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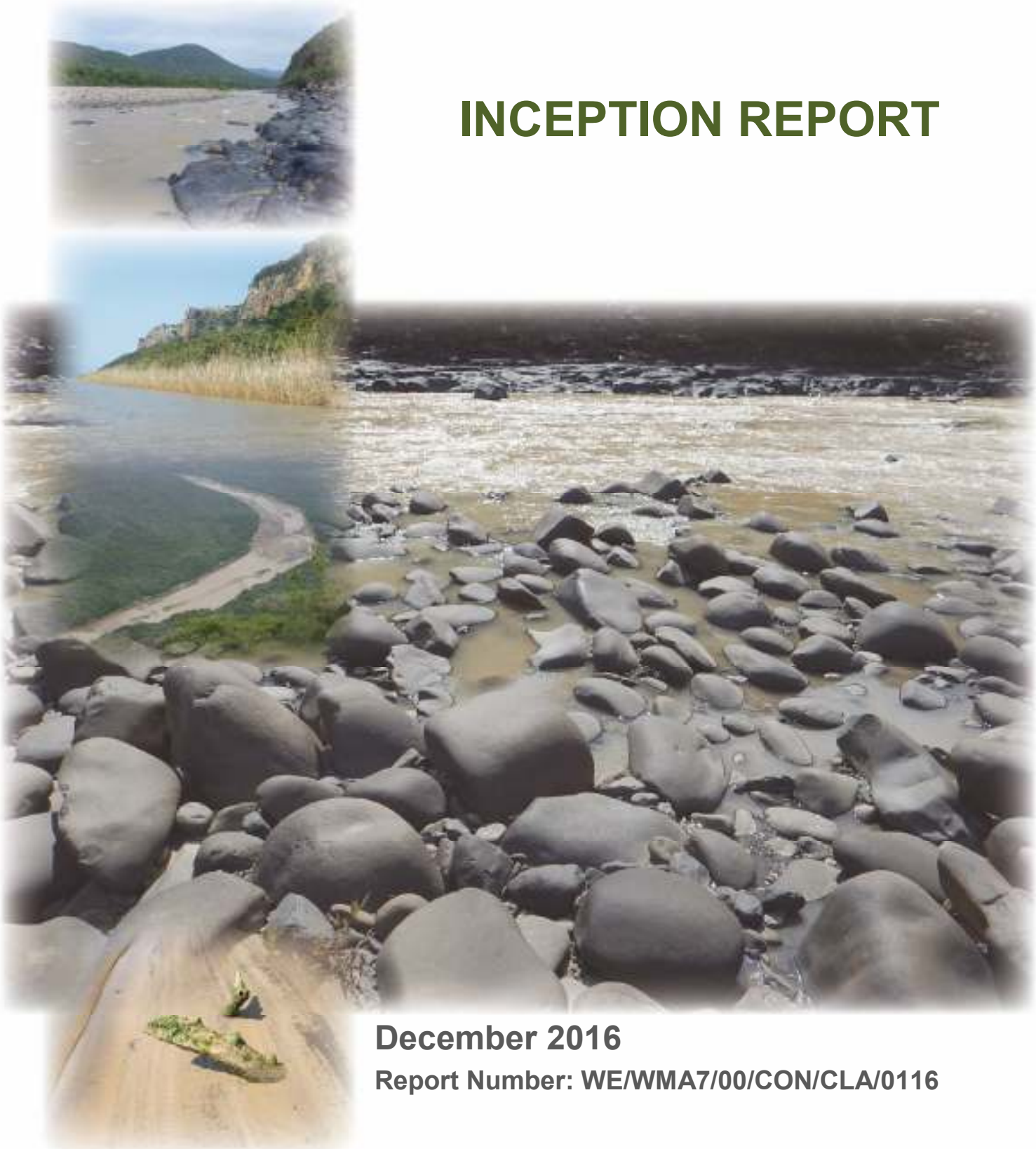
REPUBLIC OF SOUTH AFRICA

WP 11004

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



INCEPTION REPORT

December 2016

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DOCUMENT INDEX

Report name	Report number
Inception Report	**WE/WMA7/00/CON/CLA/0116**
Survey Report	WE/WMA7/00/CON/CLA/0216
Status Quo and (RUs and IUA) Delineation Report	WE/WMA7/00/CON/CLA/0316
River Workshop Report	WE/WMA7/00/CON/CLA/WKSP/0117
River Desktop EWR and Modelling Report	WE/WMA7/00/CON/CLA/0217
BHNR Report (Surface and Groundwater)	WE/WMA7/00/CON/CLA/0317
Estuary Workshop Report	WE/WMA7/00/CON/CLA/WKSP/0417
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River and Estuary RQO Report	WE/WMA7/00/CON/CLA/0218
Wetlands and Groundwater RQO Report	WE/WMA7/00/CON/CLA/0317
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Main Report	WE/WMA7/00/CON/CLA/0618a
Close Out Report	WE/WMA7/00/CON/CLA/0618b
Issues and Response Report	WE/WMA7/00/CON/CLA/0718

Bold indicates this report

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DATE:	December 2016
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REPORT SCHEDULE

Version	Date
First draft	October 2016
Final	December 2016

EXECUTIVE SUMMARY

BACKGROUND

The Department of Water and Sanitation has initiated a study to determine Water Resource Classes and associated Resource Quality Objectives for the Mzimvubu catchment in Water Management Area 7. Note that Reserve data will be reviewed as part of the study, although Reserves are not explicitly part of the Scope of Work. Scherman Colloty and Associates cc. were appointed as the Professional Service Provider to undertake the study.

The main aims of the project, as defined by the Terms of Reference (ToR), are to undertake the following:

- Coordinate the implementation of the WRCS as required in Regulation 810 in Government Gazette 33541 dated 17 September 2010, by classifying all significant water resources in the Mzimvubu catchment,
- determine RQOs using the DWS's procedures to determine and implement RQOs for the defined classes, and
- review work previously done on Ecological Water Requirements (EWRs) and the Basic Human Needs Reserve (BHNR) and assess whether suitable for the purposes of Classification.

STUDY AREA

The study area is represented by the Mzimvubu catchment which consists of the main Mzimvubu River, with the Tsitsa, Tina, Kinira and Mzintlava rivers as the main tributaries and the estuary at Port St Johns. The catchment is in Primary T, comprises of T31-36 and stretches from the Mzimkhulu River on the north-eastern side to the Mbashe and Mthatha river catchments in the south. The Mzimvubu river catchment is found in WMA 7, i.e. the Mzimvubu to Tsitsikamma WMA. The catchment covers more than two million hectares in the Eastern Cape and is comprised of almost 70% communal land. The Mzimvubu River system has been prioritised nationally as being one of the few remaining "near-natural rivers", but the catchment is classified as vulnerable as a result of rapid rates of degradation in the watershed.

PROJECT STRUCTURE AND KEY MILESTONES AND DELIVERABLES

The Mzimvubu study will be managed according to the following Project Plan.

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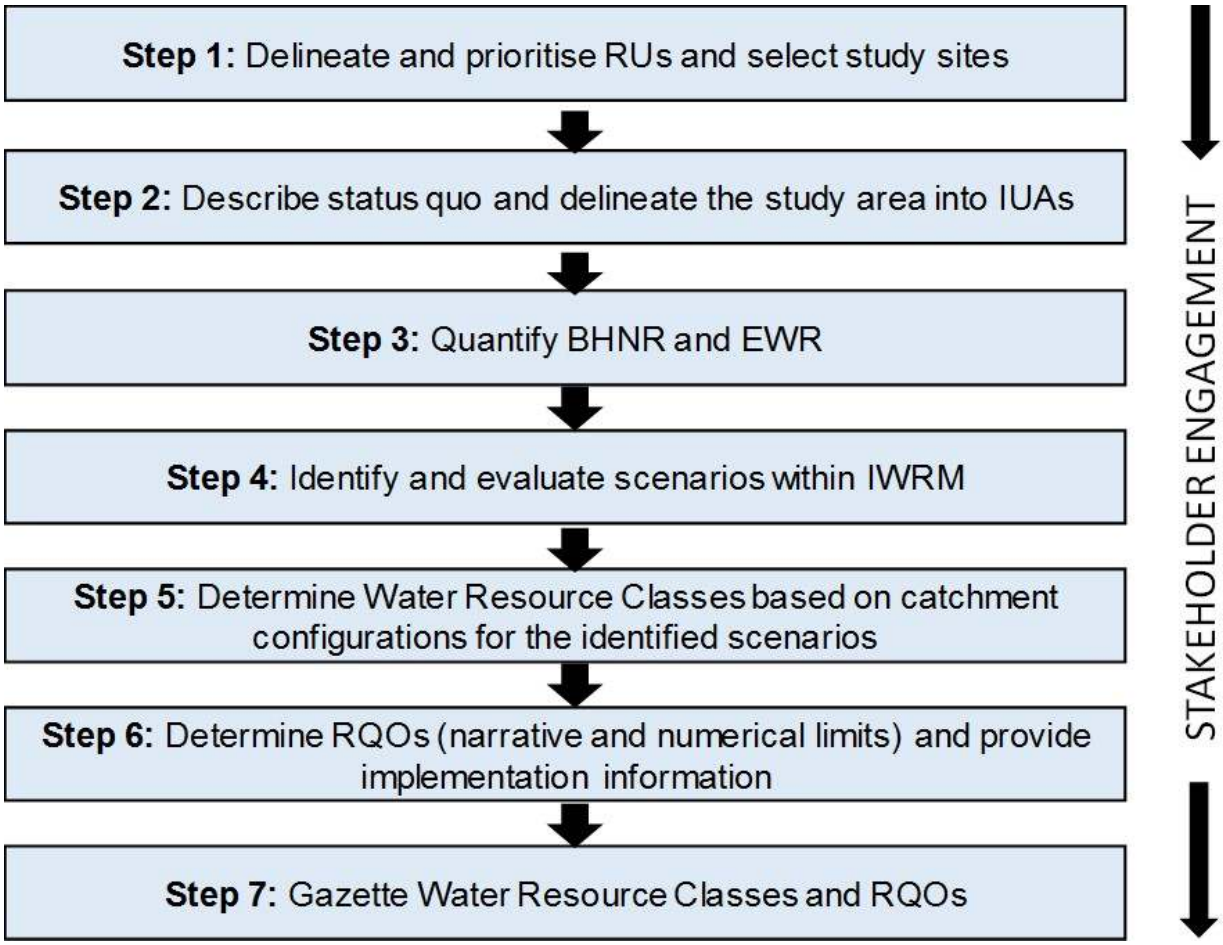

Task structure, timing and key milestones shown in the table below per financial year. The legend used is shown below the table.

Contract deliverable number	Tasks	Deliverables	Date	Quarter	Description
4.3.3g	Task 2	Rivers survey	Sep-16	Q2	S
4.3.1	Task B	Inception Report	Oct-16	Q3	R
4.3.3g	Task 2	Survey report	Oct-16	Q3	R
4.3.15	Task A	PMC meeting 1	Nov-16	Q3	M
4.3.12	Task C4	PSC meeting 1	Dec-16	Q3	M
4.3.2	Task 1	Status quo and Delineation Report	Dec-16	Q3	R
4.3.3h	Task 2	Rivers workshop and report	Feb-17	Q4	SW, R
4.3.3f	Task 2	Systems modelling report, vol 1	Mar-17	Q4	R
4.3.3f	Task 2	Rivers Desktop EWR report, vol 2	Mar-17	Q4	R
4.3.3c	Task 2	BHNR report	Mar-17	Q4	R

Contract deliverable number	Tasks	Deliverables	Date	Quarter	Description
4.3.12	Task C4	PSC meeting 2	Apr-17	Q1	M
4.3.3i	Task 2	Estuary specialist meeting and report	Apr-17	Q1	SW, R
4.3.4a	Task 3	Scenario description report	Apr-17	Q1	R
4.3.3a	Task 2	Rivers EWR report	May-17	Q1	R
4.3.15	Task A	PMC meeting 3	Jul-17	Q2	M
4.3.12	Task C4	PSC meeting 3	Aug-17	Q2	M
4.3.3b	Task 2	Estuary EWR report	Jul-17	Q2	R
4.3.3e	Task 2	Wetland EcoClassification report	Aug-17	Q2	R
4.3.3d	Task 2	Groundwater report	Aug-17	Q2	R
4.3.4b	Task 3	Ecosystem Services, Economics and User Water Quality Consequences report	Sep-17	Q2	R
4.3.4c	Task 3	Ecological Consequences report	Oct-17	Q3	R (TM required)
4.3.15	Task A	PMC meeting 4	Nov-17	Q3	M
4.3.12	Task C4	PSC meeting 4	Nov-17	Q3	M
4.3.5	Task 4	WRC and Catchment Configuration report	Jan-18	Q4	R (TM required)
4.3.6a	Task 5	Rivers and Estuary RQO report	Feb-18	Q4	R
4.3.6b	Task 5	Wetlands and Groundwater RQO report	Feb-18	Q4	R
4.3.15	Task A	PMC meeting 5	Mar-18	Q4	M
4.3.9	Task C4	2 Stakeholder (public) meetings	Mar-18	Q4	M
4.3.7	Task 6	Implementation and monitoring report	May-18	Q1	R
4.3.16	Task 7	Close out report, vol 2	Jul-18	Q4	R
4.3.16	Task 7	Main report, vol 1	Jul-18	Q2	R
4.3.8	Task 8	Legal input to the notice	Feb-July 2018	Q4-Q2	G

Financial quarters	Task descriptions	
Quarter 1 (Q1): March – May	R: final report	TM: technical meeting
Quarter 2 (Q2): June – August	SW: specialist workshop	IM: information meeting
Quarter 3 (Q3): September – November	M: meeting	G: gazetting
Quarter 4 (Q4): December – February	S: survey	

STRUCTURE OF THE REPORT

The report outlines the tasks to be conducted as part of the Mzimvubu Classification and Resource Quality Objectives study, including deliverable dates and task responsibilities. Chapter 1 provides a context to the study area, while Chapter 2 discusses available information and outlines assumptions, risks and uncertainties.

All management and communication tasks, stakeholder liaison and capacity building/mentorship opportunities are presented for discussion in Chapter 3, while Chapters 4 and 5 outline the technical, legal and project completion tasks. Chapters 6 and 7 show the study programme, team and financials. References are listed in Chapter 8.

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LIST OF ACRONYMS

AsgiSA-EC	Accelerated and Shared Growth Initiative for South Africa-Eastern Cape
BAS	Best Attainable State
BHNR	Basic Human Needs Reserve
CBA(s)	Critical Biodiversity Area(s)
CD: WE	Chief Directorate: Water Ecosystems
CMA	Catchment Management Agency
CMF	Catchment Management Forums
CSA	Conservation South Africa
DM	District Municipality
DWS	Department of Water and Sanitation
EFZ	Estuarine Functional Zone
EI	Ecological Importance
EIA	Environmental Impact Assessment
EIS	Ecological Importance and Sensitivity
ERS	Environmental and Rural Solutions
ES	Ecological Sensitivity
EWR	Ecological Water Requirements
GAI	Geomorphological Assessment Driver Index
GDP	Gross Domestic Product
GRAII	Groundwater Resource Assessment Phase II
GRIP	Groundwater Resource Information Project
GRUs	Groundwater Resource Units
GSSA	Geological Society of South Africa
HGM	Hydrogeomorphic
ISP	Internal Strategic Perspective
IUA	Integrated Units of Assessments
MAR	Mean Annual Runoff
MCA	Multi-Criteria Analysis
MRU	Management Resource Units
MWP	Mzimvubu Water Project
NPV	Net Present Value
NFEPAs	National Freshwater Ecosystem Priority Areas
NGA	National Groundwater Archive
NGI	National Geo-spatial Information
NGO	Non-Governmental Organisations
NWA	National Water Act
OCSD	Off-Channel Storage Dam
PAI	Physico-chemical Driver Assessment Indez
PES	Present Ecological State
PES/EI/ES	Present Ecological State/Ecological Importance/Ecological Sensitivity
PM	Project Manager
PMC	Project Management Committee
PSC	Project Steering Committee
PSP	Professional Service Provider
RDRM	Revised Desktop Reserve Model
REC	Recommended Ecological Category
RO	Regional Office

RPO	Red Meat Producers Organisation
RQO(s)	Resource Quality Objective(s)
RU(s)	Resource Unit(s)
SALGA	South African Local Government Association
SAM	Social Accounting Matrix
SANBI	South African National Biodiversity Institute
SC&A	Scherman Colloty & Associates cc
SCI	Socio-Cultural Importance
SQ	Sub-quaternary
TEC	Target Ecological Category
ToR	Terms of Reference
TPC(s)	Threshold(s) of Probable Concern
WARMS	Water Authorisation and Management System
WIM	Water Impact Model
WMA	Water Management Area
WR2012	Water Resources of South Africa 2012
WRC	Water Resource Classes
WRCS	Water Resource Classification System
WRSM2000	Water Resources Simulation Model 2000
WRUI	Water Resource Use Importance
WRYM	Water Resources Yield Model
ZQM	National Groundwater Quality Monitoring Network

