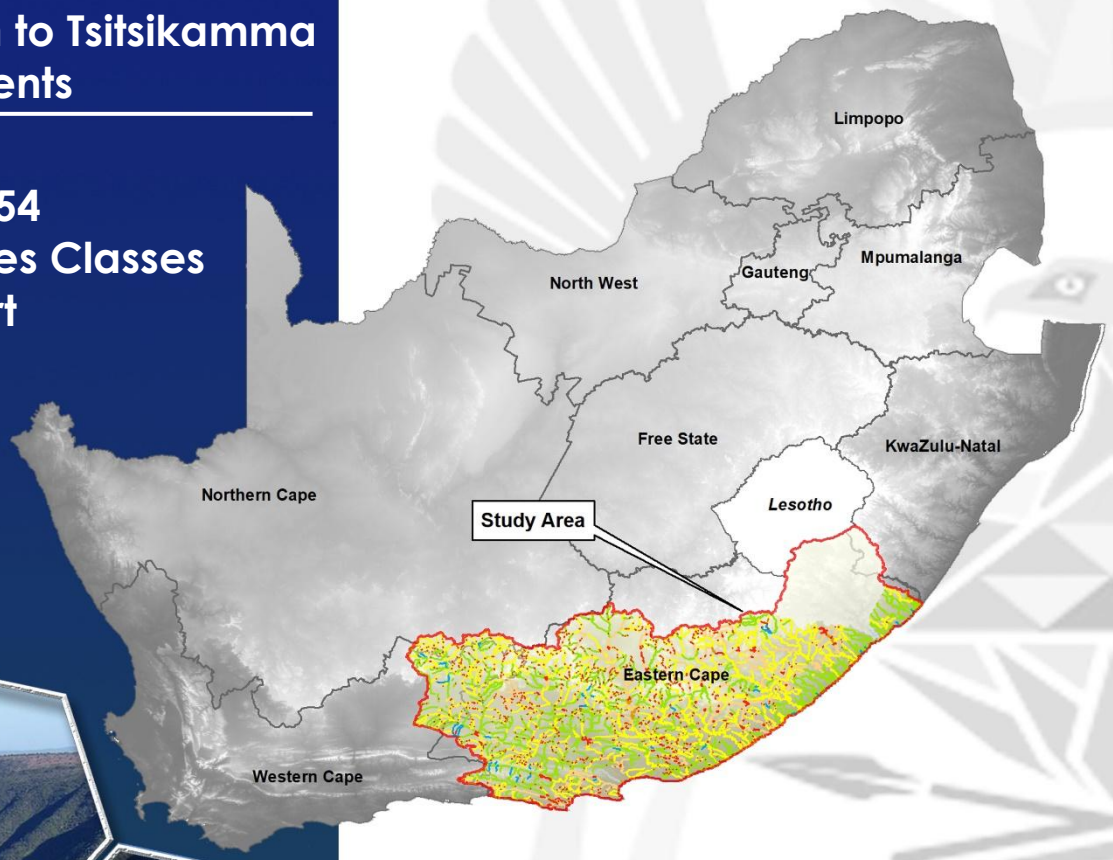
DEPARTMENT OF WATER AND SANITATION

Determination of Water Resource Classes, Reserve and the Resource Quality Objectives in the Keiskamma and Fish to Tsitsikamma Catchments

WP11354
Water Resources Classes Report



REPORT NO.:
WEM/WMA7/00/CON/RDM/2725

April 2025

water & sanitation
Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

Published by

Department of Water and Sanitation
Private Bag X313
Pretoria, 0001
Republic of South Africa

Tel: (012) 336 7500/ +27 12 336 7500
Fax: (012) 336 6731/ +27 12 336 6731

This report is to be cited as:

Department of Water and Sanitation, South Africa. April 2025. Determination of Water Resource Classes, Reserve and RQOs in the Keiskamma and Fish to Tsitsikamma catchment: Water Resources Classes Report No: WEM/WMA7/00/CON/RDM/2725.

Prepared by:

GroundTruth

Title:	*Water Resources Classes Report*
Authors:	*K. Farrell, R. Stassen, L. van Niekerk, R. Schapers*
Project Name:	*Determination of Water Resource Classes, Reserve and RQOs in the Keiskamma and Fish to Tsitsikamma catchment: WP11354*
DWS Report No.:	WEM/WMA7/00/CON/RDM/2725
Status of Report	*Final*
First Issue:	*27 March 2025*
Final Issue:	*28 April 2025*

Approved for Groundtruth: Environment and Engineering

…… …*28 April 2025*……

Dr Mark Graham *Date*

Director, GroundTruth

Supported by:

Mulangaphuma L …… ……

Project Manager *Scientific Manager*

Approved for the Department of Water and Sanitation by:

Lebogang Betty Matlala ……..

Director: Water Resource Classification 30/5/2025

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Bold type indicates this report

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25.0	WEM/WMA7/00/CON/RDM/2525	Final Socio-economic Report
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27.0	**WEM/WMA7/00/CON/RDM/2725**	**Water Resources Classes Report**

LIST OF ACRONYMS

BHN	Basic Human Needs
CMA	catchment management agencies
CD: WEM	Chief Directorate: Water Ecosystems Management
DWS	Department of Water and Sanitation
EC	Ecological Category
EWR	Ecological Water Requirements
IWRM	Integrated Water Resource Management
PES	Present Ecological State
RDM	Resource Directed Measures
REC	Recommended Ecological Category
RQO	Resource Quality Objectives
SQ	Sub-quaternary
TEC	Target Ecological Category
WRYM	Water Resource Yield Models
WRCS	Water Resource Classification System

EXECUTIVE SUMMARY

Background

This phase forms part of the following study: Determination of Water Resource Classes, Reserve and the Resource Quality Objectives in the Keiskamma and Fish to Tsitsikamma Catchments. The purpose of this study is to determine appropriate Water Resource Classes, the Reserve and associated Resource Quality Objectives (RQOs) for all significant water resources in the study area to facilitate sustainable use of the water resources while maintaining ecological integrity. The aim is to implement the Water Resource Classification System (WRCS) (as per Regulation 810, 2010) to determine the Water Resource Classes, following the integrated framework (DWS, 2017), undertake the 7-step process to determine and set RQOs, and determine the Reserve for the water resources of the study area. This will ultimately assist the DWS in the management of the water resources in the study area and making informed decisions regarding the authorisation of future water use and the magnitude of the impacts of proposed developments.

The initial step in the study has been to identify the 19 Integrated Units of Analysis (IUAs) and prioritied water Resource Units (RU) for rivers, estuaries, groundwater, and wetland systems. The EWR quantification phase for rivers and estuaries is complete, and various water resource scenarios have been defined and evaluated for each IUA. This report draws from the Scenarios Report that evaluated the ecological and socio-economic impacts of these scenarios.

Study Area

The study area consists of the water resources of the Keiskamma, Fish to Tsitsikamma catchments and include large drainage areas as well as some smaller coastal systems, including:

- Mbhashe River (part of drainage region T which includes T11, T12 and T13),
- Great Kei River (drainage region S),
- Great Fish (drainage region Q),
- Sundays (drainage region N),
- Gamtoos River (drainage region L),
- Mthatha River (drainage region T20),
- Small coastal rivers in the Pondoland area (drainage regions T60 to T90),
- Keiskamma, Buffalo, Nahoon and Gqunube Rivers (drainage region R),
- Kowie, Kariega and Boesmans Rivers (drainage region P),
- Koega and Swartkops Rivers (drainage region M),
- Krom and Seekoei Rivers (drainage region K90), and
- Tsitsikamma and small coastal rivers (drainage region K80).

Delineated Integrated Units of Analysis

The study area was delineated into 19 Integrated Units of Analysis (IUAs), which are spatial units for determining Water Resource Classes, considering socio-economic, ecological, and biophysical factors (**Figure 1**).

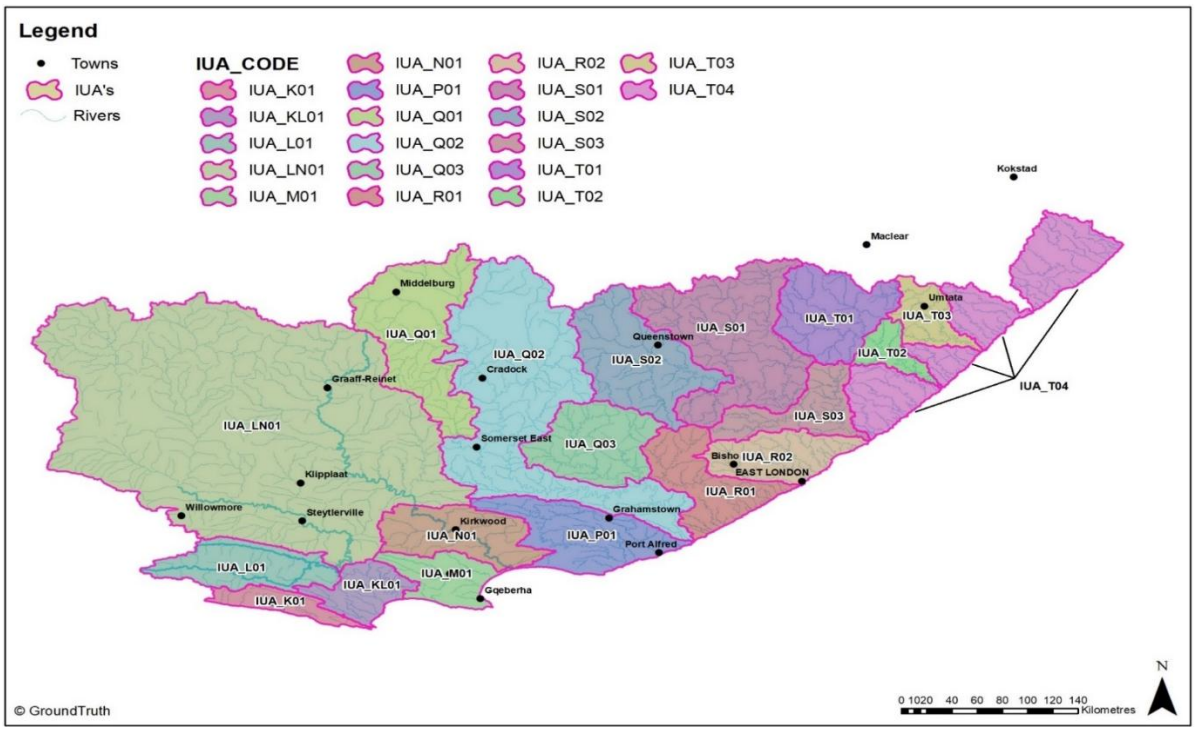

Figure 1: Integrated Units of Analysis

Resource Unit Prioristiation

Delineation and prioritisation of Resource Units (RUs) are essential for setting Resource Quality Objectives (RQOs) tailored to specific water resources. In the Keiskamma, Fish to Tsitsikamma areas, RUs were aligned with Integrated Units of Analysis (IUA) boundaries to avoid overlaps, focusing on ecologically important or stressed areas with high water use, quality impacts, or future development pressures. Priority RUs were identified and the RU Evaluation Tool applied, incorporating multi-criteria decision analysis, and validated through stakeholder consultation. This process aligns with the Resource Directed Measures operationalisation framework, with RQOs to be determined for key components in the next study phase.

Purpose of this Report

This report outlines the Water Resource Classes based on the final scenario for each IUA, forming part of Step 5 in the Classification process and preparing for Step 7, as detailed in “Development of Procedures to Operationalise Resource Directed Measures” (DWS, 2017). Refer to the following for context:

- Ecological Sustainable Base Configuration Scenario Report (Report No. WEM/WMA7/00/CON/RDM/2224)
- Scenarios Report (Report No. WEM/WMA7/00/CON/RDM/2324)
- Ecological and Socio-economic Consequences of the Scenarios Report (Report No. WEM/WMA7/00/CON/RDM/2625).

