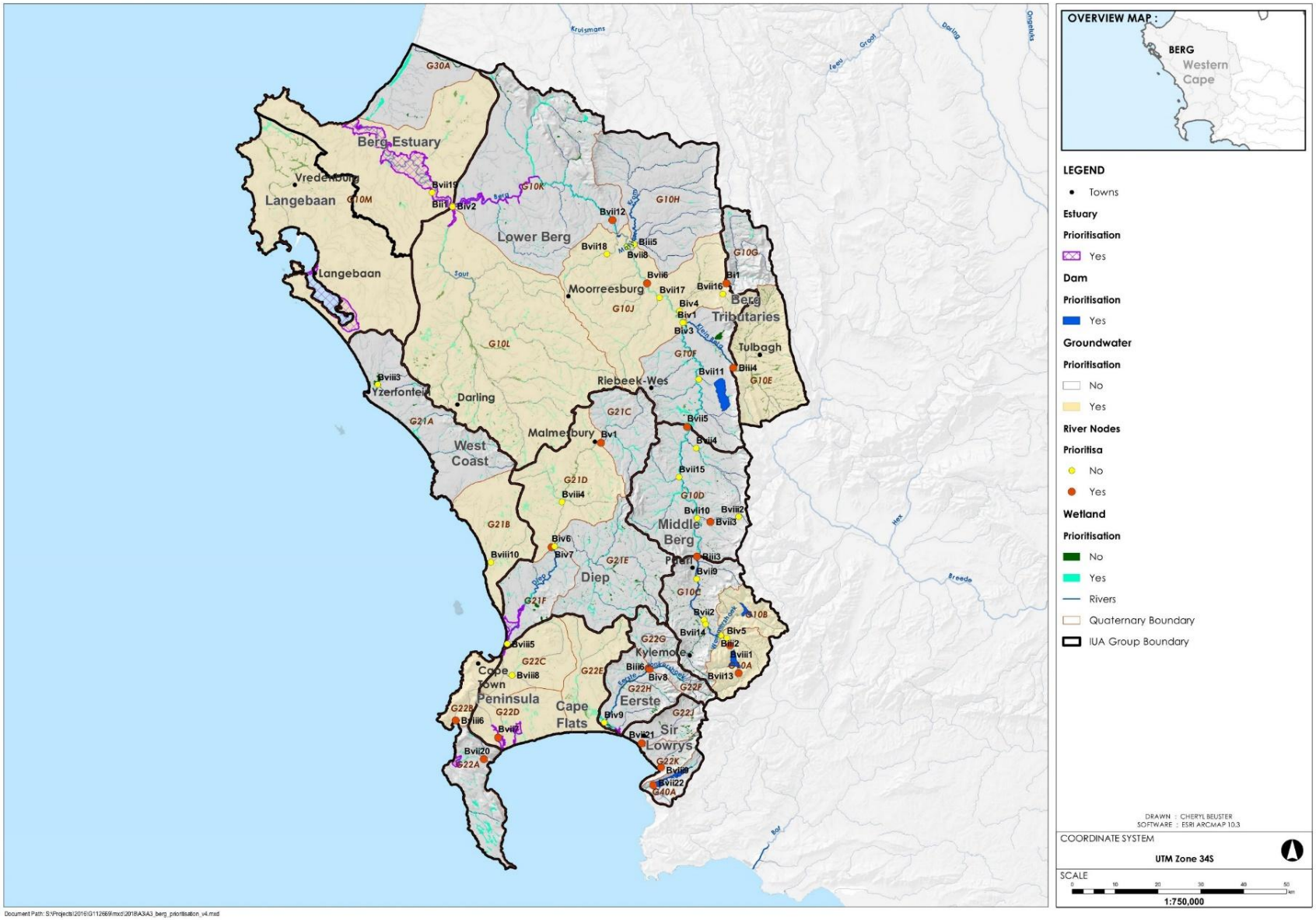


Figure 4 ***Summary of prioritised resource units for Resource Quality Objectives for the Berg Catchment***