GLOSSARY

Biophysical Node	A point in the river which can be a survey site or a hypothetical point ("site"). Survey sites are EWR sites or Key Biophysical Nodes. Hypothetical points are Desktop Biophysical Nodes.
EcoClassification	EcoClassification (or the Ecological Classification process) refers to the determination and categorisation of the Present Ecological State (PES; health or integrity) of various physical attributes of rivers relative to the natural reference condition. A range of models are used during EcoClassification, each of which relate to the indicators assessed.
Ecological Importance and Sensitivity (EIS)	Key indicators in the ecological classification of water resources. Ecological importance relates to the presence, representativeness and diversity of species of biota and habitat. Ecological sensitivity relates to the vulnerability of the habitat and biota to modifications that may occur in flows, water levels and physico-chemical conditions.
Ecological Water Requirements (EWR)	The flow patterns (magnitude, timing and duration) and water quality needed to maintain a riverine ecosystem in a particular condition. This term is used to refer to both the quantity and quality components.
EcoStatus	EcoStatus is defined as the totality of the features and characteristics of the river and its riparian areas that bear upon its ability to support an appropriate natural flora and fauna and is capacity to provide a variety of goods and services.
EWR sites	Specific points on the river as determined through the 'hotspot' and site selection process. An EWR site consists of a length of river which may consist of various cross-sections assessed for both hydraulic and ecological purposes. These sites provide sufficient indicators to assess environmental flows and assess the condition of biophysical components (drivers such as hydrology, geomorphology and physico-chemical conditions) and biological responses (*viz*. fish, macroinvertebrates and riparian vegetation).
Integrated Unit of Analysis (IUAs)	An IUA is a homogeneous area that can be managed as an entity. It is the basic unit of assessment for the Classification of water resources, and is defined by areas that can be managed together in terms of water resource operations, quality, socio-economics and ecosystem services.
Water Resource Classification System (WRCS)	The Water Resource Classification System is a defined set of guidelines and procedures for determining the different classes of water resources (South African National Water Act (Act 36 of 1998) Chapter 3, Part 1, Section 2(a)). The outcome of the Classification Process will be the setting of the class, Reserve and Resource Quality Objectives by the Minister or delegated authority for every significant water resource (river, estuary, wetland and aquifer) under consideration. This class, which will range from Minimally used to Heavily used, essentially describes the desired condition of the resource, and concomitantly, the degree to which it can be utilised.
Present Ecological State (PES)	The current state or condition of a water resource in terms of its biophysical components (drivers) such as hydrology, geomorphology and water quality and biological responses *viz*. fish, invertebrates, riparian vegetation). The degree to which ecological conditions of an area have been modified from natural (reference) conditions.

Recommended Ecological Category (REC)	The Recommended Ecological Category is the future ecological state (Ecological Categories A to D) that can be recommended for a resource unit depending on the EIS and PES. The REC is determined based on ecological criteria and considers the EIS, the restoration potential of the system and attainability there-of.
Resource Quality Objectives (RQOs)	RQOs are numeric or descriptive goals that can be monitored for compliance to the WRC, for each part of each water resource.
Resource Units (RUs)	RUs are delineated during an Ecological Reserve determination study, as each will warrant its own specification of the Reserve, and the geographic boundaries of each must be clearly delineated. These sections of a river frequently have different natural flow patterns, react differently to stress according to their sensitivity, and require individual specifications of the Reserve appropriate for that reach. RUs are nested within IUAs and may contain an Ecological Water Requirement site.
Revised Desktop Reserve Model (RDRM)	The output from the RDRM is an estimated EWR for each Ecological Category, at a desktop level for biophysical nodes other than EWR sites. Due to the large study area, additional EWRs are estimated for every Resource Unit identified which is not addressed by the more detailed EWR assessment at EWR sites. These EWRs are therefore estimated using the RDRM.
Scenario	Scenarios, in the context of water resource management and planning, are plausible definitions (settings) of factors (variables) that influence the water balance and water quality in a catchment and the system as a whole. Each scenario represents an alternative future condition, generally reflecting a change to the present condition.
Sub-quaternary catchments (SQ)	A finer subdivision of the quaternary catchments (the catchment areas of tributaries of main stem rivers in quaternary catchments), to a sub-quaternary or quinary level.
Target Ecological Category (TEC)	This is the ecological category toward which a water resource will be managed once the Classification process has been completed and the Reserve has been finalised. The draft TECs are therefore related to the draft WRC and selected scenario.
Water Resource Class (WRC)	The Water Resource Class is representative of those attributes that the DWS (as the custodian) and society require of different water resources. The decision-making toward a WRC require a wide range of trade-offs to be assessed and evaluated at a number of scales. Final outcome of the process is a set of desired characteristics for use and ecological condition each of the water resources in a given catchment. The WRCS defines three management classes, Class I, II, and III, based on extent of use and alteration of ecological condition from the predevelopment condition.

1 INTRODUCTION

1.1 STUDY CONTEXT AND MOTIVATION

Chapter 3 of the National Water Act, 1998 (NWA) (Act 36 of 1998), deals with the protection of water resources. Section 12 of the NWA requires the Minister to develop a system to classify water resources. In response to this, the Water Resource Classification System (WRCS) was gazetted on 17 September 2010 and published in Government Gazette 33541 as Regulation 810. The Water Resource Classification System is a step-wise process whereby water resources are categorised according to specific classes that represent a management vision of a particular catchment. This vision takes into account the current state of the water resource, the ecological, social and economic aspects that are dependent on the resource. Once significant water resources have been classified through the WRCS, Resource Quality Objectives (RQOs) have to be determined to give effect to the class. The implementation of the Water Resource Classification System therefore assesses the costs and benefits associated with utilisation versus protection of a water resource. Section 13 of the NWA requires that Water Resource Classes and RQOs be determined for all significant water resources.

The Mzimvubu catchment has been prioritised for implementation of the WRCS in order to determine appropriate Water Resource Classes (WRC) and RQOs in order to facilitate the sustainable use of water resources without impacting negatively on their ecological integrity. These activities will guide the management of the T3 primary catchment in order to meet the departmental objectives of maintaining, and if possible, improving the present state of the Mzimvubu River and its four main tributaries, namely the Tsitsa, Thina, Kinira and Mzintlava. This project is driven by threatened ecosystem services in the upper Mzimvubu catchment in particular due to the variety of inappropriate land uses and alien plant infestation that result in extensive erosion and degradation of the environment and ecological infrastructure. Degradation of environment causes soil erosion, damage to infrastructure, water supply shortages and loss of grazing.

1.2 AIMS AND OBJECTIVES

The Department of Water and Sanitation (DWS) has initiated a study to determine Water Resource Classes and associated RQOs for the Mzimvubu catchment in Water Management Area (WMA) 7. A preliminary Reserve was undertaken as part of the Feasibility Study for the construction of Ntabelanga Dam. Although the focus of the current Mzimvubu study is Classification and RQOs and not Reserve determination, Reserve data from the Feasibility study will be reviewed once available to the study,. Scherman Colloty and Associates cc. (SC&A) were appointed as the Professional Service Provider (PSP) to undertake the study.

The main aims of the project, as defined by the Terms of Reference (ToR), are to undertake the following:

- Coordinate the implementation of the WRCS as required in Regulation 810 in Government Gazette 33541 dated 17 September 2010, by classifying all significant water resources in the Mzimvubu catchment,
- determine RQOs using the DWA 2011 guidelines to determine and implement RQOs, and
- review all available Reserve data for use during Classification.

The project timeframe is 24 months, starting from August 2016 to July 2018. The outcome of the study will therefore be gazetted Water Resource Classes and associated Resource Quality Objectives for the Mzimvubu catchment.

1.3 OVERVIEW OF STUDY AREA

The study area is represented by the Mzimvubu catchment which consists of the main Mzimvubu River, with the Tsitsa, Tina, Kinira and Mzintlava rivers as the main tributaries and the estuary at Port St Johns. The river reaches sizable proportions after the confluence of these four tributaries in the Lower Mzimvubu area, approximately 120km from its source, where the impressive Tsitsa Falls can be found near Shawbury Mission. The Mzimvubu catchment and river system lies along the northern boundary of the Eastern Cape and extends for over 200km[1] from its source in the Maloti-Drakensberg watershed on the Lesotho escarpment to the estuary at Port St Johns. The catchment is in Primary T, comprises of T31-36 and stretches from the Mzimkhulu River on the north-eastern side to the Mbashe and Mthatha river catchments in the south. The Mzimvubu river catchment is found in WMA 7, i.e. the Mzimvubu to Tsitsikamma WMA.

The catchment covers more than two million hectares in the Eastern Cape and is comprised of almost 70% communal land. The Mzimvubu River system has been prioritised nationally as being one of the few remaining “near-natural rivers” (NFEPA Assessment, 2011), but the catchment is classified as vulnerable as a result of rapid rates of degradation in the watershed. Much of the upper catchment riverine habitat has been severely infested with alien plants, primarily black wattle (*A. dealbata*) which causes problems with bank stability and access, reduction in base flows and damage to downstream infrastructure during flood events. The upper catchment zone has therefore been defined as the source of many of the threats to ecosystem services. This zone comprises the source of the Mzimvubu and Kinira rivers, i.e. an area of approximately 435 000 hectares (ERS/CSA, 2011).

As one descends from the escarpment, extensive and utilised floodplain wetlands occur around Matatiele, Cedarville and Franklin, some of which have been recognised as National Freshwater Ecosystem Priority Areas (NFEPAs). Similarly, the area around Maclear and Ugie has extensive, and often in good condition, channelled valley-bottom wetlands, especially where adequate buffer zones have protected wetlands from agricultural activities within forestry land-use areas, e.g. PG Bison property. **Figure 1.1** is a map of the catchment area.

The socio-economic analysis reveals that this WMA is one of the most disadvantaged in South Africa, with average income being below the national average. Most of the population are located in rural and peri-urban areas. The WMA is relatively well endowed with water resources, with most occurring in the eastern part of the area. As a result, the instances of water shortages in drought periods occur primarily in the western part of the WMA. The surplus water resources create potential opportunities for development on the eastern side if feasibility can be demonstrated. Of the current usage in the WMA, the most significant by far is agriculture via irrigation. The next largest use is by municipalities (CMA Business Case, May 2015).

No major in-stream dams occur along the main rivers, with the only dams of any significant size being the dams of Belford (on the Mafube River north of Matatiele) and Ntenetyana (on a small

[1] 400km in length according to *Engineering News*, December 2015

tributary of the Kinira RIver, north of Mount Frere). Some remnant catchment dams exist in the Ongeluksnek valley and on the commercial farms in the margins of the Cedarville flats, but this is not a common practice in traditional farming systems (ERS/CSA, 2011). However, there are a number of in-stream abstraction weirs, e.g., in sub-quaternary (SQ) catchments T34D-05412 and T34D-05463 (supply to Mount Fletcher) and T35G-06002.

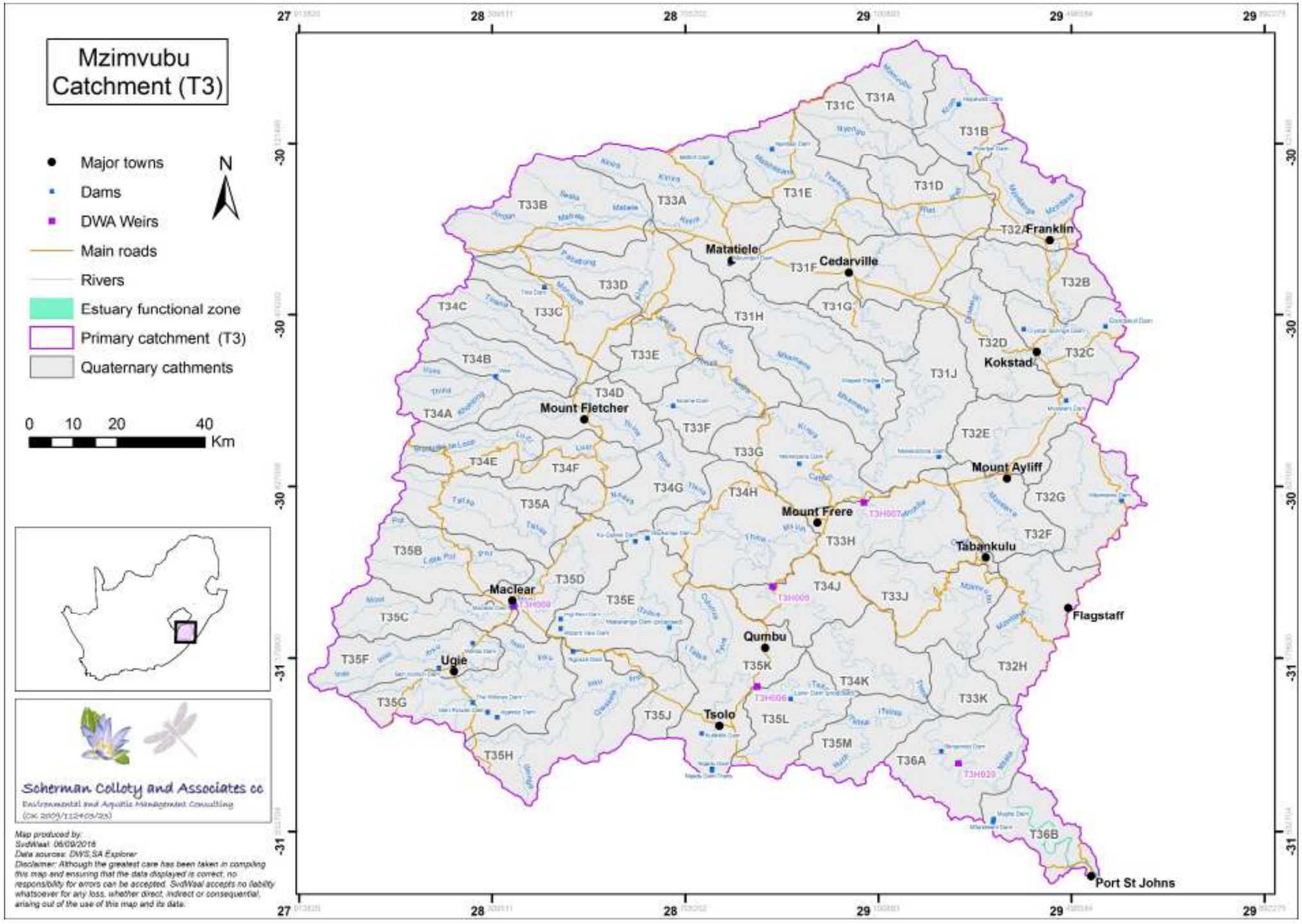

Figure 1.1 The Mzimvubu study area

2 AVAILABLE TECHNICAL INFORMATION AND ASSOCIATED CHALLENGES

2.1 HYDROLOGICAL DATA AND INFORMATION

The latest water resource system models and hydrological data for application in the study was updated in the recent DWS Feasibility Study for the Mzimvubu Water Project (MWP; 2014 series of reports) and has been sourced. The DWS Feasibility Study conducted a detailed hydrological assessment including rainfall analysis, rainfall-runoff modelling and stochastic streamflow analysis for both the Kinira and Tsitsa rivers. The hydrology for the remaining portion of the catchment has been sourced from the AsgiSA-EC (Accelerated and Shared Growth Initiative for South Africa-Eastern Cape) Mzimvubu Development Project, which was conducted prior to the feasibility study and used the WR2005 hydrology. No primary hydrological studies will be carried out due to the availability of models and data from the aforementioned sources, which are considered sufficient for the Classification study.

The Water Resources Yield Model (WRYM) has been configured for the Mzimvubu catchment and the latest WRYM configuration used in the DWS Feasibility Study and the AsgiSA-EC Mzimvubu Development Project have been sourced (AsgiSA-EC Mzimvubu Development Project in process by consultant).

The OR Tambo District Municipality (DM) is also in the process of investigating the proposed Mzimvubu–Ntsonyini Off-Channel Storage Dam (Ntsonyini Ngqongweni Regional Water Supply Scheme Phase 2 and 3) on the Kuzeke river, a relatively small tributary of the Mzimvibu river and any further information available from this process will be sourced and incorporated if available.

The WRYM configurations from these studies will be integrated/merged and appropriate verification of the data and models will be undertaken to identify inconsistencies and select the most appropriate data source for each catchment.

2.2 SOCIO-ECONOMICS DATA AND INFORMATION

2.2.1 Ecosystem services

As no specific ecosystem services data are available for the Mzimvubu catchment, research will proceed from an evaluation of available mapping and analysis of secondary material. A number of stakeholder-based programmes have been identified in the study area. Considering the shortage dearth of current information, background to the approach is provided.

Background

Natural habitats and ecosystems provide a wide range of environmental goods and services that contribute enormously – and are even essential – to human well-being. Protecting these areas is essential in order to achieve sustainable development. River systems and their associated use values are of particular importance. Use values associated with environmental goods and services, or ecosystem services, accrue to humans from the use of the environment consumptively or productively. They are classified into direct-use values, indirect-use values and option values.