Approach and Methodology

According to the WRCS guidelines (DWAF, 2007), the classification of an IUA is based on the distribution of selected Ecological Conditions (ECs) for biophysical nodes within it. The Classes are as follows and classified as:

- Class I: Majority of nodes in 'A' or 'B' ECs.
- Class II: Majority in a 'C' EC.
- Class III: Majority in a 'D' EC.

Summary of the water resource classes per IUA

This information leads to the final phase, i.e., the determination of RQOs. In addition to this quantitative information, a suggested monitoring programme with ecological specifications to achieve and maintain the RQOs (and TEC) will also be provided. This will also form part of information that will be considered for the implementation plan.

Refer to **Table 1** and **Figure 1** for the Water Resource Classes per IUA. Priority wetland, estuary, and groundwater systems have been flagged for stricter RQOs in the next phase of the study, especially those within Class I IUAs. This aims to ensure these resources receive the necessary protection and maintenance, particularly if located within a Class II or Class III IUA, where developmental pressures demand robust measures for their protection and sustainability.

Table 1: Water Resource Class per IUA

IUA	IUA code	Percentage (%) of SQ reaches in the IUA falling into the indicated EC groups					Water Resource Class
		A orA/B	B or B/C	C or C/D	D	>D	
1*	IUA_K01	21.7	13.0	39.1	26.1	0.0	II
2*	IUA_KL01		3.2	35.5	54.8	6.5	III
3	IUA_L01	16.7	35.2	25.9	18.5	3.7	II
4*	IUA_M01	4.8	14.3	4.8	47.6	23.8	III
5	IUA_LN01	2.1	31.9	54.2	11.0	0.8	II
6*	IUA_N01	5.6	27.8	30.6	16.7	19.4	II
7*	IUA_P01	0.0	23.5	52.9	22.1	1.5	II
8	IUA_Q01		39.0	48.8	11.0	1.2	II
9*	IUA_Q02	0.5	29.5	45.9	16.9	7.1	II
10	IUA_Q03	1.4	30.0	60.0	8.6		II
11*	IUA_R01	2.9	41.4	47.1	8.6		II
12*	IUA_R02	10.6	31.8	37.9	15.2	4.5	II
13	IUA_S01	0.7	21.4	53.6	24.3		II
14	IUA_S02		33.8	56.9	7.7	1.5	II
15	IUA_S03	2.2	28.9	55.6	13.3		II
16	IUA_T01		4.0	62.0	30.0	4.0	II
17	IUA_T02		18.2	72.7	9.1		II
18	IUA_T03			52.4	38.1	9.5	III
19*	IUA_T04	22.3	59.9	15.3	2.5	0.0	I
**IUAs whereby the estuaries PES results were included in the configuration*							

Important to note that during the RQO phase of the study, additional priority water resources will be identified within those IUAs classified as Class II or Class III. Class II denotes areas of moderate ecological sensitivity and developmental pressure, allowing limited utilisation while preserving ecological functions. Class III represents areas of high developmental demand or ecological significance, necessitating more stringent management measures. Flagging these resources ensures their protection and maintenance within these IUAs, supporting their long-term sustainability.

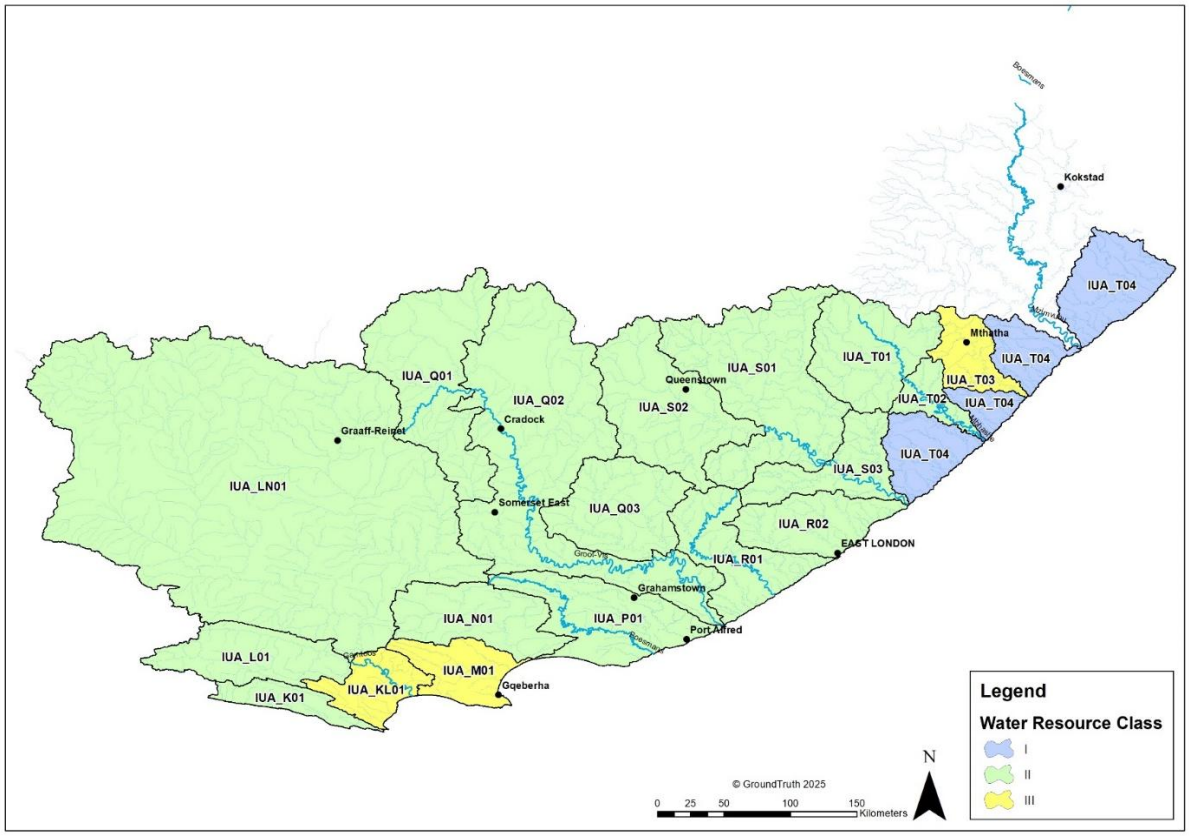

Figure 1: Water Resource Classes per IUA throughout the Keiskamma, Fish to Tsitsikamma study area

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1. INTRODUCTION

1.1 Background

The National Water Act, 1998 (No. 36 of 1998) (NWA) is founded on the principle that National Government has overall responsibility for and authority over water resource management for the benefit of the public without affecting the functioning of water resource systems. To achieve this objective, Chapter 3 of the NWA provides for the protection of water resources through the implementation of Resource Directed Measures (RDM). These measures are protection-based and include Water Resource Classification, determination of the Reserve and setting the associated Resource Quality Objectives (RQOs). These measures collectively aim to ensure that a balance is reached between the need to protect and sustain water resources, while allowing socio-economic development.

The provision of water required for the maintenance of the natural functionality of the ecosystem and provision of Basic Human Needs (BHN) is the only right to water in the National Water Act (No. 36 of 1998) (NWA). The other water users from a strategic use who are second in line to other water users are subject to formal gazetted General Authorization and water use authorization as per Section 21 of the NWA.

The Department of Water and Sanitation, through the Chief Directorate: Water Ecosystems Management (CD: WEM), has initiated a study for the determination of Water Resource Classes, Reserve and associated Resource Quality Objectives for the identified significant water resources in the Keiskamma and Fish to Tsitsikamma catchments. The water resource components included for this study are rivers, wetlands, groundwater and estuaries. The Reserve determination include both the water quantity and quality of the Ecological Water Requirements (EWR) and Basic Human Needs (BHN). This will ensure the availability of water required to protect aquatic systems (i.e. the EWR) and that the essential needs of individuals that are directly dependent on these water resources (i.e. BHN) are met.

1.2 Purpose of this study

The Keiskamma and Fish to Tsitsikamma catchments within the Mzimvubu to Tsitsikamma Water Management Area (WMA 7) are amongst many waters stressed catchments in South Africa. These areas are important for conservation and have recognisable protected areas, natural heritage, cultural and historical sites that require protection. However, water use from surface as well as groundwater for agricultural and domestic purposes are high, especially in the more arid catchments, impacting on the availability of water resources for the protection of the aquatic ecosystems. Industrial practices and domestic water use are on the rise in some of these catchments, especially around the major towns and cities. Water transfers into the study area from adjacent WMAs and within the study area and numerous storage dams changes the natural flow patterns, impacting on the aquatic biota.

Thus, the main purpose of the study is to determine, appropriate Water Resource Classes, the Reserve and set associated RQOs for all significant water resources in the study area to facilitate sustainable use of the water resources while maintaining ecological integrity.

The aim is to:

- implement the Water Resource Classification System (WRCS) (Regulation 810, 2010) to determine the Water Resource Classes (classes ranging from 1 – 3);
- follow the integrated framework (DWS, 2017);
- undertake the 7-step process to determine and set RQOs; and
- determine the Reserve for the significant water resources in the study area.

This will ultimately assist the DWS in the management of the water resources in the study area and aid in the making of informed decisions regarding the authorisation of future water use and the magnitude of the impacts of proposed developments. It must be noted that the protection and management of water resources should be done in an integrated manner, hence from source to sea. This illustrates the importance of realising that IWRM requires the co-operation and buy-in of stakeholders in the catchment and hence the forming of partnerships is essential i.e. water forums, catchment management agencies (CMA), Integrated Development Management Plans, Estuarine Management plans etc. The Integrated Water Resources Management (IWRM) also relies heavily on co-operative governance. Representative participation on the platforms that the Department creates through studies such as this, is in the form of Project Steering Committees, but the latter is but one example, of inviting integrated participation.

1.3 Purpose of this report

The purpose of this report is to document the Water Resource Classes based on the final selected scenario per IUA. The results form part of **Step 5**: Determine Water Resource Classes (based on catchment configuration for the identified scenarios) of the integrated steps for Classification, Reserve and RQOs. Furthermore, this step is in preparation for the last and final **Step 7** under the Classification steps, as outlined in the study, “Development of Procedures to operationalise Resource Directed Measures (DWS, 2017)” (**Figure 1-1**).

It is imperative that this report is read in conjunction with the Ecological Sustainable Base Configuration Scenario Report (Report No. WEM/WMA7/00/CON/RDM/2224), the Scenarios Report (Report No. WEM/WMA7/00/CON/RDM/2324) and the Ecological and Socio-economic Consequences of the Scenarios Report (Report No. WEM/WMA7/00/CON/RDM/2625).