The direct-use values refer to values associated with direct consumption, production, viewing of landscapes, bird watching, or even viewing of photographic products. Hunting and slaughter of

wildlife for meat or skins constitute direct consumption of species from the environment. Grazing by livestock, harvesting medicinal plants and animals, and harvesting indigenous or endemic plants for road-side sale constitute productive activities whose economic values are realised in the form of profits from sale of final goods such as livestock, medicinal services, and the natural resources themselves.

The indirect-use values refer to ecological or ecosystem values such as production of nutrients, maintenance of well-functioning riverine ecosystems, water purification, maintenance of specific gaseous qualities and hydrological cycles, and formation of soil and organic matter.

Option values are values attached by individuals to the maintenance and preservation of environmental goods in order to reserve an option to use them, directly or indirectly, in the future. A different notion of option value, known as vicarious value, relates to creating use options for contemporary generations. Value is not derived from use but from creating an option for use by others in the same generation. It is in this vicarious sense that option value is also seen as a non-use value.

Although all three use values make up the range of ecosystem services that are pertinent to our work, option values are not directly considered within the context of this present study. Although it is theoretically possible to generate option values, this is both a time-consuming and very expensive task. The key goods and services that form a part of community reliance, livelihoods and subsistence, or provide key non-market related economic functions, will be examined and form part of this study.

In later parts of this component of the study (Task 3) the list of goods and services will be further scrutinised to generate an overview of the likelihood that they will change given anticipated trajectories of modification to the system once scenarios are developed.

Approach

The following tasks will be undertaken during the Mzimvubu study:

- **Describe the present socio-economic status and key drivers:** This is largely a narrative description based on data available and will concentrate on key drivers in terms of the socio-economic profile. Google Earth images as well as required key stakeholder interviews will form the basis of the research for the Mzimvubu, as required. Key stakeholders will be representatives of users in an area where data sources on the use of important ecosystem services are not of the required standard for Classification and assessing the consequences of development scenarios.
- **Delineate socio-economic zones based on relevant data**: Use the data and description from above to define relevant socio-economic zones. This is “high level” and much of the analysis will concentrate on describing settlement type and associated economic parameters. Communities associated with the settlement type and associated economic parameters will be described.
- **List and describe the use of aquatic ecosystems and qualify the value of critical components:** This will serve to better contextualise the communities as identified above and list the likely ecosystem services that are water-related and possibly important. Key components of ecosystem services that are not necessarily immediately bound to adjacent communities but that deliver value, e.g., regulating services, will be identified.

- **Identify and rate ecosystem services at SQ level:** Based on the description of value and the rating, a list of high priority Resource Units (RUs) from a socio-economic basis can be generated and a narrative description explaining the importance of these RUs provided.
- **Determine relative importance of ecosystem services at SQ level:** A spreadsheet approach will be used to generate an overview of the types of aspects of socio-cultural importance that may be important. The rating and weighting of a range of criteria results in the relative importance score of ecosystem services at SQ level, which leads to the prioritisation of ecosystem services. This feeds into the prioritisation step which integrates all the different importance evaluations.

2.2.2 Macro-economics

The official data on irrigation activities in sub catchments T31, T32 and T35 is out of date and therefore a detailed measurement exercise will be introduced using Google Earth to estimate the total irrigation areas. Unpublished data at the Kokstad Agricultural Research Station will also be used as a control.

Commercial afforestation data will be sourced from the official Eastern Cape Government database which was updated recently. Production and saw mill activity will be based on the total areas planted.

Abattoir data will be sourced from the South African Abattoir Association and estimations of numbers from the Red Meat Producers Organisation (RPO).

Population numbers and other social data will be sourced from the database of the South African Local Government Association (SALGA) and Stats SA.

2.3 RIVER RESERVE DATA AND INFORMATION

The ToR for the Mzimvubu study indicated that Reserve studies have been undertaken. These studies may however not be up to the standard that is required for Classification, e.g. sites potentially impacted on by a development scenario must have been determined using Intermediate Ecological Reserve Methodology. An important step in the Classification study is therefore an assessment of the existing Reserve data and an update thereof (e.g. through an additional site survey to collect outstanding information) for the critical river sites assessed during the Feasibility Study. The recent work published in 2016 (DWS, 2016a), i.e., updated guidelines for Reserve, Classification and RQO studies, will be followed as a standardized guideline for the study (see Section 2 of this report) in terms of the sequence of steps to be undertaken, and the detail to be assessed during each step.

All raw data and information which is assumed to have been supplied to DWS (as is required in consulting projects) for the Ntabelanga-Lalini Dam Feasibility Study for the river Ecological Reserve (DWS, 2014a; b) must be made available to the PSP. A gap analysis will be undertaken and will guide the additional detail required for the EWR and BHNR step of the Classification study, should additional work be required. River Health Programme work where available and relevant, will also be collated.

2.4 ESTUARY RESERVE DATA AND INFORMATION

The Mzimvubu Estuary (31°37'52" S, 29°32'59" E) is the only estuary within the study area. It falls within the sub-tropical biogeographical coastal region of South Africa and enters the Indian Ocean at Port St Johns (Van Niekerk and Turpie, 2012).

An EWR study (intermediate level) was conducted on this estuary in 2013 (DWS, 2014c). The EWR study followed the methods as described in *Resource Directed Measures for Protection of Water Resources: Methodologies for the determination of ecological water requirements for estuaries Version 2* (DWAF, 2008) and included two field surveys during August 2012 (winter) and January 2013 (summer).

The geographical boundaries of the Mzimvubu estuary are defined by the Estuarine Functional Zone (EFZ) as follows (**Figure 2.1**).

Figure 2.1 Estuarine Functional Zone of the Mzimvubu estuary

The Present Ecological State (PES) was set as Ecological **Category B** meaning that the system is "largely natural with few modifications".

The estuary is rated as a **"highly important"** system in accordance with the estuary importance index for the estuary that takes into account the size, the rarity of the estuary type within its biographical zone, habitat, biodiversity and functional importance of the estuary (DWS, 2014c). A number of features contributed to the high importance score of the estuary, including that:

- this is the only WMA not linked to another WMA through cross-catchment transfers and is largely unregulated;
- this catchment has been identified as supplying high levels of ecological services nationally, and the South African National Biodiversity Institute (SANBI) is currently undertaking an assessment of the economic importance of the system;
- the confirmed use of the estuary by Zambezi sharks (*Carcharhinus leucas*), White steenbras (*Lithognathus lithognathus*) and Dusky kob (*Argyrosomus japonicus*) species as a pupping/nursery ground, given that these are species of conservation and fisheries concern, and that available nursery habitat for these species is highly limited in South Africa; and

- the significant role that this estuary plays in the delivery of sediments and nutrients/detritus to the marine environment, elevating the importance of this estuary in geological terms to the local beaches and marine environments.

In the light of its importance and relatively unmodified present state, the Recommended Ecological Category (REC) for the Mzimvubu Estuary was set as a **Category A**, which is also its Best Attainable State (BAS).

In the 2013 EWR study (DWS, 2014c) four development scenarios were assessed, in addition to the reference and present river inflow [as Mean Annual Runoff (MAR)], as follows:

- Small dam 0.1 MAR (Ntabelanga)
- Medium dam 0.5 MAR (Ntabelanga)
- Large dam 1.5 MAR (Ntabelanga)
- 40% of natural flows

The results from the 2013 EWR study (DWS, 2014c), as well as consequences of the selected future development scenarios, will be used to inform this Classification study. The following additional components therefore, will be addressed from an estuarine perspective for this Classification study:

- Assess consequences of future development scenarios for the Mzimvubu estuary, building on the results from the 2013 EWR study and prepare a Scenario Consequences Report.
- Define RQOs for the Recommended Ecological Category (REC) / Target Ecological Category (TEC).
- Define implementation and monitoring requirements as pertaining to the Mzimvubu estuary.

2.5 WETLAND DATA AND INFORMATION

A feasibility study for the MWP was undertaken to quantify the water requirements (DWS, 2014d) and the Reserve determination was done for both the river and estuary environments (DWS, 2014a and c). A rapid Reserve determination was also conducted for the Tsitsa River at Lalini (DWS, 2014b) as part of the Environmental Impact Assessment (EIA) for the Mzimvubu Water Project. A detailed wetland assessment was completed for the same project for wetlands associated with the proposed Ntabelanga (approximately 25km east of Maclear) and Lalini (approximately 17km northeast of Tsolo) dams (DWS, 2015). While all this information is informative to some wetlands in the Mzimvubu catchment, no direct wetland assessments were done as part of the Reserve determination. Other previous assessments of wetlands in portions of the T3 catchment were also used, e.g., Job and Walters (2013).

The following data, in addition to available literature listed above and additional information to be sourced for the study, will be used to conduct the assessment of wetlands within the Mzimvubu catchment:

- The status quo description will provide information at a broad scale to inform the delineation of the wetland groups. Identifying the spatial distribution and extent of wetlands will rely on the NFEPA spatial and metadata (Nel *et al.*, 2011). The wetland layer for the Eastern Cape is in the process of being updated however (Colloty, pers. comm.), based on the new national geo-spatial information (NGI) dataset. CSIR/SANBI has processed this to include hydrogeomorphic (HGM) typing of waterbodies. The final spatial data set should be available

towards the end of October 2016, and it may be possible to use updated maps for wetland coverage.

- Typing wetlands in terms of EcoRegions and HGM types: The typing of wetlands will be based on EcoRegions and HGM types used from the National Wetland Classification System.
- The assessment of wetland PES will rely on both of the riparian/wetland metrics rated in the PES/EI/ES database (DWS, 2014f).

The determination of Ecological Importance (EI) will consider the following criteria: RAMSAR status (2002), wetland FEPA status, habitats for rare and endangered species (birds, frogs etc.), e.g., cranes in NFEPA data, Eastern Cape Critical Biodiversity Areas (CBAs; Berliner and Desmet, 2007, which is also in the process of being updated) and wetland extent (data from NFEPA; Nel *et al.*, 2011).

2.6 GROUNDWATER DATA AND INFORMATION

The technical proposal stated that the natural and present state of groundwater conditions in existing reports will be evaluated in terms of data required to generate or update the groundwater component of the Reserve. Groundwater-surface interactions as they exist in Water Resources of South Africa 2012 (WR2012) will be investigated and calibrated against recharge figures and observed flow at gauging weirs. The groundwater use data will be updated based on latest WARMS (Water Authorisation and Management System) data and data in existing reports.

The Mzimvubu Water Project Water Resources Report (DWS, 2014e) contains a desktop review based on data in the Groundwater Resource Information Project (GRIP) and the National Groundwater Archive (NGA). Groundwater is described. The focus is on aquifer types and associated yields and water levels; and the problems associated with groundwater supply rather than the water balance of groundwater and its contribution to the groundwater contribution to the EWR.

The WRSM2000 (Water Resources Simulation Model 2000) simulations have poor fits with observed data, and no calibration is evident against groundwater variables like baseflow and recharge. Consequently, it is not likely that the existing simulations can be used to obtain time series information from which to derive the groundwater contribution to the EWR. The fact that the mean log of annual flows and standard deviations are poor suggests that seasonal distributions of flow are not well simulated, hence the subsurface flows cannot be relied upon. The results are also presented only in terms of mean annual flows, making it impossible to verify the baseflows generated, which provide the EWR.

The Reserve component of the Feasibility Study for the MWP, conducted over the past few years and culminating in a series of Reserve reports in 2014 and 2015, do not contain a groundwater report in the series, nor even a groundwater chapter, hence the role of groundwater in maintaining the EWR is not reported on. This dearth of information suggests that the surface-groundwater interactions will need to be evaluated, as this was not done in the pre-existing studies.

The level of determination for the groundwater contribution to the EWR requires data on groundwater use and a calibrated WRSM2000 model, including calibration against groundwater. The level of determination will be addressed in the Status Quo task (Task 1) based on:

- the degree to which groundwater in a catchment is utilised compared to desktop estimates;
- the degree of groundwater dependency; and
- the relative contribution of groundwater to streamflow.

2.7 ASSUMPTIONS AND PROVISOS

2.7.1 Overall study

It is assumed that all data from previous studies such as the MWP Feasibility Study will be available from DWS in the form of a Data CD or flash drive rendered at the end of that study, and will be available to the PSP timeously and on request.

It is also assumed that reviewer comments will be provided to the PSP as an integrated set of comments by the DWS Project Manager (PM), immediately after the closure of the review period. The review period was stipulated in meetings with DWS to be three (3) weeks for the Project Management Committee (PMC) and two (2) weeks for the Project Steering Committee (PSC).

2.7.2 Reserve data and work

The availability of a Data CD from the MWP Feasibility Study is of particular importance for the previous Reserve work undertaken as only limited fieldwork will be conducted as part of the Reserve technical tasks for this study. It is paramount that benchmarks are located in the field so that surveys can be done on the same line and data can be linked directly to that of previous surveys. This is particularly important for riparian vegetation surveys as vegetation was not previously surveyed in the cross-section. This step is important if Intermediate Reserve Methodology is to be used, which is a requirement of dam building.

An attempt will be made to survey a site on the main stem of the Mzimvubu River, but this is dependent on habitat availability, access and security.

2.7.3 Economics

As far as the macro-economics is concerned, a significant uncertainty is that associated with the proposed construction of the Ntabelanga and Lalini dams. The EIA for the two dams have been completed, however no funds have been made available in the short term for dam construction. The EIA found that the project was economically viable as a developmental project, but financially it will be very difficult to reach feasibility. The success or not will depend in a large way on the proposed hydro-electric power unit to be installed at Lalini Dam, which will involve the participation of Eskom.

The assumptions in the analysis will be that the dams will eventually be built, that the proposed irrigation scheme and hydro-power units will be operational, and that the results of the economic analysis reached during the EIA process, will be accepted.

2.8 RISKS AND UNCERTAINTIES

2.8.1 Scenario phase: Construction of Ntabelanga and Lalini dams

Risks and uncertainties are related to the assumption that Ntabelanga and Lalini dams (T35E) will be built. This assumption will be followed in the step around assessing operational scenarios, as confirmed with DWS. Communication with Mr Bhekokwakhe Kunene of the DWS Regional Office

(RO) in East London regarding water use licensing (e-mail of 6 October 2016), has confirmed that no approvals are required for primary infrastructure development (i.e., dams and associated infrastructure), as long as approved DWS Government Waterworks are involved. Licensing will however be required for the use of water by users taking water from the infrastructure for the purposes of domestic, industrial and irrigation use, secondary reticulation system of potable water, bulk raw water conveyance infrastructure for irrigation and the electrical power line linking Lalini power station to the existing Eskom grid.

2.8.2 Review periods

The review period was stipulated in meetings with DWS to be three (3) weeks for the Project Management Committee (PMC) and two (2) weeks for the Project Steering Committee (PSC). The most significant risk to the project timing is that the review and report finalisation periods are not met. A two (2) week window has been allocated after the receipt of integrated comments from the DWS PM for the attention of the project team to make corrections and produce finalised documents. Should review periods not be met by DWS, or report finalisation by the project team, there will be a direct impact on the financial management of the project as invoices and payment are linked to final deliverables.

3 SCOPE OF WORK: MANAGEMENT, CAPACITY BUILDING AND COMMUNICATION TASKS

The study will be run according to the following Project Plan for Classification and RQO studies, which is based on the gazetted and guideline steps for Classification and RQO studies – see **Figure 3.1**.