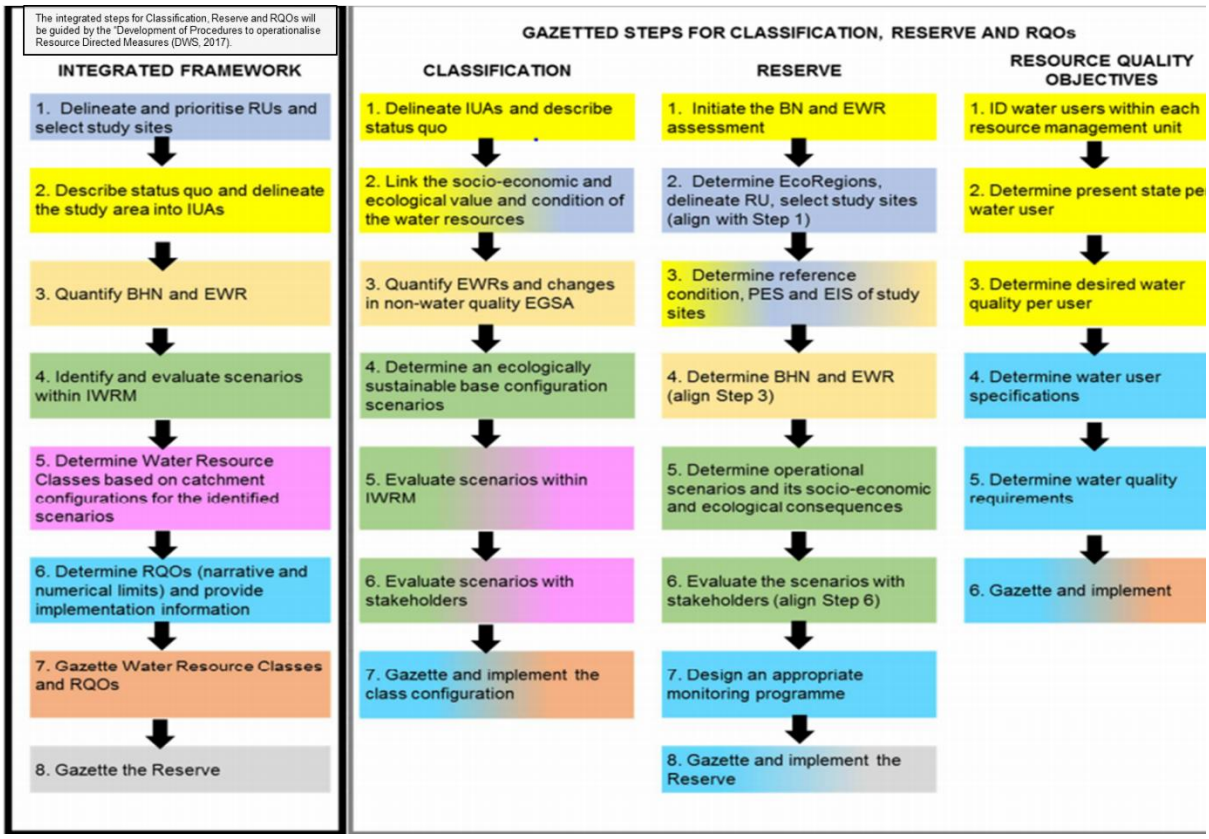

Figure 1-1: Integrated steps for the determination of the Reserve (DWS, 2017)

2. OVERVIEW OF STUDY AREA

The study area forms part of the Mzimvubu to Tsitsikamma WMA7 as indicated in **Table 2-1, Figure 2-1** to **Figure 2-3.** The water resources of the Mzimvubu River (T31 – T36) are not included as part of the study as those water resources have been classified and gazetted in 2017. Secondary catchments T40 (Mtamvuna) and T50 (Mzimkhulu) form part forms part of the Upongola Mzimkhulu Water Management Area (WMA4). A detailed overview and status quo of the study area in terms of the rivers, wetlands, estuaries and groundwater, water resource infrastructure and socio-economics has been presented in the delineation of IUAs Report (Report Number: WEM/WMA7/00/CON/RDM/0322).

Table 2-1: Main catchments and rivers in the study area

Primary catchment	Sub-catchment	Main River	Associated Rivers	Main Estuaries	Catchment Area (1) (km^2)
K	K80A-F	Tsitsikamma	Elandsbos, Kleinbos, Storms, Elands, Groot, Klasies, Klipdrift	Tsitsikamma, Elandsbos, Storms, Elands, Groot	1 206
	K90A-G	Krom	Seekoei, Kabeljous	Krom, Seekoei, Kabeljous	1 558
L	L11, L12, L21, L22, L23, L30, L40, L50, L60, L70, L81, L82, L90	Gamtoos	Sout, Buffels, Kariga, Plessis, Heuningklip, Groot, Baviaanskloof, Kouga	Gamtoos, Buffels, Groot	34 816
M	M10, M20, M30	Swartkops	Van Stadens, Maitland, Bakens, Papkuils, Coega	Swartkops, Van Stadens, Maitland, Coega	2 630
N	N11, N12, N13, N14, N21, N22, N23, N24, N30, N40	Sundays	Kamdeboo, Gats, Melk, Bul, Voel, Kariega	Sundays	21 248
P	P10, P20, P30, P40	Boesmans	Diepkloof, Boknes, Kariega, Kowie, Kasouga, Riet, Wes-Kleinemonde, Oos-Kleinemonde	Boesmans, Boknes, Kariega, Kowie, Kasouga, Riet, Wes-Kleinemonde, Oos-Kleinemonde	5 322
Q	Q11, Q12, Q13, Q14, Q21, Q22, Q30, Q41, Q42, Q43, Q44, Q50, Q60, Q70, Q80, Q91, Q92, Q93, Q94	Great Fish	Groot-Brak, Pauls, Tarka, Baviaans, Koonap, Little Fish, Kat	Great Fish	30 243
R	R10, R20, R30, R40, R50	Keiskamma	Tyume, Buffalo, Nahoon, Qinira, Gqunube, Kwelera, Kwenxura, Quko, Tyolomnqa, Gxulu, Bhirha, Mgwalana	Keiskamma, Buffalo, Nahoon, Qinira, Gqunube, Kwelera, Kwenxura, Quko, Tyolomnqa, Gxulu, Bhirha, Mgwalana	7 936

Primary catchment	Sub-catchment	Main River	Associated Rivers	Main Estuaries	Catchment Area [1] (km^2)
S	S10, S20, S31, S32, S40, S50, S60, S70	Great Kei	White-Kei, Indwe, Klipplaat, Klaas Smit, Black-Kei, Tsomo, Kubusi, Gcuwa	Great Kei	20 485
T	T11, T12, T13, T20, T60, T70, T80, T90	Mbashe, Mthatha	Xuka, Mgwali, Mthatha, Mzamba, Mtentu, Msikaba, Mzintlava, Mntafufu, Mngazi, Mngazana, Mtakatye, Mdumbi, Nenga, Mncwasa, Xora, Nqabarha, Shixini, Qhorha, Kobonqaba	Mbashe, Mgwali, Mthatha, Mzamba, Mtentu, Msikaba, Mzintlava, Mntafufu, Mngazi, Mngazana, Mtakatye, Mdumbi, Nenga, Mncwasa, Xora, Nqabarha, Shixini, Qhorha, Kobonqaba	17 938
			Total catchment area		**143 382**

[1] *WR2012 Data*

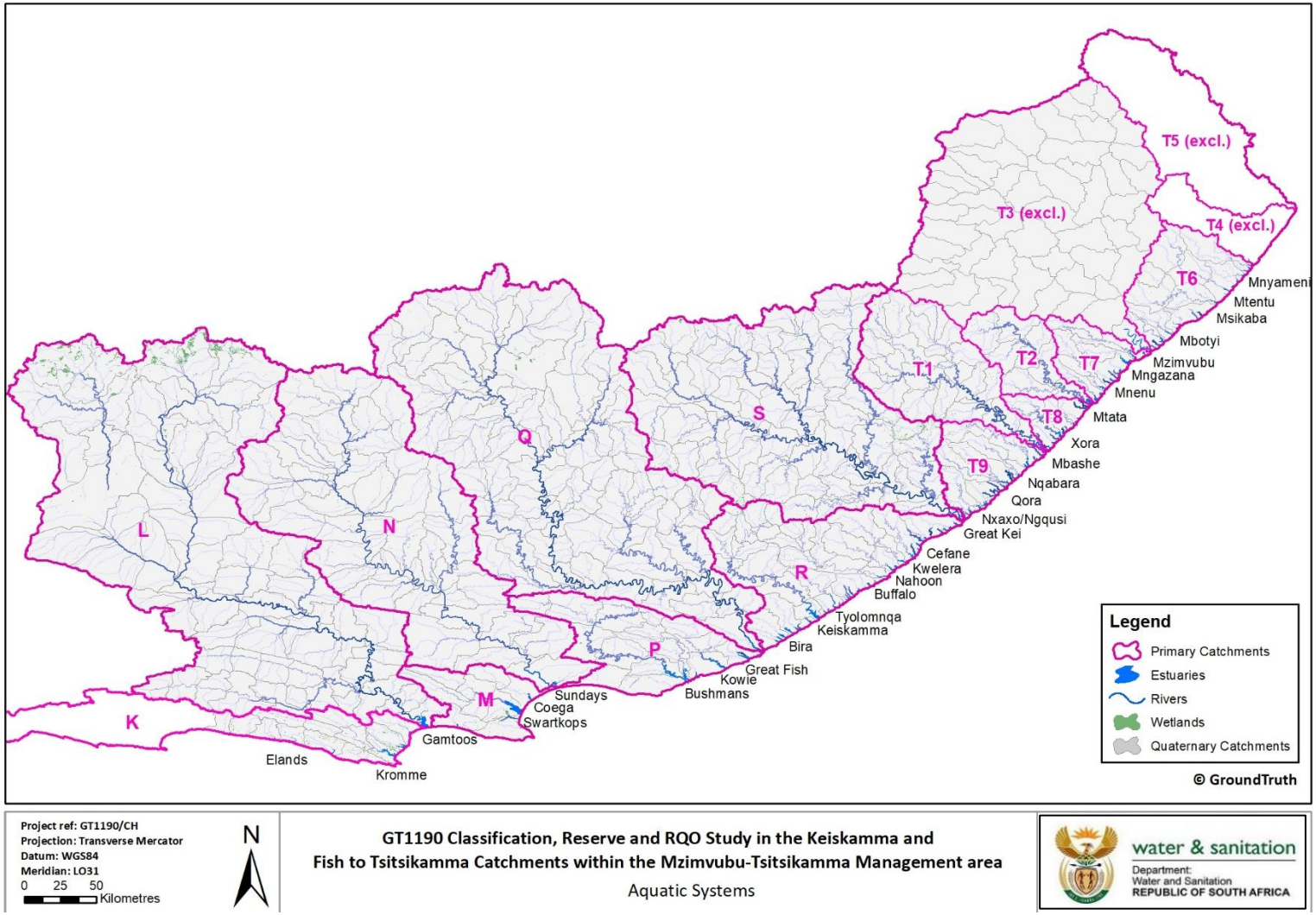

Figure 2-1: Map illustrating the study area for the Keiskamma, Fish to Tsitsikamma