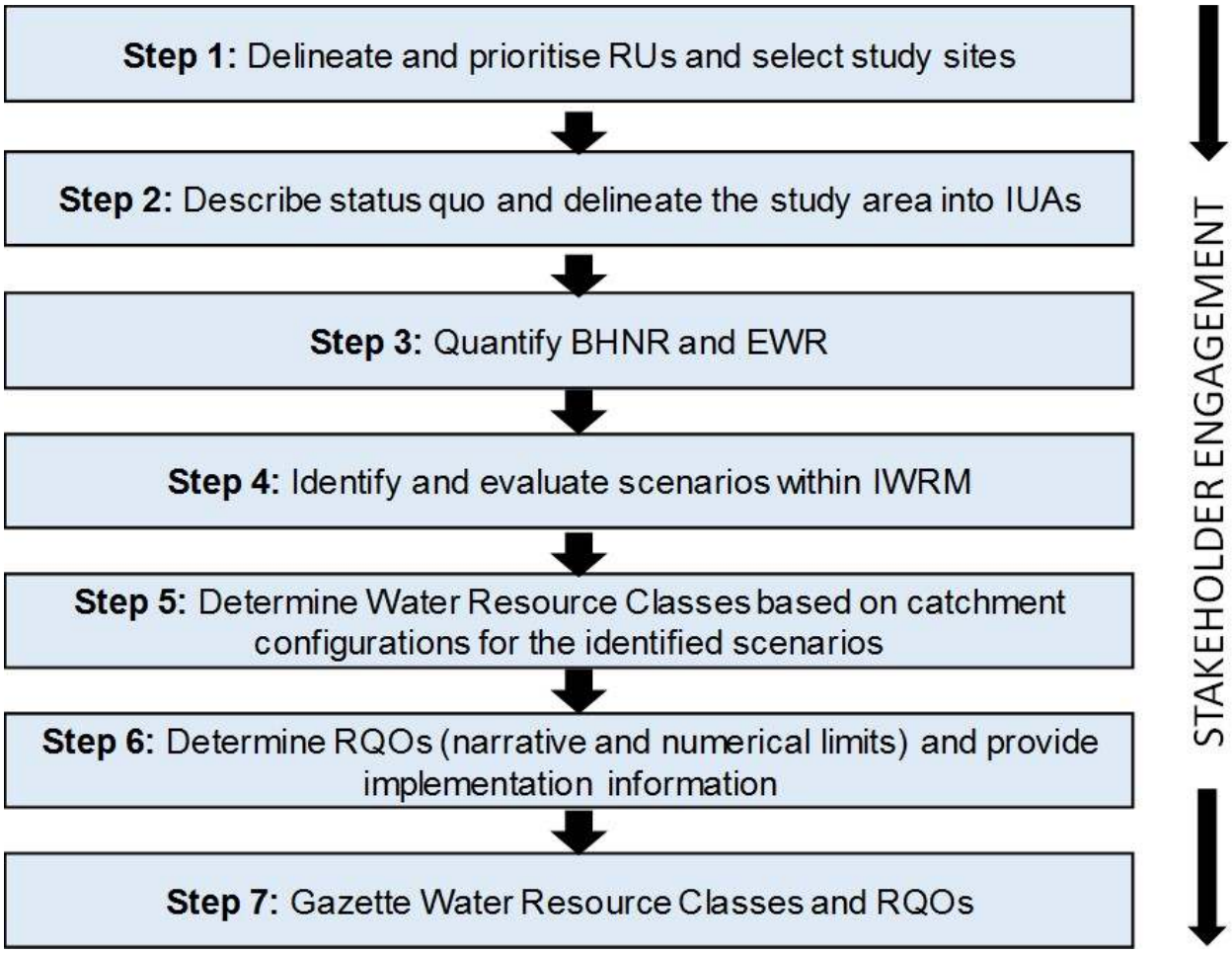

Figure 3.1 Project Plan for the Mzimvubu Classification study

The task table for the study is shown in **Table 3.1.** Note the use of the following legend:

Financial quarters	Task descriptions	
Quarter 1 (Q1): March – May	R: final report	TM: technical meeting
Quarter 2 (Q2): June – August	SW: specialist workshop	T: training
Quarter 3 (Q3): September – November	M: meeting	IM: information meeting
Quarter 4 (Q4): December – February	S: survey	G: gazetting
	O: other	

Table 3.1 Task and deliverables table for the Mzimvubu Classification and RQO study

Contract deliverable number	Tasks	Deliverables	Date	Quarter	Description
4.3.15	Task A	PMC meeting 1	Nov-16	Q3	M
4.3.15	Task A	PMC meeting 2	Mar-17	Q4	M
4.3.15	Task A	PMC meeting 3	Jul-17	Q1	M
4.3.15	Task A	PMC meeting 4	Nov-17	Q3	M
4.3.15	Task A	PMC meeting 5	Mar-18	Q4	M
4.3.1	Task B	Inception Report	Oct-16	Q3	R
4.3.19	Task C1	Initial stakeholder database	Oct-16	Q3	O
	Task C2	Stakeholder Engagement Plan (DWS)	Oct-16	Q3	n/a
4.3.18	Task C3	Study announcement	Oct-16	Q3	O
4.3.18	Task C3	BID	Nov-16	Q3	O
4.3.12	Task C4	PSC meeting 1	Dec-16	Q3	M
4.3.12	Task C4	PSC meeting 2	Apr-17	Q1	M
4.3.12	Task C4	PSC meeting 3	Aug-17	Q2	M
4.3.12	Task C4	PSC meeting 4	Nov-17	Q3	M
4.3.11	Task C4	TTG meeting 1	Jan-17	Q4	TM
4.3.11	Task C4	TTG meeting 2	Jul-17	Q2	TM
4.3.11	Task C4	TTG meeting 3	Oct-17	Q3	TM
4.3.10	Task C4	Sector meeting 1	Feb-17	Q4	IM
4.3.10	Task C4	Sector meeting 2	Jul-17	Q2	IM
4.3.9	Task C4	2 Stakeholder (public) meetings	Mar-18	Q4	M
4.3.17	Task C5	Issues and Response Report (final)	Jul-18	Q2	O
4.3.14	Task D	Mentorship programme	Oct-16	Q3	T
4.3.13	Task D	Training 1 + reporting	Jan-17	Q4	T
4.3.13	Task D	Training 2 + reporting	Jul-17	Q2	T
4.3.13	Task D	Training 3 + reporting	Oct-17	Q3	T
	Task D	Report on capacity building (appendix to Main Report)	Jul-18	Q2	R
4.3.2	Task 1	Status quo and Delineation Report	Dec-16	Q3	R
4.3.3f	Task 2	Systems modelling report, vol 1	Mar-17	Q4	R
4.3.3g	Task 2	Rivers survey	Sep-16	Q2	S
4.3.3g	Task 2	Survey report	Oct-16	Q3	R
4.3.3h	Task 2	Rivers workshop and report	Feb-17	Q4	SW, R
4.3.3f	Task 2	Rivers Desktop EWR report, vol 2	Mar-17	Q4	R
4.3.3a	Task 2	Rivers EWR report	May-17	Q1	R
4.3.3i	Task 2	Estuary specialist meeting and report	Apr-17	Q1	SW, R
4.3.3b	Task 2	Estuary EWR report	Jul-17	Q2	R
4.3.3e	Task 2	Wetland EcoClassification report	Aug-17	Q2	R
4.3.3c	Task 2	BHNR report	Mar-17	Q4	R
4.3.3d	Task 2	Groundwater report	Aug-17	Q2	R
4.3.4a	Task 3	Scenario description report	Apr-17	Q1	R
4.3.4c	Task 3	Ecological Consequences report	Oct-17	Q3	R (TM required)
4.3.4b	Task 3	Ecosystem Services, Economics and User Water Quality Consequences report	Sep-17	Q2	R

Contract deliverable number	Tasks	Deliverables	Date	Quarter	Description
4.3.5	Task 4	WRC and Catchment Configuration report	Jan-18	Q4	R (TM required)
4.3.6a	Task 5	Rivers and Estuary RQO report	Feb-18	Q4	R
4.3.6b	Task 5	Wetlands and Groundwater RQO report	Feb-18	Q4	R
4.3.7	Task 6	Implementation and monitoring report	May-18	Q1	R
4.3.16	Task 7	Main report, vol 1	Jul-18	Q2	R
	Task 7	Electronic data (associated with Close-out report)	Jul-18	Q2	O
4.3.16	Task 7	Close out report, vol 2	Jul-18	Q2	R
4.3.8	Task 8	Input to the legal notice (Water Resource Classes and RQO gazette template input)	May-18	Q1	G
	Task 8	1. technical input	Jan-18	Q4	G
	Task 8	2. legal input	Feb-July 2018	Q4-Q2	G

3.1 TASK A: PROJECT MANAGEMENT

The Mzimvubu study will be run with the assistance of the Project Management Committee, which will be selected by the DWS. The PMC comprises relevant DWS officials, officials from the Mzimvubu to Tsitsikamma proto-Catchment Management Agency (CMA), and the PSP.

Five (5) PMC meetings will be held throughout the project, at the DWS office in East London. PMC meetings and all associated arrangements (invitations, agendas, presentations and minutes) will be provided by the PSP.

Additional meetings, such as PSC and Public meetings, are discussed under Task C: Communications. This task also discusses issues such as sending out meeting invitations, agendas and associated documentation, and preparation of minutes.

Financial management will consist of invoices submitted with finalised deliverables, cash flow projections and general budget administration. A progress report and financial reporting will be included with invoices and associated deliverables.

An editor has been appointed to the team to assist with report finalisation. As specified in the ToR, the Project Management Team will assist the DWS in selecting and approving independent reviewers, if and when necessary. The use of external reviewers has not been costed.

Information required:
Guidance from the DWS Project Management Team regarding the following points, in particular:

- Report numbers
- Report formats
- Numbers of final reports to be printed and flash drives to be delivered at the end of the study
- Invoicing process, including format of invoices and deliverable dates
- DWS letters and input, as required
- Stakeholder Engagement Plan, to be prepared by the DWS PM
- Review of all documents, letters etc. as required
- Selection of the Project Management and Project Steering committees

- Compilation of PMC and PSC review comments within the agreed three (3) and two (2) week review periods respectively
- Other information or assistance as required

Deliverable dates:
PMC meeting dates as proposed below. Dates have been selected so as to report on main project deliverables. In most instances the PMC meeting will also serve as a dry run for the following PSC meeting.

- PMC 1: November 2016. This will also serve as a dry run for the December PSC meeting.
- PMC 2: March 2017
- PMC 3: July 2017
- PMC 4: November 2017
- PMC 5: May 2018

Deliverables and task responsibility:

- Study leader: Scherman
- Task leaders: Louw D (rivers), Taljaard (estuary), van Rooyen (hydrology, groundwater, scenario modelling), Mullins (macro-economics), Mackenzie (wetlands)
- Financial manager: Sauer
- Administrative assistants: Louw S, van der Waal
- Compilation of reports: van der Waal, Koekemoer
- GIS: van der Waal, MacFadyen
- Editor: Gowans
- Communications regarding meetings: Shinga, Chamane, Shabalala

Notes:

- The PSP is not responsible for ensuring reports are signed by the other delegated authorities as shown on the signatory pages of the reports.
- The PSP is not responsible for ensuring PMC and PSC comments on technical reports are received timeously.
- The PSP is not responsible for appointing or funding an external reviewer.

3.2 TASK B: INCEPTION PHASE

The objective of the Inception Phase is to produce a clear and unambiguous Inception Report, which will guide the study through the two-year study period. This is required to ensure that the Client and PSP are clear as to the deliverables, timing and costs of the programme. The project's inception phase also involves the appointment of sub-consultants, and gathering of water resource information and data for the study. This information will assist in refining the scope of work through liaison with the DWS Classification team, and specifically Mr Mulangaphuma as DWS Project Manager. The development of capacity building and mentorship programmes will also be included in this phase, as well as the preparation of the Stakeholder Engagement Plan by the DWS PM.

The information available for the study, gaps and risks are shown in Section 2 of this document. This activity has been conducted under Task B of the study.

Information required:

- Input from the project team
- Input from DWS regarding the following:
  - Stakeholder Engagement Plan
  - PMC and PSC members
  - Report numbers
  - mentorship and capacity building programme

Deliverable dates:

According to the programme the Project Plan and Inception Report must be presented at the first PMC meeting and delivered in **October 2016.** However, the first PMC meeting will be conducted in **November 2016** due to the availability of study team members.

Deliverables and task responsibility:

- Draft and Final Inception reports: Scherman, Louw D, van Rooyen/Talanda, Sami, Mackenzie, Taljaard, Shinga, Huggins, Mullins
- Attendance of the first PMC meeting to present the Inception Report: Scherman

3.3 TASK C: COMMUNICATION STRATEGY

The following activities take place at the initiation of the study:

- Study announcement (advertisements)
- Preparation and distribution of the Background Information Document (BID)
- Preparation of the Initial Stakeholder Database
- Preparation of the Stakeholder Engagement Plan: This plan is prepared by the DWS PM for the study.
- Invitation to the Inaugural PSC meeting

3.3.1 Task C1: Identification of stakeholders

The identification of stakeholders will be intensive at the beginning of the project. The list of identified PSC members will be submitted to the PMC for approval. In this regard, the identification of stakeholders and community representatives who will be PSC members is important and will be done in collaboration with DWS (as assisted by stakeholders in the study area).

Stakeholders' details will be captured on an electronic database management programme. Details will be categorised according to sectors. Comments and contributions received from stakeholders will be recorded, linking each comment to the name of the person who made it.

Typically, our team will identify stakeholders representing the following sectors of society:

- National, provincial and local government (relevant local and district municipalities)
- Relevant residents' associations, ratepayers' organisations, community-based organisations, agricultural organisations and Non-Governmental Organisations (NGOs)
- Environmental and water organisations, forums, groups, associations and government institutions
- Private sector (business, tourism, industries, irrigation) in the Mzimvubu to Tsitsikamma WMA
- Civil society
- Regional and local media

The draft database will be compiled during the first few weeks of the project implementation period; however, a database is dynamic and will be regularly updated as more information becomes available and as stakeholder information changes.

Information required:

- List of DWS internal officials and/or representatives from the relevant directorates
- List of members from the Catchment Management Forums (CMFs)

Deliverable dates:

- 31 October 2016

Deliverables and task responsibility:

- Establishment and maintenance of database: Shinga, Chamane, Shabalala

3.3.2 Task C2: Stakeholder Engagement Plan

A Stakeholder Engagement Plan which communicates the process to be followed in engaging representative groups within the study area will be compiled by DWS. The purpose of the Stakeholder Engagement Plan will be to:

- ensure that adequate engagement with stakeholders is undertaken;
- share information with different sectors;
- engage key stakeholders on key water-related issues of the Mzimvubu to Tsitsikamma WMA; and
- provide the opportunity for stakeholders to comment and raise issues on project milestones.

Information required:

- Outline of key sectors and organisations to be engaged
- Number of PSC meetings
- Number of Technical Task Group (TTG) and Sector meetings

Deliverable dates:

- To be submitted with the Inception Report in **October 2016**

Deliverables and task responsibility:

Stakeholder Engagement Plan: DWS (Mulangaphuma), Shinga and Scherman (review)

3.3.3 Task C3: Project announcements and information updates

In preparation and prior to the announcement of the project, the following activities will be undertaken:

- Interact with the relevant DWS representatives with the aim of identifying stakeholders to be invited to the PSC meetings, thereby contributing to the establishment of the database.
- Preparation of the BID and submission to the Study Leader for input and DWS for review.
- Establish contact with stakeholders.
- All other public documents that will be drafted e.g. advertisements, comment sheets, letters, and proceedings of meetings and workshops will be submitted to the Study Leader and DWS for approval before distribution.

The study will be announced through the following activities:

- Distribution of a BID (English and Xhosa). The BID will explain the need for the project, the context of the study and show the extent of the study area (map). Information such as where additional information can be obtained, the website for downloading of information, etc. will also be provided in the BID.
- A comment sheet will accompany the BID and will provide an opportunity for people to register as a stakeholder, provide names of other possible stakeholders and to comment on the Classification study.
- Placement of statutory advertisements (English and Xhosa) in relevant newspapers.
- Distribution of a personalized letter to stakeholders with a copy of the BID, including an invitation to register and participate in the Classification study.

Information required:
Input from Study Leader and DWS

Deliverable dates:

- Study advertisements and draft BID: October 2016
- Final BID and distribution thereof: November 2016

Deliverables and task responsibility:

- Advertisements, BID, Letters, Comment Sheets: Shinga, Chamane, Shabalala

3.3.4 Task C4: Meetings

PSC and Public meetings

The proposal caters for four (4) Project Steering Committee meetings to be held in the study area. East London has been identified as a suitable location for these meetings. The PSC will consist of members from various organisations and sectors, striving for balanced representation, who will provide strategic advice, oversight and guidance to achieve balanced view points and inputs from stakeholders within the study area. There is no limit to the number of PSC members. Existing structures that are in place in the Mzimvubu to Tsitsikamma WMA will be utilised for this purpose. The Project Management Committee (PMC) will approve the list of PSC members.

For each PSC meeting, invitation letters and a proposed agenda will be distributed to PSC members providing them with sufficient information about the status of the project, the purpose of the meeting and what will be expected of them (e.g. read through documents prior to the meeting and the subjects on which to provide input and comments).

The proposed dates and focus of all planned PSC Meetings is presented hereunder:

PSC meeting 1: December 2016

- Status quo assessment of WMA7 and delineation of Resource Units (RUs) and Integrated Unit of Analysis (IUAs)
- Identification of priority areas, EWR sites and desktop biophysical nodes

PSC meeting 2: April 2017

- Presentation of priority RUs nested with IUAs, with identified indicators, water quality role players and driving variables
- Desktop and River EWRs, including EcoClassification results

- Systems modelling
- Selecting and defining operational scenarios

PSC meeting 3: August 2017
- Estuary EWR results
- Wetland EcoClassification
- Groundwater report

PSC meeting 4: November 2017
- Consequences of operational scenarios (estuary, river, economics, ecosystem services, user water quality)
- Presentation of Preliminary Water Resource Classes
- Presentation of draft RQOs

Stakeholder/Public meetings: March 2018
- Feedback on public meeting and final WRC for gazetting
- Draft RQOs

TTG and Sector meetings

Technical Task Group (TTG) and Sector meetings will be held should the need arise**.** Prior to these meetings, the necessary documentation will be compiled and distributed. The meetings will be arranged, but not attended by the PSP. Minutes of all meetings will become part of the Issues and Responses Report.

TTG meetings will be held to discuss specific technical issues. The programme for these TTG meetings cannot be fixed as it will depend on the demand. Proposed subjects at this stage are user water quality, input to the Multi Criteria Analysis (MCA) system used for scenario evaluation and RQOs. Three (3) meetings are therefore currently envisaged.