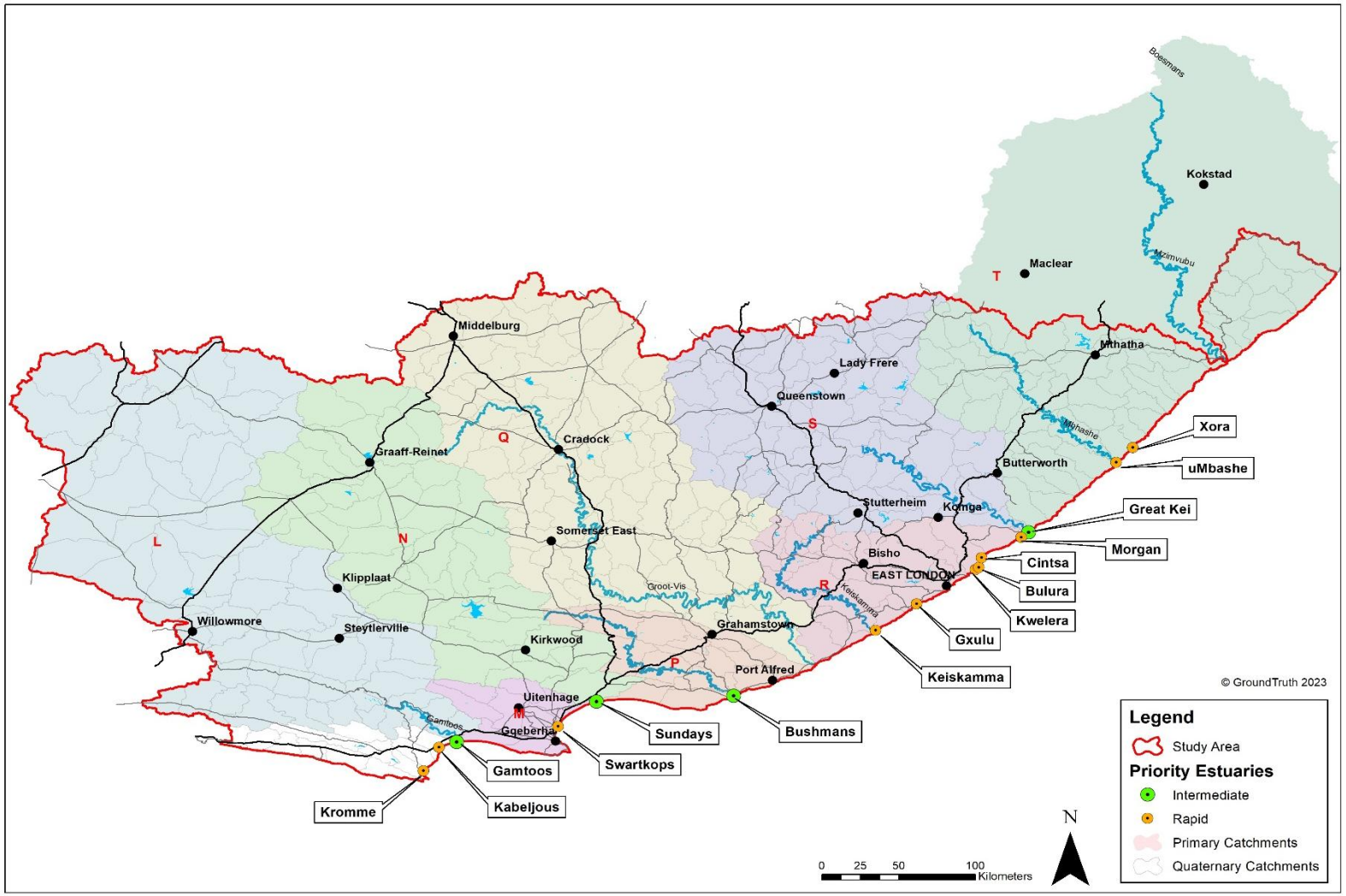

Figure 2-2: Overview of the greater study area (primary catchments)

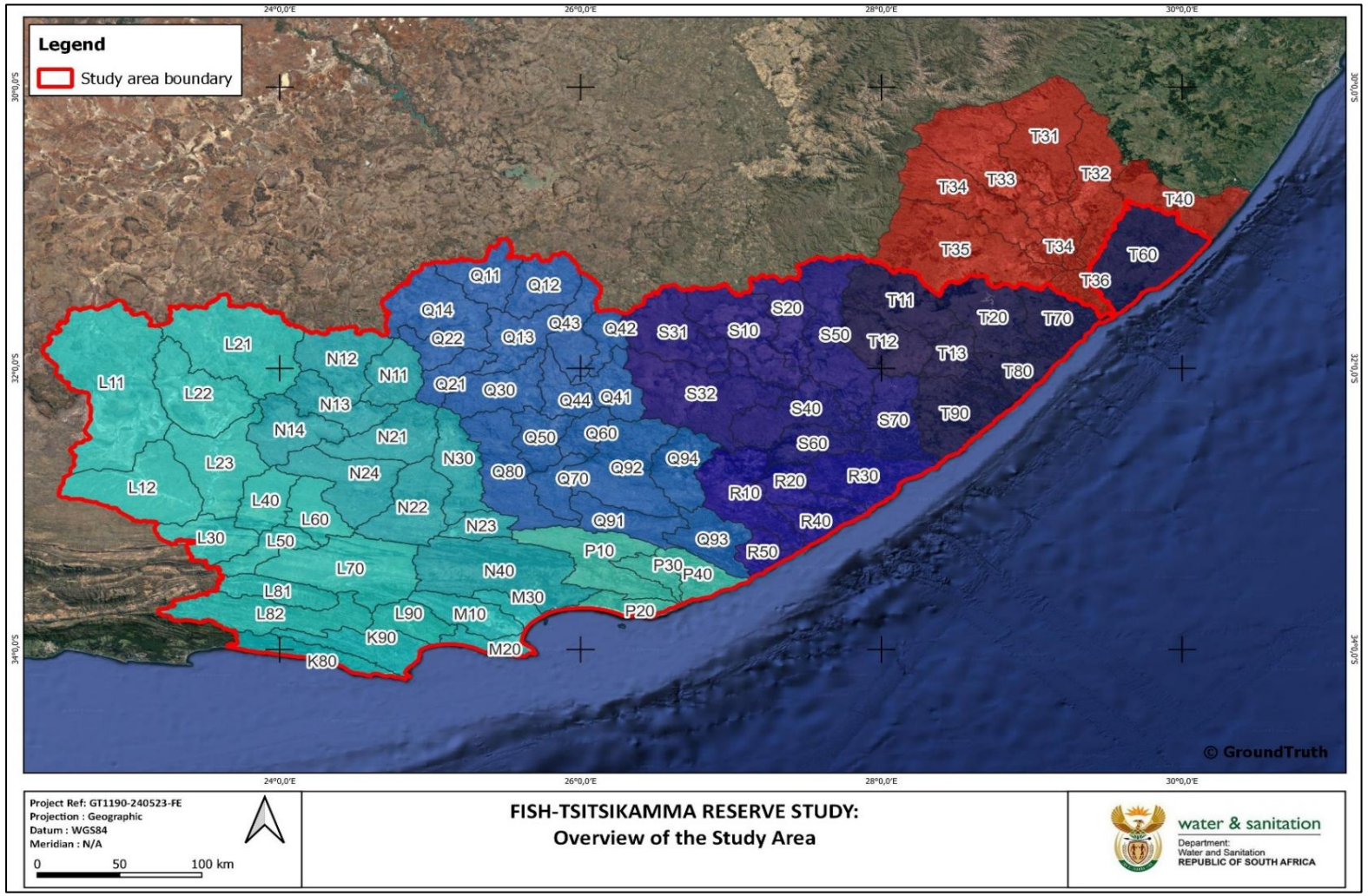

Figure 2-3: Overview of the greater study area (tertiary catchments)

3. OVERVIEW OF THE INTEGRATED UNITS OF ANALYSIS AND PRIORITY RIVERS AND ESTUARIES

3.1 Integrated Units of Analysis

Integrated Units of Analysis (IUAs) are spatial units of distinct uniqueness relatively defined by complex socially, economically, culturally and ecologically systems and their interactions and consisting of significant water resources for which Water Resource Classes are determined. The delineation of the various catchment areas was done primarily according to several socio-economic criteria and the boundaries of water resource components or catchments, taking into consideration ecological information and biophysical characteristics. These IUAs for this study were used for the assessment of the ecological and socio-economic implications and/ or consequences of the different scenarios with the ultimate objective to determine Water Resource Classes per IUA.

Due to the large number of catchments and the diversity in the water resources (aquatic ecosystems, groundwater systems, estuaries, wetlands, water infrastructure) and socio/ cultural and economic aspects, 19 IUAs were identified for the study area. These are illustrated in **Figure 3-1** and listed in **Table 3-1,** along with detailed descriptions, aligned priority river EWR sites and estuaries, their identified Recommended Ecological Categories (REC), and associated flow values.

Table 3-1: Description of the delineated Units of Analysis for the study area

IUA	IUA code	Description	Quaternary Catchments
1	IUA_K01	Tsitsikamma and headwaters of Kromme to Churchill Dam	K80A-F, K90A-B
2	IUA_KL01	Kromme from Churchill Dam to estuary and Gamtoos	K90C-G, L90A-C
3	IUA_L01	Kouga to Kouga Dam, Baviaanskloof	L81A-D, L82A-J
4	IUA_M01	M primary catchment	M10A-D, M20A-B, M30A-B
5	IUA_LN01	Groot to Kouga confluence, Upper Sundays to Darlington Dam	L11A-G, L12A-D , L21A-F, L22A-D, L23A-D, L30A-D, L40A-B, L50A-B, L60A-B, L70A-G, N11A-B, N12A-C, N13A-C, N14A-D, N21A-D, N22A-E, N23A-B, N24A-D, N30A-C
6	IUA_N01	Sundays downstream Darlington Dam	N40A-F

IUA	IUA code	Description	Quaternary Catchments
7	IUA_P01	P primary catchment	P10A-G, P20A-B, P30A-C, P40A-D
8	IUA_Q01	Fish	Q11A-D, Q14A-E, Q21A-B, Q22A-B, Q30A-B, Q80A-C
9	IUA_Q02	Great Fish	Q12A-C, Q13A-C, Q30C-E, Q41A-D, Q42A-B, Q43A-B, Q44A-C, Q50A-C, Q60A-C, Q70A-C, Q80D-G, Q91A-C, Q93A-D
10	IUA_Q03	Koonap and Kat	Q92A-G, Q94A-F
11	IUA_R01	Keiskamma	R10A-M, R40A-C, R50A-B
12	IUA_R02	Buffalo/ Nahoon	R20A-G, R30A-F
13	IUA_S01	Upper Great Kei	S10A-J, S20A-D, S40A-F, S50A-J
14	IUA_S02	Black Kei	S31A-G, S32A-M
15	IUA_S03	Lower Great Kei	S60A-E, S70A-F
16	IUA_T01	Upper Mbashe, Upper Mthatha	T11A-H, T12A-G, T20A
17	IUA_T02	Lower Mbashe	T13A-E
18	IUA_T03	Lower Mthatha	T20B-G
19	IUA_T04	Pondoland coastal	T60A-K, T70A-G, T80A-D, T90A-G

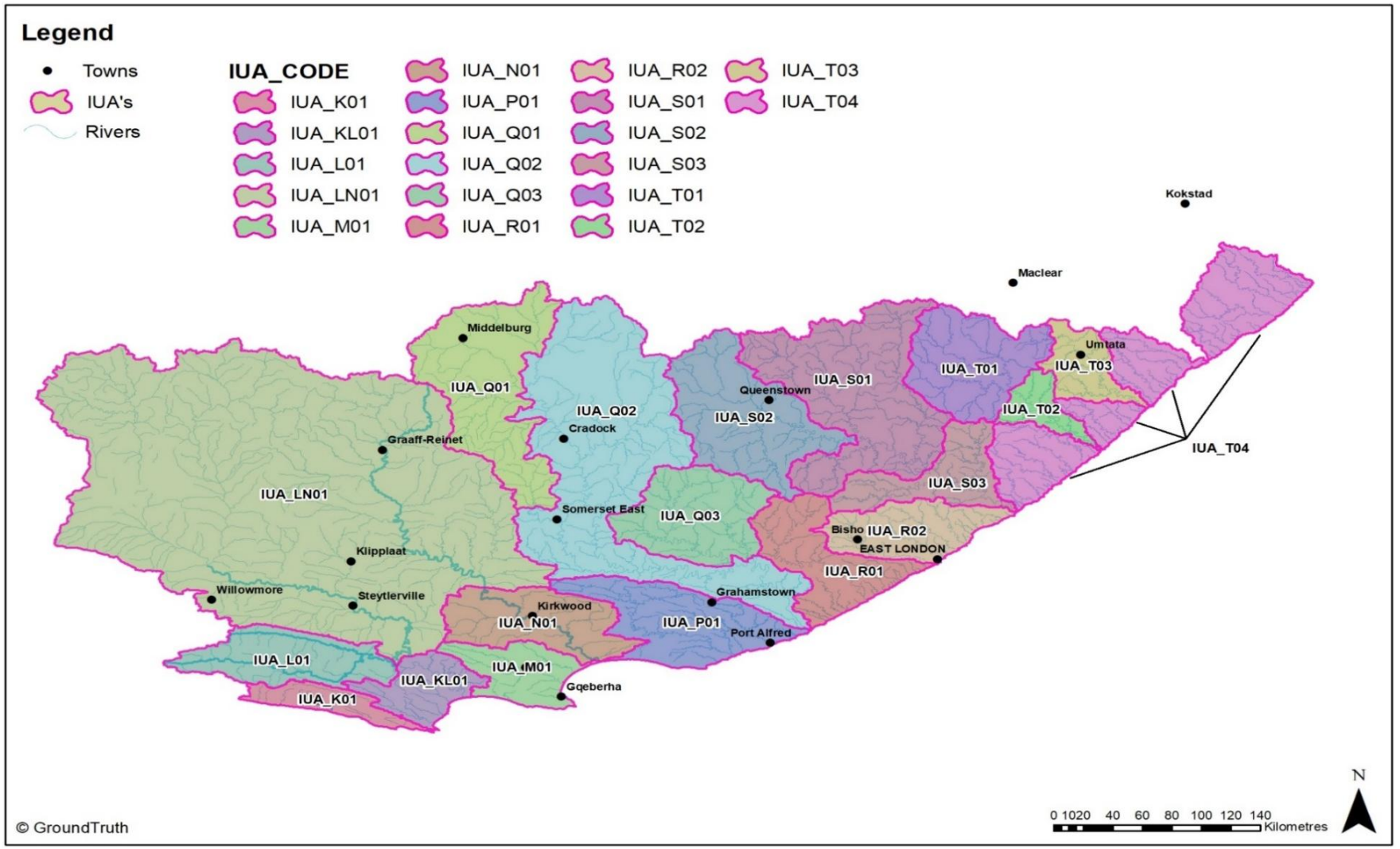

Figure 3-1: Integrated Units of Analysis

4. SUMMARY OF THE WATER RESOURCE SCENARIOS AND CONSEQUENCES

The hydrological modelling used the data and WRSM2000 models available from Water Resources of South Africa, 2012 Study (WR2012) and more recent hydrological analysis where available (Algoa and Amathole systems) as a foundation, which were then updated and converted to Water Resource Yield Models (WRYM), where applicable. The WR2012 dataset covers the hydrology from 1920 to 2009 (hydrological years), whereas the updated hydrology was available for the period 1920 to 2023. The models were created per river system/ IUA and various IUA models were joined where appropriate due to inter-basin transfers. The models for the Algoa (Nelson Mandela Bay Metropolitan Municipality) and Amathole (Buffalo City Metropolitan Municipality) systems were handled slightly differently. The Algoa model is a combination of the WR2012's WRSM2000 models (Groot, Swartkops and Coastal Catchments) and new models developed as part of the Water Availability Assessment Study (WAAS). The Amathole model was created as part of the Buffalo City Reconciliation Strategy.

The final list of models includes Algoa (WRYM); Amathole (WRYM); Great Kei with Mbashe (WRYM); Keiskamma (WRYM); Fish-Sundays (WRYM); Mthatha (WRYM); Msikaba (WRYM); Mngazi (WRYM); and Bushmans, Kariega, Kowie, East Kleinemonde (WRYM).

The models were used to simulate the hydrological flow records for the catchments / IUAs and ranged from 83 to 101 years for the various development levels of the catchments / IUA in the study area. The time series of average monthly flows and water supply volumes were then processed to get the average annual volumes at all the key sites.

Overall, five (5) water resource scenarios were identified for the purpose of this study. A summary of these is provided in

Table 4-1 below. Furthermore, the scenarios modelled are presented in **Table 4-2**. All scenarios were assessed from an ecological and socio-economic consequence perspective per IUA within the study area and the results were used to inform the Water Resource Classes as presented in this Report. Please refer to the Scenarios Report (Report No. WEM/WMA7/00/CON/RDM/2324) for further detailed information pertaining to the identified water resource scenarios and results.

Table 4-1: Summary of water resource scenarios for the study

Scenario	Scenario descriptions	
Scenario 1 (Sc1)	Present Day Demands	• Sc1a (without EWR) – "modelling flows in rivers/ estuaries and supply to users without EWR"
		• Sc1b (with EWR - rivers) – "the EWR for REC for rivers were included into the models and prioritised to ensure the flows are provided to meet the ecological need. Socio-economic consequences were assessed for potential trade-offs"
Scenario 2 (Sc2)	Medium Term (2030)	• Sc2a (without EWR)
		• Sc2b (with EWR - rivers)
Scenario 3 (Sc3)	Long Term (2050)	• Sc3a (without EWR) • Sc3.1a (intervention alternative scenario without EWR)
		• Sc3b (with EWR - rivers) • Sc3.1b (intervention alternative scenario with EWR for rivers)
Scenario 4	Water quality (considered and predicted)	• Only selected IUAs were assessed where water quality was identified to be of a concern. The future water quality status (either deterioration or improvement) is based on Sc1b – the present day status of the water quality, along with the EWR for the REC for rivers and/or estuaries.

Scenario 5	Climate Change (considered and predicted)	• Reduced availability of flow projections were used and interpreted;
		• Only one climate change scenario was assessed for the following IUAs:
		  • IUA_K01 (Kromme River);
		  • IUA_KL01 (Gamtoos River);
		  • IUA_L01 (Kouga River); and
		  • IUA_M01 (Swartkops River).

Table 4-2: Scenarios modelled per IUA

IUA		Sc No.	Water Requirements (million m^3/year)	Augmentation Interventions (million m^3/year)
No.	Code			
1	IUA_K01	Sc1	Forestry & Invasives (35.3) Irrigation (11.2)	
2	IUA_KL01	Sc1	Forestry & Invasives (6.8) Irrigation (77.9) **Kromme:** Kareedouw (0.26) Coastal Towns(8.08) **Gamtoos** Hankey/Patenise(2.01)	Kouga LM additional groundwater development to augment and supplement existing surface water allocations from Churchill & Kouga Dams. (2.2) **Kromme:** Supply to Nelson Mandela Bay (-) **Gamtoos:** Supply to Nelson Mandela Bay (-)
		Sc2	**Kromme:** Kareedouw (0.301) Coastal Towns(8.08) **Gamtoos** Hankey/Patenise(2.01)	Groundwater development for Kouga LM **Kabeljous:** Removal of illegal dams (10%) and associated irrigators. Removal of AIPs *Schoenmakerskop Desalination (60 Ml/d) as per IUA_M01
		Sc3	**Kromme:** Kareedouw (-) Coastal Towns(8.08) **Gamtoos** Hankey/Patenise(2.01)	**Same as Sc2 with,** Sc3: Guernakop (*from IUA_L01) added to Desalination (*from IUA_M01) for final iteration Sc3.1: Guernakop without Desalination

IUA		Sc No.	Water Requirements (million m^3/year)	Augmentation Interventions (million m^3/year)
No.	Code			
				Sc3.2: Raised Kouga without Desalination
3	IUA_L01	Sc1	Forestry & Invasives (0) Irrigation (36.8)	
		Sc2		
		Sc3		Proposed Guernakop Dam on Kouga River to supply (33.945)*
4	IUA_M01	Sc1	Forestry & Invasives (32.5) Irrigation (8) **Swartkops:** Nelson Mandela Bay Metro (110.75 MCM)	**Coega:** Nooitgedagt / Coega Low Level Scheme (Up to 160 Ml/d)
		Sc2	**Swartkops:** Nelson Mandela Bay Metro (126.2)	**Swartkops:** Groundwater development (0.4) **Coega:** Nooitgedagt / Coega Low Level Scheme (Up to 76.52) Schoenmakerskop Desalination (60 Ml/d)
		Sc3	**Swartkops:** Nelson Mandela Bay Metro (151.6)	Same as Sc2.
5	IUA_LN01	Sc1	Forestry & Invasives (1.5) Irrigation (367.7)	

IUA		Sc No.	Water Requirements (million m^3/year)	Augmentation Interventions (million m^3/year)
No.	Code			
			Groot: Klipplaat (0.678) **Sundays:** Robert Sobukwe (Graaff-Reinet) (5.2)	
		Sc2	**Groot:** Klipplaat (0.779) **Sundays:** Robert Sobukwe Graaff-Reinet (5.802)	**Groot:** Groundwater development (0.2) **Sundays:** Groundwater development (0.82) Re-use of water in Robert Sobukwe (Graaf-Reinet) (3.64)
		Sc3	**Groot:** Klipplaat (0.960) **Sundays:** Robert Sobukwe (Graaf-Reinet) (6.836)	Same as Sc2.
6	IUA_N01	Sc1	Forestry & Invasives (0.3) Irrigation (180.4) **Sundays:** Kirkwood, Addo, Enon (4.0025)	Supply to Nelson Mandela Bay (76.55)
		Sc2	**Sundays:** Kirkwood, Addo, Enon (4.88)	Supply to Nelson Mandela Bay (76.55)
		Sc3	**Sundays:**	Supply to Nelson Mandela Bay (76.55)

IUA		Sc No.	Water Requirements (million m^3/year)	Augmentation Interventions (million m^3/year)
No.	Code			
			Kirkwood, Addo, Enon (5.947)	
7	IUA_P01	Sc1	Forestry & Invasives (10.3) Irrigation (17.7) **Kariega:** Makhanda (Grahamstown) (8.87) Port Alfred (2.23)	**Fish:** Allocation from Glen Melville Dam (6.57) Water for Port Alfred is supplied from groundwater and desalination to those sources capacity. The balance is from local surface water.
		Sc2	**Kariega:** Makhanda (Grahamstown) (9.92) Port Alfred (2.0)	**Fish:** Increased allocation from Glen Melville Dam (7.62)
		Sc3	**Kariega:** Makhanda Grahamstown (10.33) Port Alfred (2.506)	**Fish:** Increased allocation from Glen Melville Dam (8.03)
8	IUA_Q01	Sc1	Forestry & Invasives (0) Irrigation (15.1) **Fish:** Inxuba (Cradock) (1.715)	
		Sc2	**Fish:** Inxuba (Cradock) (1.9335)	**Fish:** Groundwater development (0.7)
9	IUA_Q02	Sc1	Forestry & Invasives (1.4) Irrigation (506.7)	**Fish:** Partial supply to Makhanda (Grahamstown) (6.57)

IUA		Sc No.	Water Requirements (million m^3/year)	Augmentation Interventions (million m^3/year)
No.	Code			
			Fish: Cookhouse & Sommerset East (2.447)	
		Sc2	**Fish:** Cookhouse & Sommerset East (2.824)	**Fish:** Groundwater development (0.7) Partial supply to Makhanda (Grahamstown) (7.62)
		Sc3		**Fish:** Groundwater development (0.7) Partial supply to Makhanda (Grahamstown) (8.03)
10	IUA_Q03	Sc1	Forestry & Invasives (1.3) Irrigation (31.7) **Kat:** KwaMaqoma (Fort Beaufort), Seymour, Balfour (3.113) **Koonap:** Adelaide, Bedford (1.306)	Fish Transfer scheme provides some support to supply to Adelaide and Bedford.
		Sc2	**Kat:** KwaMaqoma (Fort Beaufort), Seymour, Balfour (3.113) **Koonap:** Adelaide, Bedford (1.306)	**Kat:** Groundwater development (0.7)
		Sc3	**Kat:** KwaMaqoma (Fort Beaufort), Seymour, Balfour (3.113) **Koonap:** Adelaide, Bedford (1.306)	Same as Sc2. **Sc3.1** **Koonap:** Foxwood Dam

IUA		Sc No.	Water Requirements (million m^3/year)	Augmentation Interventions (million m^3/year)
No.	Code			
11	IUA_R01	Sc1	Forestry & Invasives (15.6) Irrigation (16.4) **<u>Keiskamma:</u>** Peddie (2.68) Dimbaza (7.29) Debe (0.78) ADM (2.33)	Identifying and addressing unlawful irrigation, especially on Keiskamma (Not modelled)
		Sc2	**<u>Keiskamma:</u>** Peddie (3.72) Dimbaza (10.39) Debe (1.37) ADM (2.83)	
		Sc3	**<u>Keiskamma:</u>** Peddie (-) Dimbaza (-) Debe (-) ADM (3.39)	
12	IUA_R02	Sc1	Forestry & Invasives (9.7) Irrigation (2.9) **Amathole:** Buffalo City (91.41) Amathole District (3.35)	