Sector meetings will be representative of different sectors in the study area, e.g., agriculture and industry, as required. Stakeholders will be identified (per relevant sector of society) and invited to attend the meetings. The programme for Sector meetings cannot be fixed as it will depend on the demand. Provision has been made for two (2) Sector meetings.

Information required:
- Meetings will be dependent on technical input required or presented for discussion. Provisional dates are provided in the Gantt chart.

Deliverable dates:
- Dates for PSC Meetings 1 to 4 as presented above
- Dates for Technical Task Group meetings (as and when required)
- Dates for Sector meetings (as and when required)

Actions:
- Establishing PSC database.
- Distribution of invitations, agendas and accompanying documentation for PSC and Public meetings.
- Coordination, attendance registers, participation in the PSC and Public meetings, compilation and distribution of meeting minutes.

- Invitations, agendas, attendance registers, relevant information documents and minutes of three (3) TTG meetings, and two (2) Sector meetings, as required.
- Update Issues and Response Report with all comments raised at meetings.

Deliverables and task responsibility:
- Attendance of PSC and Public meetings: Shinga
- Stakeholder Issues and Response Report: Chamane, Shabalala
- Minutes of meetings: Shinga, Chamane, Shabalala
- Distributions of invitations, agendas and accompanying documentation for PSC, TTG, Sector and Public meetings: Chamane, Shabalala

Notes:
- PSC meetings will be held in East London.
- PMC, TTG and Sector meetings will be held at the DWS offices in East London, unless there is a request or requirement for the TTG and/or Sector meetings to be held elsewhere in the study area.
- TTG and Sector meetings will only be held as the need arises, and upon consultation and approval by the client.
- **PSC Meeting 4:** Should the presented scenarios have changed significantly with the consideration of stakeholder comments, the process to invite stakeholder inputs on the revised scenarios will have to be repeated to reach an acceptable level of agreement with stakeholders (note, however, that there is no financial provision for costs associated with repeat workshops).

3.3.5 Task C5: Recording of comments

An Issues and Response Report will be compiled and updated throughout the duration of the project. This report will list all the comments from stakeholders (received through comment sheets, raised at meetings, *via* telephone calls, faxes and email) and responses from the project team.

Information required:
- This will be dependent on the comments raised and/or submitted by stakeholders.

Deliverable dates:
- Submission of updated Issues and Responses Report bimonthly (if there are any new comments)
- A final Issues and Responses Report will be rendered in **July 2018**

Actions:
- Submission of comments to the Study Leader and DWS Project Manager for coordinating the provision of responses to comments raised by stakeholders.
- To be submitted to DWS after each PSC meeting or interaction where comments were raised.
- Keep an updated Issues and Response Report.

Deliverables and task responsibility:
- Stakeholder Issues and Response Report: Shinga, Chamane, Shabalala

3.3.6 Task C6: Website information

All public information will be made available to the DWS to upload on the Department's website and the address will be sent to all stakeholders.

DWS website link: https://www.dwa.gov.za/rdm/wrcs/default.aspx

Information required:

- All public documents and reports to be uploaded once finalised and approved

Deliverable dates:

- Continuous task for the duration of the project

Deliverables:

- Stakeholder Engagement Plan
- Public documents
- Presentations
- Issues and Responses Report
- Technical reports for PSC review

Task responsibility:

- Shinga**,** Scherman

3.4 TASK D: MENTORSHIP AND CAPACITY BUILDING

The ToR requires skills transfer within the department, focussing on skills required by water resource managers in the study area. The capacitation of stakeholders is also considered vital to enable stakeholders to assist in the decision-making process required by Classification and the development of RQOs.

The **Capacity Building Framework** shown as **Table 3.2** is presented as a draft document that will be developed during the study with DWS's input. Three (3) training opportunities have been provided for (as listed in the proposal), which will be linked to specialist workshops or meetings already taking place (i.e., TTG and/or PSC meetings). These training opportunities are aimed at DWS staff, with invitations prepared by the PSP and circulated by the DWS PM. Previous exposure or training in any of the methods used during Reserve, Classification or RQO studies will be an advantage to trainees. This process will therefore build on their earlier exposure to these processes.

The Capacity Building Framework also addresses stakeholder capacitation. This will largely be in the form of documentation that will be provided prior to stakeholder engagement opportunities, as mentioned in Task C, but will also include appropriate sessions with stakeholders (or selected groups, as at TTG meetings) to prepare them for specific events. As part of their mentorship, DWS personnel will be included in the team providing the capacity session prior to each meeting. The time allocated to various training sessions will be dependent on the time available to trainees, whether DWS staff or PSC members.

It is acknowledged that for stakeholders to fully participate and provide useful input to PSPs at TTG meetings (for example), identified stakeholders need to be clear on the background leading up to

the TTG meeting, as well as what may be expected of them at the meeting. This is a difficult task to achieve as stakeholders are normally not available for long periods of time at meetings, but the PSP and DWS personnel participating in the Mentorship Programme will attempt as far as possible to provide at least a few hours of preparation time with stakeholders before TTG and PSC meetings. The effective use of stakeholder interaction time will be required and preparation interactions will be planned for timeously.

Training will also be conducted at specialist workshops undertaken for the study, which may include a larger group of DWS officials. Aims, Objectives and Learning Outcomes will be identified per learning area and per learning opportunity.

A draft **Mentorship Programme (Table 3.3)** has been developed specifically for the Chief Directorate: Water Ecosystems (CD: WE) staff seconded to the programme, and will involve them in tasks as much as is feasible considering their workloads and availability. At this stage Mr Lawrence Mulangaphuma has been seconded to the study.

Table 3.2 Draft Capacity Building Framework for the Mzimvubu study

Training opportunity associated with:	Task number	Approximate date (proposed venue)	Trainee identification	Trainers	Subject
Training 1 associated with TTG meeting 1: Water quality	D	January 2017 (East London)	Stakeholders involved with TTG meeting; DWS staff; mentee	Patsy Scherman	▪ Background to process and where water quality fits in process ▪ Input to user water quality process, i.e., identification of users, hotspots and pollution protection areas, driving variables
Training 2 associated with TTG meeting 2: EWR task, including wetlands and groundwater	D	May 2017 (East London)	Stakeholders involved with TTG meeting; DWS staff; mentee	Delana Louw James Mackenzie Karim Sami	▪ Understanding of EWR ▪ Wetland process; information requests ▪ Groundwater process; including groundwater/surface water interactions
Training 3 associated with TTG meeting 3: Input to scenario step	D	October 2017 (East London)	Stakeholders involved with TTG meeting; DWS staff; mentee	Pieter van Rooyen	▪ Scenario process ▪ MCA analysis
PSC meeting 4: Multi-criteria analysis and scenario consequences	C4	November 2017 (East London)	PSC members; DWS staff; mentee	Pieter van Rooyen William Mullins Patsy Scherman	▪ Scenario process consequences ▪ MCA analysis ▪ Introduction to RQOs

Table 3.3 Draft Mentorship Programme for the Mzimvubu study: Mr Lawrence Mulangaphuma and seconded staff

Steps	Learning area	Task description	Skills required	Mentee participation / involvement
Step 1: Delineation of RUs and select provisional study sites	Ecology, Hydrology, Water Quality, Delineation	▪ Hot sport identification and level assessment ▪ Delineation of RUs	▪ Use of Google Earth ▪ Sourcing of data ▪ Delineation of the Resource Units	▪ Delineation study team meeting ▪ Delineation of RUs in form of discussion session with team leader ▪ Review of Status Quo/Delineation report
Step 2: Describe status quo and delineate study area into IUAs	Ecology, Hydrology, Water Quality, Socio-economics, Groundwater, Delineation, Training	▪ Establishment of a network of nodes to be used as the basis of the Classification Process ▪ Determination of the present-day status of the catchment (ecological, economic, social, ecosystem services and water quality) ▪ Water resources rezoning and identification of important water use ▪ Delineation of IUAs	▪ Application of GIS ▪ Use of Google Earth ▪ Allocation of nodes ▪ Data collection and sourcing (what to collect and how) ▪ Delineation of the socio-economic zones ▪ Delineate groundwater resource units ▪ Training skills	▪ Delineation study team meeting ▪ Delineation of IUAs, Water Resource Use Importance and selection of nodes in form of discussion session with team ▪ Review of Status Quo/Delineation report ▪ Assistance at stakeholder training sessions
Step 3: Quantify EWRs and BHNR	Ecology, Hydrology, Hydrodynamics, Water Quality	▪ Reserve field survey ▪ Extrapolation and ▪ estimation processes, i.e. biophysical nodes ▪ Understanding the hydrology of the Mzimvubu system ▪ Understanding the BHNR ▪ EWR processes ▪ Ecosystem services ▪	▪ Sourcing of data ▪ Exposure to field data collection methods ▪ Desktop EWR estimation for biophysical nodes ▪ Interpretation of results ▪ Understanding the application of EcoStatus and estuary models ▪ Setting and running the river water quality model (PAI) ▪ Understanding linkages between	▪ Attendance of River survey ▪ A session with the modellers in January/February 2017 regarding systems modelling for the Mzimvubu catchment ▪ Attendance of River specialist workshop and exposure to each model used with the relevant specialist: February 2017 ▪ Attendance of Estuary specialist workshop: April 2017 ▪ Review of specialist reports: January to June 2017 ▪ A session with Greg Huggins to develop an

Steps	Learning area	Task description	Skills required	Mentee participation / involvement
			ecosystem services, PES and REC	understanding of ecosystem services and the assessment thereof: February 2017
Step 4: Identification and evaluation of scenarios within Integrated Water Resource Management	Ecology, Hydrology, Water quality, macro-economics, ecosystem services, MCA	Establishment of operational scenarios, considering the relationship among social, economic and ecological trade-offs	▪ The development of the scenarios and understanding the scenario modelling process ▪ Interpretation of consequences results	▪ A session with the modellers in January/February 2017 around the modelling of scenarios ▪ Attendance of Estuary specialist workshop: April 2017 ▪ A session with the economics team regarding their approach to scenario evaluation: June 2017 ▪ A session with the rivers ecological team to evaluate consequences to scenarios: July 2017 ▪ Review and input to all reports, i.e. including individual specialist reports: July – November 2017
Step 5: Determine WRC and configurations for the identified scenarios	MCA	▪ Social, economic and ecological trade-offs ▪ MCA ▪ Selection of catchment configurations ▪ Allocation of WRC	▪ Understanding and use of MCA ▪ Understanding the process of defining WRC ▪ Training skills	▪ Training session around MCA: October 2017 ▪ Attendance of a working session to discussion TECs ▪ Assistance at stakeholder training sessions
Step 6: RQOs and implementation	Determination of the RQOs	Development of RQOs	▪ Use of the RQOs toolkit and development of numerical limits ▪ Knowledge on effective water resourcing monitoring	▪ Attendance of internal preparatory meeting for RQO determinations: September/October 2017 ▪ Input on implementation ▪ Review of associated reports: November 2017 – May 2018
Step 7: Gazette WRC and RQOs	Communication, Public participation, Stakeholder engagement	▪ Stakeholder consultation ▪ Legal input to gazetting	▪ Stakeholder engagement ▪ Knowledge of DWS's legal structures	▪ Input from the perspective of the water resource custodian into the legal process ▪ Assistance at public meetings

Information required:
Input from DWS on draft programmes regarding mentorship and capacity building requirements. The programmes presented in the Inception Report are preliminary and will be finalised with the client's input.

Deliverable dates:
- Draft capacity building and mentorship programme: **October 2016**
- Training events as linked to TTG and PSC meetings

Deliverables and task responsibility:
- Capacity building programme, including stakeholder training events: Scherman, DWS, study team
- Mentorship programme: Scherman, DWS (Mulangaphuma and other DWS officials)

4 SCOPE OF WORK: TECHNICAL TASKS

4.1 TASK 1: DESCRIBE STATUS QUO AND DELINEATION

4.1.1 Status quo description

The status quo description is essential as it describes the baseline on which all future decisions are based on. Status quo is described for the following components.

Water resources

The current infrastructure and water use of the system will be described. A summary of previous hydrological simulation studies will be compiled listing salient statistics of hydrological analysis representative of current and future conditions. A water use importance assessment will be prepared for defining where and to what extent the natural river flow has changed. Water resource system model network layouts will be reviewed to identify where abstractions, return flows (if any) and storage structures are located.

Rivers

The PES of the rivers will be described at a SQ scale and at a broad overview level. The existing information available as part of the DWS/WRC PES/EI/ES study (DWS, 2014f) will be used as a baseline and will be reviewed and adjusted where necessary. The PES will be provided in terms of Ecological Categories as well as summarised reasons for the change from natural.

Estuaries

A broad overview of the present state of the Mzimvubu Estuary will be provided based on available literature and information.

Wetlands

The status quo description will provide information at a broad scale to inform the delineation of the wetland groups. Identifying the spatial distribution and extent of wetlands will rely on the NFEPA spatial and metadata (Nel *et al.*, 2011). The wetland layer for the Eastern Cape is in the process of being updated however (Colloty, pers. comm.), based on the new NGI dataset. CSIR/SANBI has processed this to include hydrogeomorphic HGM typing of waterbodies. The final spatial data set should be available towards the end of October 2016, and it may be possible to use updated maps for wetland coverage. This work will be at desktop level.

Groundwater

A map of significant groundwater resource units (GRUs) will be compiled (see Section 4.1.3). A summary of existing data and available knowledge will be presented at the appropriate scale.

Ecosystem services

Ecosystem services will be identified at a broad overview level. As no specific ecosystem services data are available for the Mzimvubu catchment, research will proceed from an evaluation of available mapping and analysis of secondary material where available. A number of stakeholder-based programmes have been identified in the study area. Considering the dearth of current information, background to the approach is provided.

Macro-economics

The purpose of this section is to evaluate the socio-economic status and economic returns on the existing out-of-the-stream water use by the various water users in the Mzimvubu river catchment. The objective is to provide a baseline (status quo) value of the current water use of each IUA to be identified for later comparison with the value of water for the different operational scenarios, and build on previous information available from feasibility and other studies. The current macro-economic situation of the catchment will be based on available information in the catchment, including that of recent studies for the Ntabelanga Dam EIA.

Water quality

Water quality problem areas and proposed pollution protection areas will be identified (following the guidelines of DWS, 2016c), and for these, the relevant issues will be described at a broad overview level. It is recommended that a meeting take place with any major water quality stakeholders (e.g., DWS's Water Quality Planning Directorate or the district municipality) so that repositories of information and data are identified. Previous experience has shown that data gathering may be a lengthy process and so should be initiated early in the study in preparation for data analysis stages.

4.1.2 RU and IUA delineation

The SQ river reaches will be combined into Resource Units based on similarity in terms of land use, ecological state as well as consideration of the locality of different levels of hotspots. These will again be grouped into IUAs. An Integrated Units of Analysis is a broad scale unit (or catchment area) that contains several biophysical nodes. These nodes define at a detail scale, specific attributes that together describe the catchment configuration of the IUA.

RUs where more detailed level of information is required (based on the hotspot determination), will be revised with a more detailed process to determine Management Resource Units (MRUs).

Groundwater

The technical proposal calls for a map of significant Groundwater Resource Units (GRUs) to be compiled. The following criteria will be utilised:

- Geological conditions which impact on borehole yields and water quality.
- The role of groundwater in baseflow to rivers from the regional aquifer or via interflow from high lying springs.
- Topography.
- A summary of existing data on harvest potential, groundwater use as per WARMS, and baseflows will be compiled and presented at the appropriate scale.

In order to define and delineate GRUs, and to quantify the groundwater component of the EWR, the study area needs to be delineated into GRUs based on:

- interaction with other components of the hydrological cycle such as wetlands and rivers;
- nature of the aquifers (primary, secondary dolomitic, alluvial etc.);
- lithology when it affects borehole yields and groundwater quality;
- topography;
- groundwater dependence and use;
- groundwater quality; and
- recharge and available groundwater resources.

The key outcome of this delineation process is a map demarcating GRUs and a description of the important groundwater parameters of each GRU. The sources of data to be used in this study for grouping and delineation in hierarchical order, are:

- An original primary delineation by quaternary catchment boundary as demarcated in WR2012.
- Geological age and lithology based on the Geological Society of South Africa (GSSA) (Anhaeusser *et al.,* 2006).
- Identification of groundwater regions based on geological considerations.
- Identification of catchments with baseflow to surface water bodies, as listed in Groundwater Resource Assessment Phase II (GRAII) (DWA, 2006).
- Climate, recharge, and Harvest Potential (DWA, 2006).

4.1.3 Identification of (river) hotpots (now called the prioritising of RUs)

The term hotspots, as used within Classification, refer to areas that would require detailed levels of investigation for decision-making. Hotspots will usually consist of areas that are stressed in terms of water use and/or in terms of water quality, that has a likelihood for future water resource development and that has a high ecological and socio-cultural importance (or any combination there-of). Therefore, the area mostly likely to qualify as a hotspot will be an area under stress with a high ecological and socio-cultural importance. The following tools will be applied and the results overlaid to identify the hotspots.

Ecological Importance

Relevant tools for rivers (at SQ scale), estuaries and wetlands (grouped wetland types) will be used to evaluate the Ecological Importance and Sensitivity (EIS).

Socio-Cultural Importance (SCI)

The existing SCI model will be applied to determine the importance at SQ level using criteria such as recreation, subsistence use and cultural importance.

Water Resource Use Importance (WRUI)

The existing WRUI model will be applied to determine importance based on criteria such as existing stress, future developments and water quality.

Water quality

Water quality hotspots will be identified using information gathered during the status quo task, as well as that from the WRUI assessment. Water quality hotspots are areas of high water quality importance, and generally indicate areas where a poor water quality state is highlighted.

Information required for the deliverable:

- All relevant information from previous studies
- PES/EI/ES data (DWS, 2014f) which is readily available
- Socio-economic zones based on relevant data
- Groundwater Resource Units
- Economic zones

Deliverable dates:

- The delivery date for the *draft* Status Quo and Delineation Report is *end October 2016/early November 2016*
- The delivery date for the ***final*** Status Quo and Delineation Report is ***December 2016***

Deliverables and task responsibility:

- Status Quo and Delineation Report: Louw D, Kotze, Mullins, Talanda, van Rooyen, Scherman, Huggins, Sami, Mackenzie, Taljaard, van Niekerk

Notes:

Under normal circumstances this work would be documented in three separate reports. It has however been requested to combine this deliverable.

4.2 TASK 2: QUANTIFY ECOLOGICAL WATER REQUIREMENTS

4.2.1 Systems modelling and River Desktop EWRs

Systems modelling

Natural and Present Day monthly time series of river flows will be prepared for the relevant EWR sites and desktop biophysical nodes. Existing (selected) hydrological models will be further refined (delineated) to prepare the time-series data at the defined river reaches, if required. Standard delineation techniques will be applied to derive the representative flow time-series. Note that no primary hydrological studies will be carried out and only available data and models will be refined to undertake this analysis. A concise report describing the revised hydrological models will be prepared referencing the electronic data of the models and resulting time-series data as the primary deliverable of this task

Desktop EWRs

Due to the large study area, additional EWRs are estimated for every Resource Unit identified which is not addressed by the more detailed EWR assessment. These EWRs are estimated using the Revised Desktop Reserve Model (RDRM). The output of the results is an estimated EWR for each Ecological Category.

Due to the current developmental phase that the RDRM is in (i.e., Water Research Commission project K5/2539/2 entitled *Refinement of the Revised Desktop Reserve Model*, May 2016-October 2017), Dr Birkhead will use the results emanating from the River Workshop in February 2017 to establish "rules" for stress-curves and shifts in the stress or flow from natural to the Recommended Ecological Category (REC). This will assist him in more accurately running the RDRM for the desktop nodes while the model is in its current developmental phase, rather than using the current default settings (developed largely on fish guilds) to set stress profiles.

Information required:

- All EcoClassification models for the EWR sites as well as field data collected in a standard and accepted electronic format.
- Output from the River workshop in February 2017 to more accurately set stress profiles for desktop nodes.

Deliverable dates:

- The delivery date for the *draft* Systems Modelling Report is *January 2017*

- The delivery date for the ***final*** Systems Modelling Report is ***early March 2017***
- The delivery date for the ***final*** River Desktop EWR Report is ***end March 2017***[2]

Deliverables and task responsibility:
- Systems modelling: Talanda, van Rooyen
- River Desktop EWRs: Birkhead, Louw D

Notes:
- Note that the Desktop EWR component fits better with the River EWR information and can only be provided after that information has become available.
- Although one deliverable is contracted for this task, it is requested that two volumes be submitted, i.e., the Modelling Report in January (draft) and February (final) 2017, with the Desktop EWR Report submitted in March 2017.

4.2.2 Other river EWRs

EWRs at detailed level

There are three existing EWR sites, one of which is documented to be at Intermediate level and the other two sites at Rapid level (DWS, 2014a; b). Once the CD of raw data has been obtained, the suitability of processes followed and level of detail will be investigated and the additional work identified to address any gaps.

An initial broad assessment of the results have indicated that field work will be required at the EWR sites. The disciplines involved will cover the following components:
- Habitat integrity
- Water quality
- Hydraulics
- Fluvial geomorphology
- Riparian vegetation
- Fish
- Macroinvertebrates

The process of determining the EWRs will consist of two phases as follows:
- Applying EcoClassification Level III and Level IV to determine the PES, EIS and REC.
- Quantifying the EWR for the PES, REC and potentially alternative states.

Information required:
- All EcoClassification models for the EWR sites as well as field data collected in a standard and accepted electronic format.
- Results from the rivers field survey to be conducted in **September 2016**
- Results from the rivers workshop to be held in **February 2017**

Deliverable dates:
- The delivery date for the Rivers Survey Report is **October 2016**
- The delivery date for the Rivers Workshop Report is **February 2017**

[2] No draft report is required for the desktop EWRs as each node is processed once through the RDRM, with the output being a series of EWR tables per node. PES and REC results for the nodes are documented in the Status Quo and Delineation Report.

- The delivery date for the *draft* River EWR Report is *March 2017*
- The delivery date for the ***final*** River EWR Report is ***May 2017***

Deliverables and task responsibility:
- River Survey Report: Scherman, Louw D, Kotze, Mackenzie, Uys, Rowntree
- River Workshop Report: Scherman, Louw D, Kotze, Mackenzie, Uys, Rowntree, Koekemoer
- River EWR Report: Scherman, Louw D, Kotze, Mackenzie, Uys, Rowntree, Koekemoer, Birkhead, van der Waal

4.2.3 Estuary EWRs

A two-day specialist workshop will be convened to confirm the PES and REC, and to assess the consequences of future development scenarios that may have an impact on the Mzimvubu estuary. The Estuary Templates (as per the official DWS methodology – DWAF [2008]) will be completed by all specialists and provide input information to the estuary tasks.

Information required:
- Results from the estuary workshop to be held in **April 2017**

Deliverable dates:
- The delivery date for the Estuary Workshop Report is **April 2017**
- The delivery date for the *draft* Estuary EWR Report is *May 2017*
- The delivery date for the ***final*** Estuary EWR Report is ***July 2017***

Deliverables and task responsibility:
- Estuary Workshop Report: Taljaard, van Niekerk, Adams, Snow, Weerts, Forbes, Turpie
- Estuary EWR Report: Taljaard, van Niekerk, Adams, Snow, Weerts, Forbes, Turpie

Notes:
- One estuary workshop will be held, during which estuary EWRs as well as ecological consequences to scenarios will be determined. Results will be provided in two reports, as requested by the client.

4.2.4 Basic Human Needs Reserve (BHNR)

This will be a report containing both Surface and Groundwater BHNR figures.

The following are the actions required:
- Obtain data at most refined level available (e.g., Census sub-place, DWS): Data is obtained at the most refined level available e.g., Census sub-place and/or recent DWS data for water service schemes, and/or municipal data for quantum of water services delivered to people serviced.
- Match quaternary catchment with refined data: SQs are matched with refined data. Population and water service data are very seldom available at SQ level, and has to be manipulated, usually via GIS, to populate each SQ and describe level of access to water services.
- Spatially identify water users at quaternary level by source of water provision: Separate those on formal schemes and those not linked to basic services and directly dependent on run-of-river/groundwater abstraction.
- Spatially identify water users at SQ level by source of water provision: Separate those on formal schemes and those not linked to basic services and directly dependant on run-of-

river/groundwater abstraction. Areas where groundwater may be stressed by abstraction can be identified.
- Generate quantum of water based on defined daily allocation multiplied by those identified as dependent. A model is set up to generate the quantum of water based on defined daily allocation and multiplied by those identified as dependant.
- Develop model with BHNR per quaternary catchment.

Information required:
- Demographic data at most refined level available (e.g., Census sub-place)

Deliverable dates:
- The delivery date for the *draft* BHNR Report is *February 2017*
- The delivery date for the ***final*** BHNR Report is ***March 2017***

Deliverables and task responsibility:
- Basic Human Needs Reserve Report: Huggins (surface water), Sami (groundwater)

4.2.5 Groundwater

Baseflow contribution to rivers can be identified utilising data from WR2012. These catchments will require more detailed rainfall runoff and rainfall baseflow simulations.

The assessment of groundwater components of relevance to the Reserve will consist of the following for each GRU:
- *Recharge:* Since recharge is the primary source driving the groundwater contribution to EWR, recharge will be obtained from existing sources like GRAII, existing reports and maps. In addition, where gauged catchments with baseflow data exist, these will be used to derive monthly time series of recharge and estimates of threshold monthly precipitation when recharge occurs using WRSM2000. This relationship will be used to estimate recharge in ungauged catchments.
- *Baseflow:* Baseflow will be simulated using WRSM2000 and calibrated against gauging weirs. Where no gauging weirs exist, parameters will be transferred from gauged catchments of similar conditions.
- *Groundwater use:* Existing groundwater use affects the groundwater stress index and allocable groundwater. Groundwater use for water supply will be quantified using WARMS data and data from other studies. Figures for irrigation using groundwater will be identified from WARMS and quantities verified by comparing registered use with irrigation area using Google Earth
- *Allocable groundwater*: Volumes of groundwater that are available will be calculated based on recharge, the portion of baseflow required for EWR, the BHNR and current estimated groundwater use.
- *Groundwater quality*: The variations in potable groundwater can be identified from the National Groundwater Quality Monitoring Network (ZQM) database. Water quality will need to be investigated by lithology and rain zones. Catchments and lithologies with good water quality will be identified.

Information required:

The following suggested literature sources and databases will need to be accessed for groundwater information:

Type of data	Data	Source
Catchment delineation	Quaternary catchment boundaries	WR2012
Groundwater discharge zones	Wetland location	NFEPA atlas 2011
Population	Population and water source	Stats SA
Climatic data	Rainfall	WR2012
Geology	Lithology and structures	Council for GeoScience geological maps
Soils	Soil maps	WR2012
Hydrology	Flow data Baseflow	WR2012 GRAII
Geohydrology	Harvest Potential Exploitation Potential Recharge Hydrochemistry Water levels Borehole yields	GRAII GRAII GRAII ZQM database NGA NGA
Groundwater use	Licenced groundwater use Municipal water use Schedule 1 water use Livestock water use	WARMS All Towns, Internal Strategic Perspective (ISP) Stats SA GRAII

Deliverable dates:

- The delivery date for the *draft* Groundwater Report is *June 2017*
- The delivery date for the ***final*** Groundwater Report is ***August 2017***

Deliverables and task responsibility:

- Groundwater Report: Sami

4.2.6 Wetlands

Wetland EcoClassification will be conducted in accordance with the procedures outlined in Rountree *et al.*, (2013) and Ewart-Smith *et al.*, (DWS, 2016b). The detail procedure is largely dependent on wetland priority and HGM typing.

Information required:

- Wetland HGM type (Ollis *et al.*, 2013)
- Wetland condition (direct or inferred), (various studies including PES/EI/ES (DWS, 2014f))
- Social and cultural importance of wetlands
- Water resource use importance ratings applicable to wetlands
- Wetland EI and Ecological Sensitivity (ES)
- Wetland prioritisation

Deliverable dates:

- The delivery date for the *draft* Wetland EcoClassification Report is *June 2017*
- The delivery date for the ***final*** Wetland EcoClassification Report is ***August 2017***

Deliverables and task responsibility:

- Wetland EcoClassification Report: Mackenzie, Colloty

4.3 TASK 3: IDENTIFICATION AND EVALUATION OF SCENARIOS

The purpose of this task is to identify likely future scenarios that could include development of water resource and wastewater infrastructure, changes to operation of existing infrastructure and changes to existing and future system operation. As Classification will not be based on potential future system changes that have not yet been investigated to a certain degree, the identified scenarios will be likely scenarios for which some baseline work such as feasibility and reconciliation strategy studies are available. It is envisaged that a scenario where the flow conditions comply with the REC will be evaluated as the one extreme with the largest potential negative implication on the economy. Other intermediate scenarios will also be defined to provide for a practical range of conditions (settings) for comparison and to find the best balance between protection and level of water use.

4.3.1 Identification and yield modelling of scenarios

Operational scenarios will be evaluated to determine the appropriate balance between protection and use of the water resource. Scenarios will be formulated based on the Catchment Management Strategies and relevant planning feasibility studies such as the recently completed Mzimvubu Water Project and possibly the Ntsonyini Ngqongweni Regional Water Supply Scheme Phase 2 and 3 [Mzimvubu–Ntsonyini Off-Channel Storage Dam (OCSD)] that is being undertaken by the OR Tambo DM. The MWP selected three (3) of the original 19 potential dam development sites investigated in the previous study, of which the most favourable option (Ntabelanga in conjunction with the potential Lalini Dam hydropower scheme) was taken forward for further detailed investigation.

The selection of scenarios should be limited to options currently being planned for implementation in the next 10-16 years. It is envisaged that a scenario where the flow conditions comply with the REC will be evaluated as the one extreme with the largest potential negative impact on the economy. Other intermediate scenarios will also be defined to provide for a practical range of conditions (settings) for comparison and to find the best balance between protection and level of water use. The PSP will recommend certain scenarios and will liaise with the client during the selection process of operational scenarios. However, the range of operational scenarios that finally have to be assessed should be ultimately selected or approved by DWS.

For budgeting purposes, the number of scenarios will be limited to a maximum of five (5) (excluding those for natural and present day conditions). Scenarios can only be evaluated on systems with Rapid or higher level EWR information available (river and estuary).

Information is required from the following studies:

- Feasibility Study for the MWP
- DWS Water Resource Study in support of the ASGISA-EC Mzimvubu Development Project
- Ntsonyini Ngqongweni Regional Water Supply Scheme Phase 2 and 3

Deliverable dates:

- The delivery date for the *draft* Scenario Description Report is *February 2017*
- The delivery date for the ***final*** Scenario Description Report is ***April 2017***

Deliverables and task responsibility:

- Scenario Description Report: Talanda, van Rooyen

Notes:

- The PSP is responsible for facilitating the process to define the operational scenarios but is not responsible for the final decision-making.
- The PSP is responsible for analysing the selected scenarios (selected by DWS) that have been budgeted for under this task (i.e., a total of five (5) scenarios).

4.3.2 Scenario consequences: Economics, ecosystem services and non-ecological water quality

Economics

It is proposed that each of the sub-catchments be delineated in line with the identified Integrated Units of Analysis (IUA) and that they are analysed as an economic region, with the possibility of sub–zones as dictated by economic, demographic and topographical conditions. An economic baseline of current economic activities will be constructed for each relevant water-based activity in the defined IUAs. The following activities will be included:

- Commercial forestry.
- Irrigation, including the proposed area to be irrigated once Ntabelanga Dam becomes operational.
- Saw mills and the PG Bison board facility at Ugie, abattoirs.
- The proposed hydro-electric generation units below the proposed Lalini Dam.
- Where necessary, the value of household water.

For analysing the macro-economic situation, the following approach will be used to determine the current economic situation of the Mzimvubu catchment:

- Macro-economic models driven by water, based on the Eastern Cape Social Accounting Matrix (SAM) [used in the application of the Water Impact Model (WIM)].

The macro-economic perspective study will therefore require an assessment of the economic impacts of the water dependent activities. To accomplish this, an econometric model approach based on the input-output model will have to be constructed for each of the IUAs. The WIM will be used to express the socio-economic impacts of the current situation and eventually compared with possible changes as a result of different operational scenarios.

The WIM, as it is currently constructed, is in the form of a dynamic computerised water entitlement model which can be used to identify and quantify the following indicators:

- Economic benefits
- Maximum possible water reduction
- Capitalised impact

The first step in calculating the macro-economy of each of the IUAs will be to identify and establish the detailed water users in terms of volume currently used. In the case of irrigation and commercial forestry the detailed areas under production are determined together with the different crops produced.

A WIM will be constructed for the catchment and the identified Economic Zones. The model is driven by the level of production output in the specific region. It measures the social and economic effects on irrigation agriculture, commercial forestry and industry. For agriculture the model can

accommodate up to ten individual products and for forestry it makes provision for pine and gum sub-species. The following impacts will be estimated by the WIM:

- Gross Domestic Product (GDP)
- Low income households and total households
- Employment creation

The economic consequences of the different Operational Scenarios will be expressed by using three metrics namely:

- An economic growth parameter, i.e., GDP
- A social growth parameter, i.e., job creation
- A poverty alleviation growth parameter, i.e., funds transferred to low-income households

A change in economic metrics (parameters) will be driven by a change in water availability over time in a specific identified IUA by multiplying the specific water volume over time with the specific GDP, employment and household income multiplier calculated during the establishment of the economic baseline for each region. This will be discounted back and expressed as a Net Present Value (NPV) to be used in the final evaluation model.

After the metrics are derived, a ranking is applied which is based on the highest net benefit to society in terms of GDP and employment stimulation. This is a simple linear relationship where the highest NPV of each scenario transcends the other scenarios.