IUA		Sc No.	Water Requirements (million m^3/year)	Augmentation Interventions (million m^3/year)
No.	Code			
		Sc2	**Amathole:** Buffalo City (102.05) Amathole District (3.96)	**Buffalo City:** Water Reuse (20) **Amathole:** Groundwater (3.3)
		Sc3	**Amathole:** Buffalo City (120.66) Amathole District (4.71)	**Buffalo City:** Water Reuse (26) Wesselshoek Dam (10.9) **Amathole:** Groundwater (3.3)
13	IUA_S01	Sc1	Forestry & Invasives (7.2) Irrigation (36.1) **White Kei:** Emalahleni LM (2.42) **Tsomo:** Intsika LM (4.833)	
		Sc2	**White Kei:** Emalahleni LM (2.51) **Tsomo:** Intsika LM (4.84)	**Tsomo:** Additional abstraction to ADM Eskom (80) Irrigators (22) (80% AOS) Domestic (10) (98% AOS) Groundwater development (0.1) Extension of the Tsojana Scheme (0.12)

IUA		Sc No.	Water Requirements (million m^3/year)	Augmentation Interventions (million m^3/year)
No.	Code			
		Sc3	**White Kei:** Emalahleni LM (2.61) **Tsomo:** Intsika LM (4.86)	Same as Sc2.
14	IUA_S02	Sc1	Forestry & Invasives (2.1) Irrigation (23.1) **Black Kei:** Komani (Queenstown) (13.8)	
		Sc2	**Black Kei:** Komani (Queenstown) (13.282)	**Black Kei:** Additional abstractions from Xonxa and Lubisi Dams (2) Re-use of water in Komani Queenstown (4.391)
		Sc3	**Black Kei:** Komani (Queenstown) (14.67)	Same as Sc2.
15	IUA_S03	Sc1	Forestry & Invasives (29.6) Irrigation (8.1) **Gubu:** Stutterheim (1.02) **Gcuwa:** Butterworth (8.54)	

IUA		Sc No.	Water Requirements (million m^3/year)	Augmentation Interventions (million m^3/year)
No.	Code			
		Sc2	**Gubu:** Stutterheim (1.13) **Gcuwa:** Butterworth (8.22)	**Kubu:** Groundwater development (2) **Gcuwa:** Extension of Qolora Scheme (0.5) Groundwater development in Butterworth & Idutwa Additional allocation from Xilinxa Dam (2.9) Re-use of water in Butterworth (3.877) Raising of Gcuwa dam
		Sc3	**Gubu:** Stutterheim (1.32) **Gcuwa:** Butterworth (9.08)	Same as Sc2 with: **Gubu:** Groundwater development (2)
16	IUA_T01	Sc1	Forestry & Invasives (40.6) Irrigation (5.4) **Mbashe:** Elliot (0.305) Collywobbles Hydropower (84.88)	
		Sc2	**Mbashe:** Elliot (0.333)	Sc2.1 hydropower transfer was removed as a scenario to check impact on water availability and EWR on downstream IUA_T02

IUA		Sc No.	Water Requirements (million m^3/year)	Augmentation Interventions (million m^3/year)
No.	Code			
			50% utilisation of irrigation allocation from Ncora Dam (11) Collywobbles Hydropower (84.88)	
		Sc3	Forestry & Invasives (40.6) Irrigation (5.4) **<u>Mbashe:</u>** Elliot (0.305) Collywobbles Hydropower (84.88)	Same as Sc2.
17	IUA_T02	Sc1	Forestry & Invasives (0.3) Irrigation (0)	
		Sc2	Hydropower releases in IUA_T01 (from Mthatha Dam) included for full impact on this downstream IUA.	Sc2.1 hydropower was removed as a scenario to check impact on water availability and EWR on downstream IUA_T02
		Sc3		Same as Sc2.
18	IUA_T03	Sc1	Forestry & Invasives (5) Irrigation (0) **<u>Mthatha:</u>** Mthatha (22.332)	
		Sc2	**<u>Mthatha:</u>** Mthatha (23.126)	**<u>Mthatha:</u>** Groundwater development Re-use of water (2.795)

IUA		Sc No.	Water Requirements (million m^3/year)	Augmentation Interventions (million m^3/year)
No.	Code			
		Sc3	**Mthatha:** Mthatha (55.08) Hydropower (90)	Same as Sc2.
		Sc3.1	**Mthatha:** Mthatha (24.393) Hydropower (132)	Same as Sc2. An alternative (but less likely scenario included for sensitivity)
19	IUA_T04	Sc1	Forestry & Invasives (13.1) Irrigation (0) **Msikaba:** Lusikisiki (5.837) **Mngazi:** Port St. Johns (7.95)	Identifying and addressing unlawful irrigation
		Sc2	Irrigation (1.45) **Msikaba:** Lusikisiki (5.901) **Mngazi:** Port St. Johns to be supplied from sources outside the Mngazi.	**Msikaba:** Construction of Zalu Dam (on Xura River) (16.7 MCM) Additional abstractions from Magwa Dam and to meet the growing water requirements (1) **Mngazi:** Abstraction from the Mzimvubu/Mzintlava River (1) Identifying and addressing unlawful irrigation
		Sc3	Irrigation (1.45) **Msikaba:**	Same as Sc2.

IUA		Sc No.	Water Requirements (million m^3/year)	Augmentation Interventions (million m^3/year)
No.	Code			
			Lusikisiki (5.901) **<u>Mngazi:</u>** Port St. Johns to be supplied from sources outside the Mngazi.	

In November 2024, a workshop on consequences and trade-offs was held, where specialists assessed all water resource scenarios. Ecological models were used to evaluate river and estuary responses to present-day, medium-term, and long-term developments. The socio-economic assessment included a Comparative Ecological Risk Assessment (CERA) and an economic analysis to evaluate the impacts of proposed water management scenarios on the Keiskamma and Fish to Tsitsikamma economies per IUA.

Management scenarios were based on actual development options for the study area and upstream regions, with some rivers experiencing minimal or no flow changes. From an ecological perspective, a scenario comparison matrix was developed, based on flow variations, to compare scenarios against natural conditions, baseflows, and EWRs for the REC. Seasonal hydrographs, showing changes in wet (flood) and dry (baseflow) periods, were prepared for each EWR site within the IUAs to highlight ecological consequences.

For a detailed summary of the ecological and socio-economic consequence results for each IUA, including the preferred selected scenario and supporting rationale, please refer to Table 4-3 below.

Table 4-3: Comprehensive summary of the ecological and socio-economic consequences per IUA, including the preferred scenario and the rationale

IUA		Resource	Priority river and estuaries	TEC-BAS[1]	Final preferred scenario
No.	Code				
1	IUA_K01	River	KROM01_R (Kromme)	C/D	Sc2a: There will be an ecological trade-off, particularly in the biota's response to limited flows during the dry season, as these may not align with their flow preferences.
2	IUA_KL01	River	GAMT01_I (Gamtoos)	D	Sc3b: There will be an ecological trade-off, particularly in the biota's response to limited flows, as these may not align with their flow preferences should the proposed new dam be constructed. It is thus imperative that the EWR is implemented if the new dam is built.
		Estuary	Gamtoos	C	
			Kabeljous	-	
3	IUA_L01	River	KOUG01_R (Kouga)	B/C	Sc1b
4	IUA_M01	River	SWAR01_I (KwaZungu/ Swartkops)	B/C	Sc1b
		Estuary	Swartskops	-	
5	IUA_LN01	River	SUND01_FV (Sundays (Upper)	C	Sc 2a: The river systems are mostly ephemeral, thus the water users are dependent on groundwater resources and only when available, do they depend on surface water resources.
			GRT01_D (Groot (L70G)	B	

IUA		Resource	Priority river and estuaries	TEC-BAS[1]	Final preferred scenario
No.	Code				
6	IUA_N01	River	SUND02_R (Sundays (Lower)	D	Sc3b
7	IUA_P01	River	BOES01_FV (Bushmans)	B	Sc2a: The REC for the Kariega Estuary is Category C. Scenario 2 produces the same outcomes as the present-day scenario (Scenario 1). From a river perspective, if the EWR is not implemented, the ecology will respond negatively to the resulting flows.
		Estuary	Kariega	C	
8	IUA_Q01	River	FISH01_R (Great Fish (Upper)	D	Sc1b
9	IUA_Q02	River	FISH03_I Great Fish (Lower)	C	Sc1b
		Estuary	Great Fish	-	
10	IUA_Q03	River	KOON01_R Koonap	D	Sc3a.1: There will be an ecological trade-off, particularly in the biota's response to limited flows during the dry season in both rivers, as these may not align with their flow preferences.
			KAT02_R Kat (Lower)	C/D	
			KAT01_I Kat (Upper)	C	
11	IUA_R01	River	KEIS01_I (Keiskamma (Upper)	D	Sc1b: Implement demand management and prioritise the maintenance and upgrading of existing infrastructure to provide additional water for users, thereby reducing the socio-economic trade-offs associated with this selected scenario.
			KEIS02_R (Keiskamma (Lower)	B/C	
			TYUM01_R (Tyume)	B/C	
		Estuary	Keiskamma	B	
12	IUA_R02	River	BUFF01_I (Buffalo (Middle)	C/D	Sc3a: There will be an ecological trade-off, particularly in the biota's response to limited flows during the dry season, as these may not align with their flow preferences. However, if water quality is not improved, there will be further deterioration of the ecological condition during wet and dry seasons.
13	IUA_S01	River	TSOM01_I (Tsomo)	C/D	Sc3b: To minimise a larger ecological trade-off, where the biota would respond negatively to the resulting flows, this scenario was selected. It includes the implementation of the EWR, as it leads to limited socio-economic losses, which are not as
			INDW01_R (Indwe)	C/D	

IUA		Resource	Priority river and estuaries	TEC-BAS[1]	Final preferred scenario
No.	Code				
			WKEI01_R (White Kei)	C	severe as the potential losses to the river system's health and integrity.
14	IUA_S02	River	BKEI01_I (Black Kei)	D	Sc3b
15	IUA_S03	River	GKEI01_I (Great Kei	C	Sc3b: To minimise a larger ecological trade-off, where the biota would respond negatively to the resulting flows, this scenario was selected. It includes the implementation of the EWR, as it leads to limited socio-economic losses, which are not as severe as the potential losses to the river system's health and integrity.
			GCUW01_R (Gcuwa)	D	
			KUBU03_R (Kubusi (Lower)	C	
		Estuary	Great Kei	B/C	
16	IUA_T01	River	MBHA02_R (Mbhashe (Upper))	B/C	Sc1b: There will be an ecological trade-off, particularly in the biota's response to limited flows during the dry season, as these may not align with their flow preferences.
17	IUA_T02	River	MBAS01_I (Mbhashe (Middle)	C/D	Sc1b
		Estuary	Mbashe	B	
18	IUA_T03	River	MTHA01_I (Mthatha (Lower))	C	Sc3b
19	IUA_T04	River	MNGA01_R (Mngazi)	B/C	Sc1b
		River	NQAB01_R (Nqabarha)	C	
		River	MTEN01_R (Mtentu)	B/C	
		Estuary	Mngazi	B	

[1]*TEC – Target Ecological Category for rivers and Best Attainable State for estuaries*

5. WATER RESOURCE CLASSES APPROACH

According to the WRCS guidelines (DWAF, 2007), the classification of an IUA is determined by the distribution of selected ECs for biophysical nodes within the IUA. Generally, an IUA is classified as Class I if the majority of nodes fall within 'A' or 'B' ECs, Class II if most nodes are in a 'C' EC, and Class III if the majority are in a 'D' EC. It is recommended to use the criteria outlined in **Table 5-1** (adapted from the guideline rules) for determining the IUA class. In this table, the 'units' refer to the percentage of river length associated with each biophysical node falling within the specified ECs.

An IUA is in Class I if the following applies:

- No requirement for any % of units being greater than or equal to an A/B EC;
- 60% of the units are greater than or equal to a B EC;
- 80% of the units are greater than or equal to a C EC;
- 95% of the units are greater than or equal to a D EC; and
- it follows that < 5% of the units can be in an E EC

Table 5-1: Preliminary guidelines for determining the IUA class for a scenario

Class and Description		**Percentage (%) of SQ reaches in the IUA falling into the indicated EC groups**				
		≥A/B	**≥B**	**≥C**	**≥D**	**>D**
I: Minimally used and configuration of EC of that water resource minimally altered from its pre-development conditions		**0**	**60**	**80**	**95**	5-
II: Moderately used and configuration of EC of that water resource moderately altered from its pre-development conditions			**0**	**70**	**90**	10
III: Heavily used and configuration of EC of that water resource significantly altered from its pre-development conditions	Either			**0**	**80**	20
	Or				100	-

The rules in **Table 5-1** only apply to 'full' categories and do not include 'half' categories (e.g., EC of a B versus an EC of a B/C). Half categories represent those that can be either a high C or a low B (in the B/C example). As a result, the stricter category was selected: if the reach was B/C, a B was chosen; for a C/D, a C was chosen.

Additionally, it is important to note that the Water Resource Classes are based on (i) the updated PES-EIS (WRC, 2025) results that were used to define the ecological categories for each sub-quaternary reach within each IUA, ensuring the use of the most up-to-date PES data and (ii) at the EWR sites, the updated PES from the field surveys were used. If the Target Ecological Category (TEC) was different from the PES derived for the Intermediate and Rapid 3 EWR sites, it replaced the updated PES results for 2025.

Regarding the estuaries, because there are many within some of the IUAs, every estuary in the IUA was included in the analysis for IUA_K01, KL01, M01, N01, P01, Q02, R01, R02, and T04. This process was facilitated by the use of the PES-EIS update (2025) results. Ultimately, the Water Resource Class, as outlined in **Table 5-1**, was configured accordingly.

In addition to the considerations outlined above, priority wetland and groundwater systems were also carefully taken into account. These systems played a crucial role in informing adjustments to the overall Water Resource Classes. By incorporating the unique characteristics and environmental significance of these priority wetland and groundwater systems, the analysis ensured that their specific requirements were adequately addressed. As a result, the final Water Resource Classes will reflect the importance of these systems, ensuring a more accurate and comprehensive representation of the overall environmental condition across the catchment areas. This integrated approach ensure to maintenance of the ecological integrity of both surface water and groundwater systems while supporting the long-term sustainability of these critical resources.

It must be noted that the preliminary Water Resource Classes per IUA were presented at the Project Steering Committee meeting held on 21 January 2025 for consultation with the stakeholders. Sectoral meetings were further held in Mthatha, East London and Gqeberha on 25, 26 and 27 March 2025 respectively, whereby the Class per IUA was presented as well to the different sectors in the catchment areas. After this report has been reviewed and comments addressed, the final Water Resource Classes, together with the RQOs will be prepared for gazetting.

6. WATER RESOURCE CLASSES PER IUA

The Water Resource Classes per IUA, as determined by applying the criteria presented in **Table 5-1** are presented in **Table 6-1** and illustratred in **Figure 6-1**. It must be noted that through determining the classes, additional considerations were taken into account for estuaries, wetlands and groundwater. The detailed catchment configuration per IUA can be provided upon request.

Table 6-1: Water Resource Class per IUA

IUA	IUA code	Percentage (%) of SQ reaches in the IUA falling into the indicated EC groups					Water Resource Class
		A orA/B	B or B/C	C or C/D	D	>D	
1*	IUA_K01	21.7	13.0	39.1	26.1	0.0	II
2*	IUA_KL01		3.2	35.5	54.8	6.5	III
3	IUA_L01	16.7	35.2	25.9	18.5	3.7	II
4*	IUA_M01	4.8	14.3	4.8	47.6	23.8	III
5	IUA_LN01	2.1	31.9	54.2	11.0	0.8	II
6*	IUA_N01	5.6	27.8	30.6	16.7	19.4	II
7*	IUA_P01	0.0	23.5	52.9	22.1	1.5	II
8	IUA_Q01		39.0	48.8	11.0	1.2	II
9*	IUA_Q02	0.5	29.5	45.9	16.9	7.1	II
10	IUA_Q03	1.4	30.0	60.0	8.6		II
11*	IUA_R01	2.9	41.4	47.1	8.6		II
12*	IUA_R02	10.6	31.8	37.9	15.2	4.5	II
13	IUA_S01	0.7	21.4	53.6	24.3		II
14	IUA_S02		33.8	56.9	7.7	1.5	II
15	IUA_S03	2.2	28.9	55.6	13.3		II
16	IUA_T01		4.0	62.0	30.0	4.0	II
17	IUA_T02		18.2	72.7	9.1		II
18	IUA_T03			52.4	38.1	9.5	III
19*	IUA_T04	22.3	59.9	15.3	2.5	0.0	I

**IUAs whereby the estuaries PES results were included in the configuration*

Following the WRCS protocol, priority wetland and groundwater systems were evaluated during this study and thus incorporated into the determination of the Water Resource Classes. This protocol provides a structured approach to classify water resources, balancing the objectives of protection, sustainable utilisation, and socio-economic development.

Importantly, **Table 6-2** highlights some of the additional prioritised water resource components (estuaries, groundwater and wetlands) identified within each IUA, offering key insights into areas where stricter Resource Quality Objectives (RQOs) will be established in the next phase of the study to safeguard these critical resources. During the RQO determination phase, further interrogation and refinement will take place as to other prioritised water resources per IUA.

From an estuaries perspective, the following criteria was further selected to identiefy additional estuarine Resource Units (particularly those systems that are located within IUAs categorised as a Class I or Class II:

- High ecological category being either A, A/B or B;
- Recordings of critically endangered fish species, such as Estuarine Pipefish (*Syngnathus watermeyeri);*
- Recordings of critically endangered vegetation species, such as seagrass (*Zostera capensis);*
- More than 5 ha coverage of mangrove species; and
- More than 20 ha coverage of saltmarshes (intertidal and supratidal combined).

It is crucial that these components are flagged within IUAs classified as Class II or Class III. Class II denotes areas of moderate ecological sensitivity and developmental pressure, allowing limited utilisation while preserving ecological functions. Class III represents areas of high developmental demand or ecological significance, necessitating more stringent management measures. Flagging these resources ensures their protection and maintenance within these IUAs, supporting their long-term sustainability.

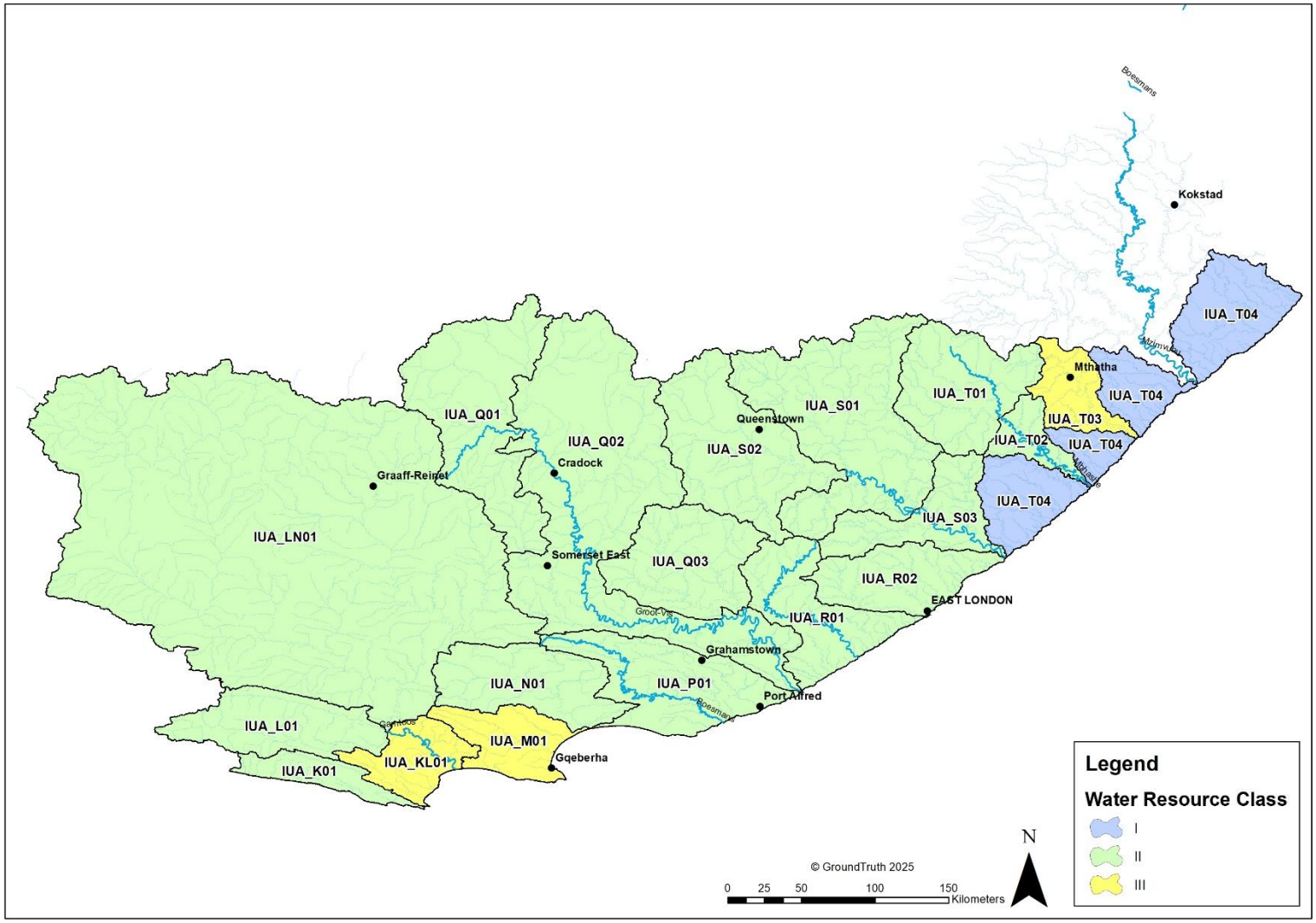

Figure 6-1: Water Resource Classes per IUA throughout the Keiskamma, Fish to Tsitsikamma study area

Table 6-2: Priorised water resource components (estuaries, groundwater and wetlands)

IUA No.	IUA Code	Class	Priority estuaries*		Groundwater RUs (quats)	Wetlands
1	IUA_K01	II	Lottering	High EC	GW_RU01 (K80A, K80B, K80C, K80D, K80E and K80F)	Tsitsikamma Plains Wetland Complex
			Elandsbos	High EC		Kromme Wetland
			Storms	High EC		
			Elands	High EC		
			Groot (Oos)	High EC		
2	IUA_KL01	III	Kabeljous	Priority estuary	GW_RU02 (K90F, K90G and K90E)	
			Gamtoos	Priority estuary		
			Kromme			
3	IUA_L01	II			GW_RU03 (L82B and L82D)	Krakeel Wetland Complex
4	IUA_M01	III	Van Stadens	High EC	GW_RU04 (M10A, M10B)	Longmore Wetland Complex
			Swartkops		GW_RU05 (M10C, M10D)	Chatty River Wetland Complex
					GW_RU06 (M20A, M20B. M30A)	

IUA No.	IUA Code	Class	Priority estuaries*		Groundwater RUs (quats)	Wetlands
5	IUA_LN01	II			GW_RU13 (N13A, N13B and N13C)	Sneeuberg West
					GW_RU14 (N14A, N14B and N14C)	
6	IUA_N01	II				
7	IUA_P01	II	Kariega	Priority estuary 		
			Bushans			
			Kowie			
			Kasouga	High EC		
			Riet	High EC		
			West Kleinemonde	High EC		
			East Kleinemonde	High EC		

IUA No.	IUA Code	Class	Priority estuaries*		Groundwater RUs (quats)	Wetlands
8	IUA_Q01	II			GW_RU20 (Q14A, Q14B, Q14C and Q14D)	Loodsberg
9	IUA_Q02	II	Great Fish			Dagbreek
10	IUA_Q03	II				
11	IUA_R01	II	Keiskamma	Priority estuary 		
			Tyolomnqa			
			Mpekweni	High EC		
			Mtati (Mthathi)	High EC		
			Mgwalana	High EC		