Ecosystem services

Each of the sites will be evaluated with respect to the status quo relating to ecosystem services. Assessment of the impacts of the various scenarios essentially identifies the direction of change (either positive or negative) and estimates the magnitude of the change in benefits and costs that may be experienced within the river system or estuary. The process adopted will ensure the analysis of potential economic changes based on a valuation of the status quo, i.e., the value of the ecosystem services currently provided by the water in the Mzimvubu system, identifying the potential change that each of the key ecosystem services may undergo in each of the scenarios mooted. The magnitude of change is estimated by the relevant specialists but facilitated by the ecosystem services task leader.

The following activities will be undertaken for this task:

- Link ecosystem services per IUA to spatial points of analysis sensitive to scenario change.
- For the ecosystem services spatial points of analysis (as defined by the ecological task and usually linked to EWR sites) and sensitive to scenario changes, will be identified. Likely ecosystem services sensitive to scenario changes at logical spatial points will be listed.
- List likely ecosystem services sensitive to scenario changes at logical spatial points: For the ecosystem services this is conducted at the specialist workshops with the input of qualified experts who are familiar with the project area. The method is followed for river, estuaries and wetlands. Ecosystem services are typically amalgamated into the appropriate service type, e.g. provisioning services and weighted. Critical ecosystem services may be quantified in greater detail where the impact of likely scenarios may demand this.
- Analyse change from status quo per scenario and at logical zones of impact: Critical ecosystem services may be quantified in greater detail where scenarios demand. For ecosystem services the magnitude of change per scenario will be rated and then the scenarios will be ranked. This will be done in specialist workshop environment.

- Rate magnitude of change per scenario for ecosystem services and rank: Scenarios at different spatial points can be examined. Spatial points can be given a relative weight to adjudicate scenario preference.

Non-ecological (user) water quality

The importance of the impact of changing water quality conditions on non-ecological users of the resource is an issue that needs consideration. These users may include domestic use, agricultural or economic use, for example. Scenarios may result in changing water quality conditions, not only for the ecology, but also for human and other users, which may or may not be due to changing ecological state. Consequences here should be linked to economic impacts as well, if scenarios cause water quality changes which result in economic impacts for users.

It is recommended that as this is the first water quality step involved with gathering information from a large group of stakeholders, water quality stakeholder interaction must be conducted (e.g., in the form of a water quality TTG meeting). The information gathered here will inform the water quality RQO process, and prepare stakeholders for input to RQOs, as well as the review of draft water quality RQOs.

Information required:

Input from stakeholders at a TTG meeting; provisionally set for January (TTG meeting 1) or July 2017 (TTG meeting 2).

Deliverable dates:

- The delivery date for the *draft* Scenario Consequences Report: Economics, ecosystem services and non-ecological water quality, is *July 2017*
- The delivery date for the ***final*** Scenario Consequences Report: Economics, ecosystem services and non-ecological water quality, is ***September 2017***

Deliverables and task responsibility:

- Scenario Consequences Report: Economics, ecosystem services and non-ecological water quality: Mullins/Mosaka, Huggins, Scherman

4.3.3 Scenario consequences: River and estuary ecology

The ecological consequences are determined for each scenario by comparing the predicted ecological state to the PES and REC. As such, these evaluations can only be undertaken at river EWR sites where sufficient information is available.

One of the activities of the two-day estuary specialist workshop to be held in April 2017 is to assess the consequences of future development scenarios that may have an impact on the Mzimvubu Estuary. Results will build on those of the 2013 EWR study (DWS, 2014b), and is reliant on consequences assessment for the river site upstream of the estuary.

Information required:

- Results from the rivers workshop to be held in **February 2017**
- Results from the estuaries workshop to be held in **April 2017**

Deliverable dates:

- The delivery date for the *draft* Ecological Consequences Report is *August 2017*

- The delivery date for the ***final*** Ecological Consequences Report is ***October 2017***

Deliverables and task responsibility:

- Ecological Consequences Report: Louw D, Koekemoer and rivers team (rivers), Taljaard and estuaries team (estuaries)

Notes:

It is assumed that no scenarios will impinge on wetlands, hence no scenario consequences for wetlands are included in this task. This type of specialist work has not been undertaken before for wetlands other than riverine wetlands.

4.4 TASK 4: DETERMINATION OF DRAFT WATER RESOURCE CLASSES

It is proposed that a multi-criteria analysis (MCA) spreadsheet be applied for the comparison of scenarios, undertaking sensitivity analysis and to determine the WRC for each IUA based on the guideline methodology. The results from the MCA as well as other factors such as timing of interventions, bridging periods required for planning and implementation, auxiliary environmental risk and urgency of development (including prevailing political imperatives), will be synthesised by the study team (all specialists) to derive the recommended Target Ecological Category for each EWR site, estuary and desktop biophysical node. A work session will be held with relevant DWS officials to discuss, and if necessary, modify the TEC for presentation to the PSC.

Information required:

Input from DWS in a work session to discuss proposed TECs: provisionally set for October 2017

Deliverable dates:

- The delivery date for the *draft* Water Resource Classes and Catchment Configuration Report is *November 2017*
- The delivery date for the ***final*** Water Resource Classes and Catchment Configuration Report is ***January 2018***

Deliverables and task responsibility:

- Water Resource Classes and Catchment Configuration Report: Van Rooyen and Talanda, Louw D, Scherman

4.5 TASK 5: RESOURCE QUALITY OBJECTIVES

RQOs are set for the WRC selected. In most cases, the focus will be on providing the RQOs for the current situation and then indicating how these will change for the TEC; i.e., the Ecological Category that relates to the draft WRC and selected scenario.

A full suite of RQOs will be provided for High Priority RUs, whereas RQOs will be provided for selected indicators only for Low and Moderate RUs.

4.5.1 River RQOs

RQOs will be set for hydrology, water quality, habitat and biota. It is proposed that RQOs will be identified as follows for each RU depending on its level of priority:

- Low priority: EcoStatus as a minimum with estimated EWRs (hydrology RQO) where available.

- Moderate priority: EWR (hydrology RQO) and water quality as numerical information (if data are available) and narrative for habitat and biota.
- High priority: All components as numerical data if information is available.

Note that the above may be adjusted based on further development of the RQO processes, case studies and the project currently being conducted for DWS on the Operationalisation of Resource Directed Measures, Project No. WP10951.

4.5.2 Non-ecological (user) water quality RQOs

Areas will be identified where water quality is significant to users, and not just to the resource base (ecology). In addition to RQOs being provided at EWR sites for supporting ecological objectives (i.e., EcoSpecs), water quality RQOs will need to be provided in a range of other areas where water quality issues of importance have been identified. This step will build on previous stakeholder involvement and input to the process, and will include feedback on draft RQOs. Adjustments to current methods as outlined in DWS (2016c), will be followed as far as possible.

It is recommended that this information be provided together with the River RQOs in a single report, and per identified significant Resource Unit or sub-quaternary catchment.

4.5.3 Estuary RQOs

EcoSpecs and TPCs (Thresholds of Potential Concern) for the REC were prepared for the Mzimvubu Estuary as part of the previous Reserve study (DWS, 2014c). These will be translated into RQOs for the PES and REC at the two-day specialist workshop held in April 2017. Once the TEC has been estimated, the estuary specialists will refine the above mentioned RQOs to reflect this. RQOs are set for all the estuary components: flow, hydrodynamics, water quality, sediment processes, microalgae, macrophytes, invertebrates, fish and birds.

4.5.4 Wetland RQOs

RQOs will be developed for high priority wetlands per wetland type. These will be at the narrative level and numerical where available data allows. If no data exist that can be used for numerical RQOs of high priority wetlands, a wetland integrity score, based on current land use with respective wetlands and their buffer zones, will be calculated for each wetland using available information.

4.5.5 Groundwater RQOs

At this point groundwater resources have been classified according to water use stress, and the groundwater contribution to the EWR has been quantified. RQOs will now be identified to balance protection and use, and ensure fitness for use on a GRU scale, on the following basis:

- Potential impact of abstraction on baseflow
- Identification of groundwater dependent ecosystems
- Management class required
- Groundwater Reserve
- Present Status Category
- Groundwater levels
- Groundwater quality
- Key narrative and measurable indicators to limit impacts on the resource as management criteria

Deliverable dates:

- The delivery date for the *draft* RQO Report: Rivers and Estuaries, is *November 2017*
- The delivery date for the ***final*** RQO Report: Rivers and Estuaries, is ***February 2018***
- The delivery date for the *draft* RQO Report: Wetlands and Groundwater, is *November 2017*
- The delivery date for the ***final*** RQO Report: Wetlands and Groundwater, is ***February 2018***

Deliverables and task responsibility:

- River and Estuaries RQO Report: Louw D and Koekemoer (rivers), Taljaard and van Niekerk (estuaries), Scherman (user water quality)
- Wetlands and Groundwater RQO Report: Mackenzie (wetlands), Sami (groundwater)

Notes:

- It is recommended that User water quality RQOs be provided together with the River RQOs in a single report, and per identified and significant Resource Unit or sub-quaternary catchment.

4.6 TASK 6: IMPLEMENTATION AND MONITORING

Implementation of the WRC and RQOs will require certain actions to ensure compliance, which will be itemised in an implementation plan and monitoring programme. The implementation plan relates to proposed actions that must be undertaken within Integrated Water Resource Management to ensure that the WRC is maintained. The monitoring programme (one of the actions) will be further unpacked to provide information necessary to monitor compliance as well as the responses. This task will include the groundwater monitoring programme.

Information required:

Acceptance of proposed RQOs and reviewer comments received timeously on previous reports.

Deliverable dates:

- The delivery date for the *draft* Monitoring Programme and Implementation Report is *March 2018*
- The delivery date for the **final** Monitoring Programme and Implementation Report is ***May 2018***

Deliverables and task responsibility:

- Rivers input: Louw D and rivers/hydrology teams
- Estuaries input: Taljaard and estuaries team
- Wetland input: Mackenzie and Colloty
- Groundwater input: Sami
- Non-ecological (user) water quality: Scherman

5 SCOPE OF WORK: PROJECT COMPLETION AND LEGAL TASKS

This section of the report involves production of the output of the study, i.e., production of the main and close out reports and electronic data, as well as input to the gazette and management of the review period.

5.1 TASK 7: SUMMARY REPORTS AND ELECTRONIC DATA

All results of the study are summarised in a Main Report. The purpose of this document is to provide a succinct summary of the technical outputs of the study. The Close Out Report will summarise tasks such as management and communication strategies. All raw data, maps, GIS information, models, minutes of meeting and reports will be provided electronically on flash drives, together with a detailed inventory of what is provided.

Deliverable dates:

- According to the programme the three deliverables linked to this task will be rendered in **July 2018**
- Delivery dates for the draft Main and Close Out reports are therefore *May and June 2018* respectively

Deliverables and task responsibility:

- Main report: Scherman, van der Waal
- Close Out report: Scherman (management and training), Shinga (communication), Sauer (financials)
- Electronic data: Koekemoer

5.2 TASK 8: PREPARE INFORMATION FOR GAZETTING AND MANAGE REVIEW PROCESS

The PSP will prepare the technical information for the gazette in accordance with the format and requirements of the DWS. The gazetting will address the Water Resource Classes and RQOs. The DWS study officials will then submit the documentation through the appropriate internal channels for approval by the Minister or delegated authority. Technical comments will be addressed by the PSP when received during the 60-day comment period, although this is likely to be after study completion. Any additional studies that might be required due to comments will not be undertaken. The communications team for the study, Ms Shinga and her colleagues, will liaise with the study PM to collate technical queries and comments.

Information required:

A template from the DWS for preparation of the Classification and RQO gazette.

Deliverable dates:

- The first draft of technical input to the gazette will be provided in *January 2018.*
- Legal input to the legal notice and gazette will be provided in the period following the availability of technical input, i.e., from *February 2018*.
- According to the programme the gazette input will be provided in **May 2018**, although it is assumed that input will be required throughout the gazetting phase.

Deliverables and task responsibility:

- Legal input to the gazetting process: Thompson
- Populate draft gazette for review by DWS: Scherman, Louw D, Mackenzie, Taljaard, van Rooyen
- Management of review process: Shinga
- Addressing of comments on the gazette: Study team

Notes:

- Legal input by Hubert Thompson will be provided throughout the study as required. It is recommended that liaison with the DWS regarding legal requirements be undertaken well before 2018.
- The PSP will build on experience gained from previous Classification studies.
- The PSP will be responsible for the technical preparation of the gazette and management of reviewer comments in liaison with the DWS. The PSP will not be responsible for ensuring that associated legal processes take place, e.g., signing of the templates by the gazetted authority.
- The ToR and proposal submitted in February 2016 did not specify the preparation of Reserve gazettes.

6 STUDY PROGRAMME AND STUDY TEAM

6.1 STUDY PROGRAMME

The study programme is shown as **Table 6.1**, where tasks and deliverables are shaded according to financial years. Note the use of the following legend.

Financial quarters	Task descriptions	
Quarter 1 (Q1): March – May	R: final report	TM: technical meeting
Quarter 2 (Q2): June – August	SW: specialist workshop	T: training
Quarter 3 (Q3): September – November	M: meeting	IM: information meeting
Quarter 4 (Q4): December – February	S: survey	G: gazetting
	O: other	

Note that reporting deadlines are for Final reports only. Deliverable dates for Draft and Final reports are shown on the GANNT chart (**Table 6.2**) using the abbreviations Dr and Fnl respectively. Note that the budget caters only for one round of comments and two hard copies of final reports excluding specialist appendices that will only be in electronic format. A spreadsheet summarising all the comments and the response of the Client will be provided with the final report to indicate how the comments have been addressed.

Table 6.1 Study programme for the Mzimvubu study

Contract deliverable number	Tasks	Deliverables	Date	Quarter	Description
4.3.3g	Task 2	Rivers survey	Sep-16	Q2	S
4.3.1	Task B	Inception Report	Oct-16	Q3	R
4.3.19	Task C1	Initial stakeholder database	Oct-16	Q3	O
	Task C2	Stakeholder Engagement Plan (DWS)	Oct-16	Q3	n/a
4.3.18	Task C3	Study announcement	Oct-16	Q3	O
4.3.14	Task D	Mentorship programme	Oct-16	Q3	T
4.3.3g	Task 2	Survey report	Oct-16	Q3	R
4.3.15	Task A	PMC meeting 1	Dec-16	Q3	M
4.3.18	Task C3	BID	Nov-16	Q3	O
4.3.12	Task C4	PSC meeting 1	Dec-16	Q3	M
4.3.2	Task 1	Status quo and Delineation Report	Dec-16	Q3	R
4.3.11	Task C4	TTG meeting 1	Jan-17	Q4	TM
4.3.13	Task D	Training 1 + reporting	Jan-17	Q4	T
4.3.10	Task C4	Sector meeting 1	Feb-17	Q4	IM
4.3.3h	Task 2	Rivers workshop and report	Feb-17	Q4	SW, R
4.3.15	Task A	PMC meeting 2	Mar-17	Q4	M
4.3.3f	Task 2	Systems modelling report, vol 1	Mar-17	Q4	R
4.3.3f	Task 2	Rivers Desktop EWR report, vol 2	Mar-17	Q4	R
4.3.3c	Task 2	BHNR report	Mar-17	Q4	R

Contract deliverable number	Tasks	Deliverables	Date	Quarter	Description
4.3.12	Task C4	PSC meeting 2	Apr-17	Q1	M
4.3.3i	Task 2	Estuary specialist meeting and report	Apr-17	Q1	SW, R
4.3.4a	Task 3	Scenario description report	Apr-17	Q1	R
4.3.3a	Task 2	Rivers EWR report	May-17	Q1	R
4.3.15	Task A	PMC meeting 3	Jul-17	Q2	M
4.3.11	Task C4	TTG meeting 2	Jul-17	Q2	TM
4.3.13	Task D	Training 2 + reporting	Jul-17	Q2	T
4.3.12	Task C4	PSC meeting 3	Aug-17	Q2	M
4.3.10	Task C4	Sector meeting 2	Jul-17	Q2	IM
4.3.3b	Task 2	Estuary EWR report	Jul-17	Q2	R
4.3.3e	Task 2	Wetland EcoClassification report	Aug-17	Q2	R
4.3.3d	Task 2	Groundwater report	Aug-17	Q2	R
4.3.4b	Task 3	Ecosystem Services, Economics and User Water Quality Consequences report	Sep-17	Q2	R
4.3.11	Task C4	TTG meeting 3	Oct-17	Q3	TM
4.3.4c	Task 3	Ecological Consequences report	Oct-17	Q3	R (TM required)
4.3.15	Task A	PMC meeting 4	Nov-17	Q3	M
4.3.12	Task C4	PSC meeting 4	Nov-17	Q3	M
4.3.13	Task D	Training 3 + reporting	Nov-17	Q3	T
4.3.5	Task 4	WRC and Catchment Configuration report	Jan-18	Q4	R (TM required)
4.3.8	Task 8	Technical input to legal notice	Jan-18	Q4	G
4.3.6a	Task 5	Rivers and Estuary RQO report	Feb-18	Q4	R
4.3.6b	Task 5	Wetlands and Groundwater RQO report	Feb-18	Q4	R
4.3.15	Task A	PMC meeting 5	Mar-18	Q4	M
4.3.9	Task C4	2 Stakeholder (public) meetings	Mar-18	Q4	M
4.3.7	Task 6	Implementation and monitoring report	May-18	Q1	R
4.3.17	Task C5	Issues and Response Report (final)	Jul-18	Q2	O
	Task D	Report on capacity building (appendix to Main Report)	Jul-18	Q2	R
4.3.16	Task 7	Electronic data (associated with Close-out report)	Jul-18	Q4	O
4.3.16	Task 7	Close out report, vol 2	Jul-18	Q4	R
4.3.16	Task 7	Main report, vol 1	Jul-18	Q2	R
4.3.8	Task 8	Legal input to the notice	Feb-July 2018	Q4-Q2	G