IUA No.	IUA Code	Class	Priority estuaries*		Groundwater RUs (quats)	Wetlands
			Bira (Bhirha)	High EC		
			Gqutywa	High EC		
			Ngculura (Ngculurha)	High EC		
			Mtana	High EC		
			Nqinisa	High EC		
			Kiwane (Khiwane)	High EC		
			Tyolomnqa	High EC		
			Lilyvale	High EC		
			Ross' Creek	High EC		
			Ncera (Ncerha)	High EC		
			Goda	High EC		
			Hlozi	High EC		
12	IUA_R02	II	Nahoon			eDrayini Floodplain Wetland

IUA No.	IUA Code	Class	Priority estuaries*		Groundwater RUs (quats)	Wetlands
			Qinira (Quinirha)	High EC		KwaMasele Wetland Complex
			Kwelera (Kwelerha)	High EC		
			Bulura (Bulurha)	High EC		
			Cunge	High EC		
			Cintsa	High EC		
			Cefane	High EC		
			Kwenxura (Kwenxurha)	High EC		
			Nyara (Nyarha)	High EC		
			Imtwendwe (Mtwendwe)	High EC		
			Haga-haga	High EC		
			Mtendwe	High EC		
			Quko	High EC		
			Morgan	High EC		
			Cwili	High EC		

IUA No.	IUA Code	Class	Priority estuaries*		Groundwater RUs (quats)	Wetlands
13	IUA_S01	II			GW_RU35 (S20C, S20D)	Cala wetland complex
						Mbokotwa floodplain
14	IUA_S02	II				Cairns Wetland Complex
						Hogsback Wetland Complex
15	IUA_S03	II	Great Kei			
16	IUA_T01	II			GW_RU40 (T11A, T11C, T11D, T11E, T11F, T11G and T11H)	Elliot/Khowa wetland complex
					GW_RU42 (T20A)	
17	IUA_T02	II	Mbashe			
18	IUA_T03	III	Mtata		GW_RU44 (T20B, T20C, T20D, T20E, T20F and T20G)	

IUA No.	IUA Code	Class	Priority estuaries*		Groundwater RUs (quats)	Wetlands
19*	IUA_T04	I	Mngazi	Priority estuary 	GW_RU45 (T60A, T60B, T60C, T60D, T60E, T60F, T60G, T60H, T60J and T60K)	Sikombe and Xolobeni
			Gxara (Gxarha)	High EC	GW_RU46 (T70A, T70B, T70C, T70E, T70F, T70G and T70D)	Ludeke Halt
			Ngogwane	High EC	GW_RU48 (T90A, T90D, T90G and T90F)	
			Qolora (Qolorha)	High EC 		
			Chulumna			
			Ncizele	High EC		
			Timba	High EC		
			Kobonqaba (Khobonqaba)	High EC 		
			Nxaxo/Ngqusi	High EC 		
			Cebe	High EC		
			Gqunqe	High EC		
			Zalu	High EC		
			Ngqwara (Ngqwarha)	High EC		
			Sihlontlweni	High EC		

IUA No.	IUA Code	Class	Priority estuaries*		Groundwater RUs (quats)	Wetlands
			Nebelele	High EC		
			Qora (Qhorha)	High EC		
			Kobongaba			
			Jujura (Jujurha)	High EC		
			Ngadla	High EC		
			Shixini	High EC		
			Beechamwood	High EC		
			Kwazlelitsha (Kwazwedala)	High EC		
			Kwa-Goqo	High EC		
			Ku-Nocekedwa	High EC		
			Nqabara/Nqabarana	High EC		
			Ngomane (East)	High EC		
			Ngoma/Kobule	High EC		
			Mendu	High EC		

IUA No.	IUA Code	Class	Priority estuaries*		Groundwater RUs (quats)	Wetlands
			Mendwana	High EC		
			Ku-Mpenzu	High EC		
			Ku-Bhula (Mbhanyana)	High EC		
			Kwa-Suku	High EC		
			Ntlonyane	High EC		
			Nkanya	High EC		
			Sundwana	High EC		
			Bulungula	High EC		
			Ku-Amanzimuzama	High EC		
			Nqakanqa	High EC		
			Mdikana	High EC		
			Mncwasa	High EC		
			Mpako	High EC		
			Mapuzi	High EC		

IUA No.	IUA Code	Class	Priority estuaries*		Groundwater RUs (quats)	Wetlands
			Thsani	High EC		
			Mdumbi	High EC 		
			Lwandilana	High EC		
			Lwandile	High EC		
			Mtakatye	High EC  		
			Hluleka	High EC		
			Mnenu	High EC		
			Mpande	High EC		
			Sinangwana	High EC		
			Mngazana	High EC   		
			Mngazi	High EC  		
			Gxwaleni	High EC		
			Bulolo	High EC		
			Mtumbane	High EC		

IUA No.	IUA Code	Class	Priority estuaries*		Groundwater RUs (quats)	Wetlands
			Ntlupeni	High EC		
			Nkodusweni	High EC		
			Mntafufu	High EC		
			Ingo	High EC		
			Mzintlava	High EC		
			Mzimpunzi	High EC		
			Kwanyambalala	High EC		
			Mbotyi	High EC		
			Mkozi	High EC		
			Sikatsha	High EC		
			Lupatana	High EC		
			Mkweni	High EC		
			Msikaba	High EC		

IUA No.	IUA Code	Class	Priority estuaries*		Groundwater RUs (quats)	Wetlands
			Mgwegwe	High EC		
			Mgwetyana	High EC		
			Mtentu	High EC		
			Sikombe	High EC		
			Kwanyana	High EC		
			Mtolane	High EC		
			Mnyameni	High EC		
			Mpahlanyana	High EC		
			Mpahlane	High EC		
			Mzamba	High EC		

7. CONCLUSION

The proposed Water Resource Classes and Catchment Configurations have been documented in the previous chapters and conclude the Water Resource Classification phase of this study.

The information leads to the final phase, i.e., the determination of RQOs. In addition to this quantitative information, a suggested monitoring programme with ecological specifications to achieve and maintain the RQOs (and TEC) will also be provided. This will also form part of information that will be considered for the implementation plan.

Refer to **Table 7-1** and **Figure 7-1** for the Water Resource Classes per IUA. Priority wetland, estuary, and groundwater systems have been flagged for stricter RQOs in the next phase of the study. This aims to ensure these resources receive the necessary protection and maintenance, particularly if located within a Class II or Class III IUA, where developmental pressures demand robust measures for their protection and sustainability.

Table 7-1: Water Resource Class per IUA

IUA	IUA code	Percentage (%) of SQ reaches in the IUA falling into the indicated EC groups					Water Resource Class
		A orA/B	B or B/C	C or C/D	D	>D	
1*	IUA_K01	21.7	13.0	39.1	26.1	0.0	II
2*	IUA_KL01		3.2	35.5	54.8	6.5	III
3	IUA_L01	16.7	35.2	25.9	18.5	3.7	II
4*	IUA_M01	4.8	14.3	4.8	47.6	23.8	III
5	IUA_LN01	2.1	31.9	54.2	11.0	0.8	II
6*	IUA_N01	5.6	27.8	30.6	16.7	19.4	II
7*	IUA_P01	0.0	23.5	52.9	22.1	1.5	II
8	IUA_Q01		39.0	48.8	11.0	1.2	II
9*	IUA_Q02	0.5	29.5	45.9	16.9	7.1	II
10	IUA_Q03	1.4	30.0	60.0	8.6		II
11*	IUA_R01	2.9	41.4	47.1	8.6		II
12*	IUA_R02	10.6	31.8	37.9	15.2	4.5	II
13	IUA_S01	0.7	21.4	53.6	24.3		II
14	IUA_S02		33.8	56.9	7.7	1.5	II
15	IUA_S03	2.2	28.9	55.6	13.3		II
16	IUA_T01		4.0	62.0	30.0	4.0	II
17	IUA_T02		18.2	72.7	9.1		II
18	IUA_T03			52.4	38.1	9.5	III
19*	IUA_T04	22.3	59.9	15.3	2.5	0.0	I
**IUAs whereby the estuaries PES results were included in the configuration*							

Important to note that during the RQO phase of the study, additional priority water resources will be identified within those IUAs classified as Class II or Class III. Class II denotes areas of moderate ecological sensitivity and developmental pressure, allowing limited utilisation while preserving ecological functions. Class III represents areas of high developmental demand or

ecological significance, necessitating more stringent management measures. Flagging these resources ensures their protection and maintenance within these IUAs, supporting their long-term sustainability.

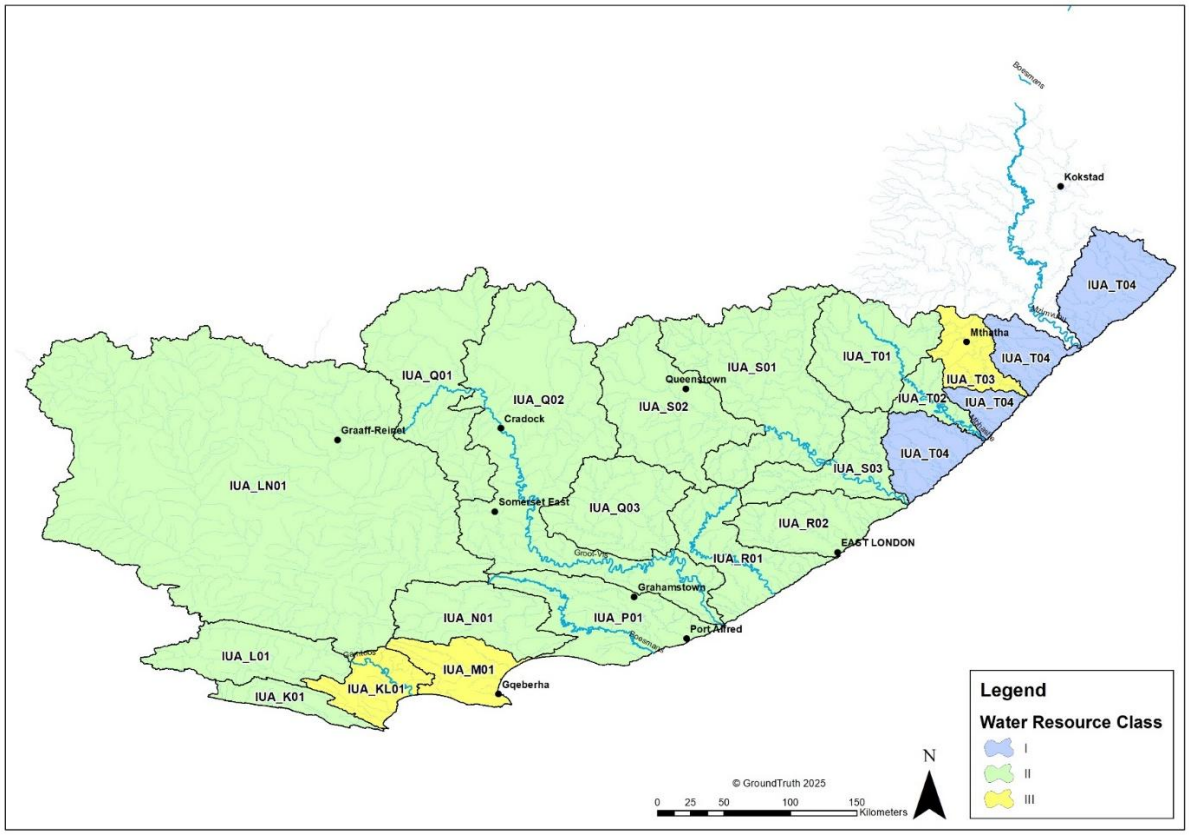

Figure 7-1: Water Resource Classes per IUA throughout the Keiskamma, Fish to Tsitsikamma study area

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