Table 6.2 GANTT chart for the Mzimvubu study

Months	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
TASKS	**2016**					**2017**												**2018**						
																			Gazetting					
	Aug	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**
TASK A: PROJECT MANAGEMENT																								
PMC meetings				x				x				x				x						x		
TASK B: INCEPTION PHASE																								
Inception Report			Dr	Fnl																				
TASK C: COMMUNICATIONS COORDINATION/STAKEHOLDER ENGAGEMENT																								
BID and Project announcement			x	x																				
Stakeholder Engagement Plan, database			x																					
PSC meetings					x				x				x			x								
TTG meetings						TTG				TTG					TTG									
Sector meetings							x					x												
Issues and Responses report																								x
Stakeholder / public meetings (2)																				x				
TASK D: CAPACITY BUILDING																								
Capacity building + mentorship programmes			Dr																					
Training opportunities						x						x			x									
Capacity building report (appendix to main report)																		x						
TASK 1: STATUS QUO ETC.																								
Status quo and Delineation Report			Dr		Fnl																			
TASK 2: QUANTIFY EWRs																								
River site visit and Survey Report		Survey	Rep																					
Systems modelling Report						Dr		Fnl																
River specialist workshop and report							x																	
Rivers desktop EWR report								x																
River EWR report								Dr		Fnl														
Estuary specialist workshop and report									x															
Estuary EWR report										Dr		Fnl												

Months	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
TASKS	**2016**					**2017**												**2018**						
																			Gazetting					
	Aug	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**
Wetland EcoClassification report											Dr		Fnl											
BHNR report							Dr	Fnl																
Groundwater component EWR report											Dr		Fnl											
TASK 3: SCENARIOS																								
Scenario description report							Dr		Fnl															
Ecological Consequences Report (river and estuary)													Dr		Fnl									
Consequences report: ecosystem services, economics and user water quality												Dr		Fnl										
TASK 4: DRAFT WRC																								
WRC and Catchment Configuration report																Dr		Fnl						
TASK 5: RQOs																								
Rivers and estuary RQO report																Dr			Fnl					
Wetlands and Groundwater RQO report																Dr			Fnl					
TASK 6: IMPLEMENTATION & MONITORING																								
Implementation and monitoring report																	x			Dr		Fnl		
TASK 7: MAIN REPORT & ELECTRONIC DATA																								
Main report, incl capacity building																						Dr		Fnl
Electronic data																								x
Close out report																							Dr	Fnl
TASK 8: LEGAL NOTICE																								
Tehcnial input to the gazette																		Dr			x	Fnl	x	x
Legal input to the legal notice and gazette																			x	x				x

6.2 STUDY TEAM

The study team consists of individuals with extensive experience in the field of water resource planning. The proposed team members have been involved in a variety of studies for DWS since 1988 that focussed on EWR determinations and associated studies, and more recently, Water Resource Classification and the development of Resource Quality Objectives. The economics team for the Mzimvubu Classification study conducted the economics of the EIA for Iliso Consulting, thereby ensuring good overlap for this component of the study.

The study team is shown as task teams in the organogram provided as **Figure 6.1.**

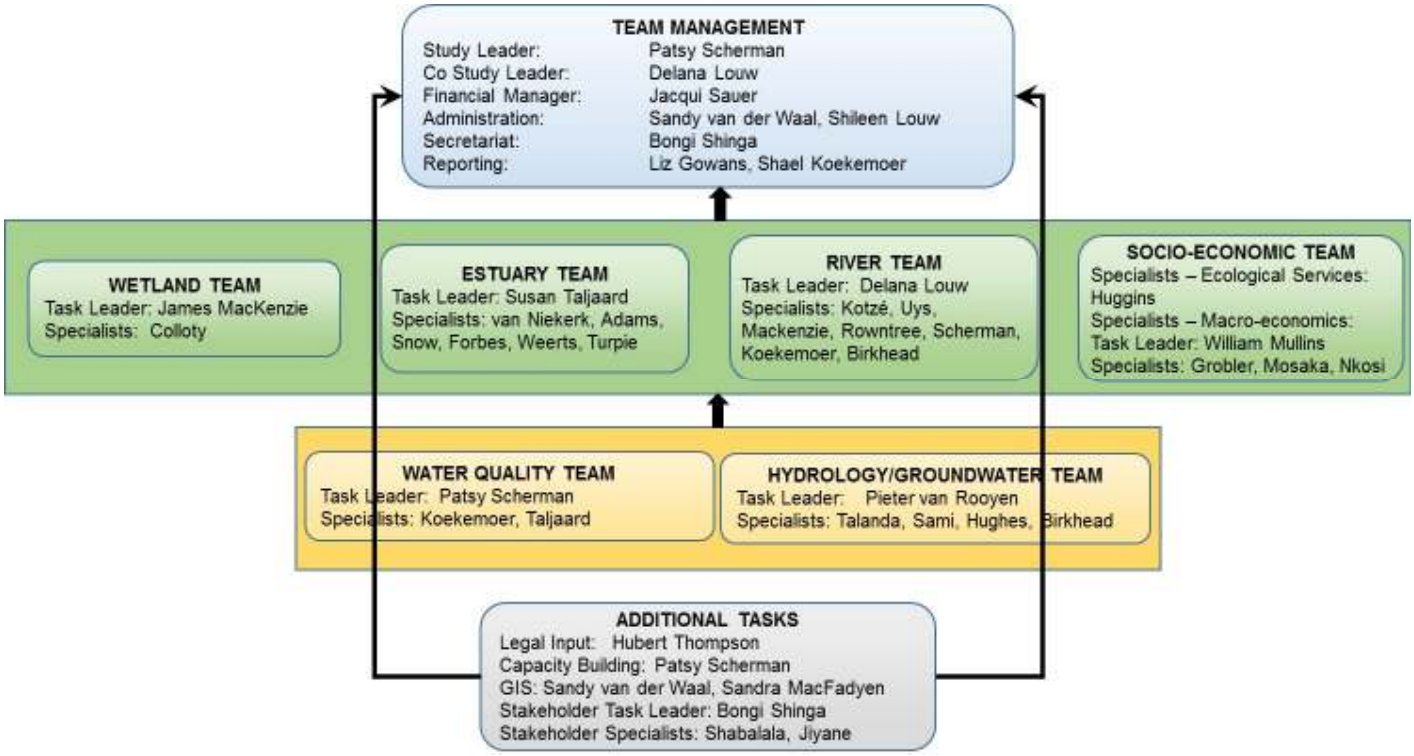

Figure 6.1 Team organogram

The full team list, and all organisations represented, are shown in **Table 6.3**. The team will be led by Dr Patsy Scherman of Scherman Colloty & Associates cc. Task leaders are Delana Louw (rivers), Dr Susan Taljaard (estuaries), James MacKenzie (wetlands), William Mullins (socio-economics), Pieter van Rooyen (hydrology/groundwater) and Bongi Shinga (communications). Financial management will be undertaken by Jacqui Sauer of SC&A, and legal input provided by Hubert Thompson.

Table 6.3 Team list for the Mzimvubu study

Title	Name	Surname	Company / Organisation	Position
Prof	Janine	Adams	Nelson Mandela Metropolitan University	Macrophytes, Estuaries
Dr	Drew	Birkhead	Streamflow Solutions	Hydraulician, Rivers
Dr	Brian	Colloty	Scherman Colloty and Associates	Wetlands
Ms	Nicollete	Forbes	Marine & Estuarine Research	Invertebrates, Estuaries
Ms	Liz	Gowans	Liz Gowans Design and Publishing	Editor
Mr	Paul	Grobler	Conningarth Economists	Economics
Mr	Greg	Huggins	Nomad Consulting	Ecosystem Services
Prof	Denis	Hughes	Rhodes University	Hydrologist
Ms	Thule	Jiyane	Wakhiwe SES	Graphics & Communication
Ms	Shael	Koekemoer	Koekemoer Aquatic Services	Diatoms; Reporting
Dr	Piet	Kotze	Clean Stream Biological Services	Fish, Rivers
Ms	Delana	Louw	Rivers for Africa eFLows Consulting	Task Leader: Rivers & Integrator
Ms	Shileen	Louw	Rivers for Africa eFLows Consulting	Administration
Ms	Sandra	MacFadyen	BioGIS	GIS
Mr	James	Mackenzie	Mackenzie Ecological and Development Services	Riparian vegetation (rivers), wetlands
Mr	David	Mosaka	Conningarth Economists	Economist
Mr	William	Mullins	Conningarth Economists	Economist
Ms	Phindile	Nkosi	Conningarth Economists	Economist
Prof	Kate	Rowntree	Rhodes University	Geomorphologist (rivers)
Dr	Karim	Sami	WSM Leshika Consulting	Groundwater
Ms	Jacqui	Sauer	Scherman Colloty and Associates	Financial manager
Dr	Patsy	Scherman	Scherman Colloty and Associates	Study Leader: Water Quality (rivers)
Ms	Amanda	Shabalala	Wakhiwe SES	Public Participation Officer
Ms	Bongi	Shinga	Wakhiwe SES	Stakeholder Engagement Specialist
Dr	Gavin	Snow	University of Witswatersrand	Microalgae, Estuaries
Mr	Colin	Talanda	WRP Consulting Engineers	Yield modelling
Dr	Susan	Taljaard	CSIR	Water quality (estuaries), Estuaries Task Leader
Mr	Hubert	Thompson	Thompson & Thompson	Legal Input
Dr	Jane	Turpie	Anchor Environmental Consulting	Birds, Estuaries
Dr	Mandy	Uys	Laughing Waters	Invertebrates, Rivers
Ms	Sandy	van der Waal	Scherman Colloty and Associates	Administration , GIS
Ms	Lara	van Niekerk	CSIR	Hydrodynamics, Estuaries
Mr	Pieter	van Rooyen	WRP Consulting Engineers	Yield modelling
Dr	Steven	Weerts	CSIR	Fish, Estuaries

7 FINANCIAL SUMMARY

The budget for this study for time, disbursements and VAT is **R5 414 658.00**. A summary of this information per deliverable and task is provided in **Table 7.1**.

Table 7.1 Budget summaries

BUDGET SUMMARY – BY DELIVERABLE			
Deliverable	**Linked task**	**Deliverable description**	**Total**
4.3.15	Task A	Project Management Committee Meetings x5	162 906.00
4.3.1	Task B	Inception Report	221 616.00
4.3.19	Task C1	Initial stakeholder database	41 952.00
4.3.18	Task C3	BID & study announcement	53 124.00
4.3.12	Task C4	Project Steering Committee Meetings x3	505 020.00
4.3.11	Task C4	Technical Task Group Meetings x3	185 592.00
4.3.10	Task C4	Sector Meetings x2	86 982.00
4.3.9	Task C4	Stakeholder (Public) Meetings x2	197 904.00
4.3.17	Task C5	Issues and Response Report (first draft)	62 472.00
4.3.14	Task D	Mentorship programme	12 312.00
4.3.13	Task D	Training and Capacity Building Report	73 758.00
4.3.2	Task 1	Status Quo and Delineation	494 874.00
4.3.3	Task 2	EWR	1 571 376.00
4.3.4	Task 3	Scenarios	796 290.00
4.3.5	Task 4	WRC and Catchment Configuration Report	269 382.00
4.3.6	Task 5	RQOs	211 470.00
4.3.7	Task 6	Implementation and Monitoring Report	114 456.00
4.3.16	Task 7	Main Report and Project Close-Out Report	166 668.00
4.3.8	Task 8	Water Resources Classes and RQOs Gazette Template Input	186 504.00
PROJECT TOTALS			**5 414 658.00**

BUDGET SUMMARY – BY TASK	
Task	**Total**
TASK A: PROJECT MANAGEMENT	162 906.00
TASK B: PROJECT INCEPTION	221 616.00
TASK C: COMMUNICATION COORDINATION - STAKEHOLDER PROCESS	1 133 046.00
TASK D: CAPACITY BUILDING	86 070.00
TASK 1: DESCRIBE STATUS QUO, IDENTIFY HOTSPOTS AND DELINEATE IUAs AND RUs	494 874.00
TASK 2: QUANTIFY ECOLOGICAL WATER REQUIREMENTS	1 571 376.00
TASK 3: SCENARIOS	796 290.00
TASK 4: DRAFT WATER RESOURCE CLASSES	269 382.00
TASK 5: RESOURCE QUALITY OBJECTIVES	211 470.00
TASK 6: IMPLEMENTATION AND MONITORING	114 456.00
TASK 7: MAIN REPORT AND ELECTRONIC DATA	166 668.00
TASK 8: INPUT TO THE LEGAL NOTICE (TEMPLATES) AND COMMENT REVIEW	186 504.00
PROJECT TOTALS	**5 414 658.00**

A cash flow projection table and graph is provided in **Table 7.2** and **Figure 7.1** respectively. Note that figures are shown for month due, and links to the GANTT chart (**Figure 6.2**). Invoicing may then lag by one month, depending on the date of the month submitted. Progress report will constantly update and show actual vs expected expenditure.

Table 7.2 Cash flow table

TASKS	2016					2017												2018							TOTAL
																			GAZETTING						
	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	
TASK A: PROJECT MANAGEMENT																									
Project Management Meetings				32 581				32 581				32 581				32 581						32 581			**162 906**
TASK B: INCEPTION PHASE																									
Inception Report				221 616																					**221 616**
TASK C: COMMUNICATION COORDINATION -																									
BIDs & Project Announcement				53 124																					**53 124**
Stakeholder Engagement Plan & Database			41 952																						**41 952**
PSC Meetings					100 548				129 162				172 026			103 284									**505 020**
TTG Meetings						54 036				69 882					61 674										**185 592**
Sector Meetings							44 346					42 636													**86 982**
Stakeholder / Public Meetings																				197 904					**197 904**
Issues and Response Report																								62 472	**62 472**
TASK D: CAPACITY BUILDING																									
Mentorship programme				6 156									6 156												**12 312**
Training Opportunities						21 204						15 504				37 050									**73 758**
Training Report (Part of Main Report)																									**0**
TASK 1: DESCRIBE STATUS QUO, IDENTIFY																									
Status Quo & Delineation Report					494 874																				**494 874**
TASK 2: QUANTIFY ECOLOGICAL WATER																									
River Field Survey and Report			236 778																						**236 778**
Systems Modelling Report								313 728																	**313 728**
River Specialist Workshop and Report							374 490																		**374 490**
Rivers Desktop EWR Report								109 668																	**109 668**
River EWR Report										64 752															**64 752**
Estuary Specialist Workshop Report									265 164																**265 164**
Estuary EWR and Consequences Report												41 496													**41 496**
Wetland EcoClassification Report													54 036												**54 036**
BHNR Report								34 200																	**34 200**
Groundwater Component EWR Report													77 064												**77 064**
TASK 3: SCENARIOS																									
Scenario Description Report									241 680																**241 680**
Ecological Consequences Report (River & estuary)															342 114										**342 114**
Consequences Report (Ecosystem services,														212 496											**212 496**
TASK 4: DRAFT WATER RESOURCE CLASSES																									
WRC and Catchment Configuration Report																		269 382							**269 382**
TASK 5: RESOURCE QUALITY OBJECTIVES																									
Rivers & Estuary RQO report																			95 190						**95 190**
Wetlands & Groundwater RQO Report																			116 280						**116 280**
TASK 6: IMPLEMENTATION AND MONITORING																									
Implementation and Monitoring Report																						114 456			**114 456**
TASK 7: MAIN REPORT AND ELECTRONIC DATA																									
Main report including Training Report																								138 624	**138 624**
Electronic Data																								8 892	**8 892**
Close-Out Report																								19 152	**19 152**
TASK 8: INPUT TO THE LEGAL NOTICE																									
Water resources classes and RQOs gazette																								186 504	**186 504**
PROJECT TOTAL (INCL VAT)	**0**	**0**	**278 730**	**313 477**	**595 422**	**75 240**	**418 836**	**490 177**	**636 006**	**134 634**	**0**	**132 217**	**309 282**	**212 496**	**403 788**	**172 915**	**0**	**269 382**	**211 470**	**197 904**	**0**	**147 037**	**0**	**415 644**	**5 414 658**
projected	0	0	278 730	592 207	1 187 629	1 262 869	1 681 705	2 171 882	2 807 888	2 942 522	2 942 522	3 074 740	3 384 022	3 596 518	4 000 306	4 173 221	4 173 221	4 442 603	4 654 073	4 851 977	4 851 977	4 999 014	4 999 014	5 414 658	10 829 316
	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	

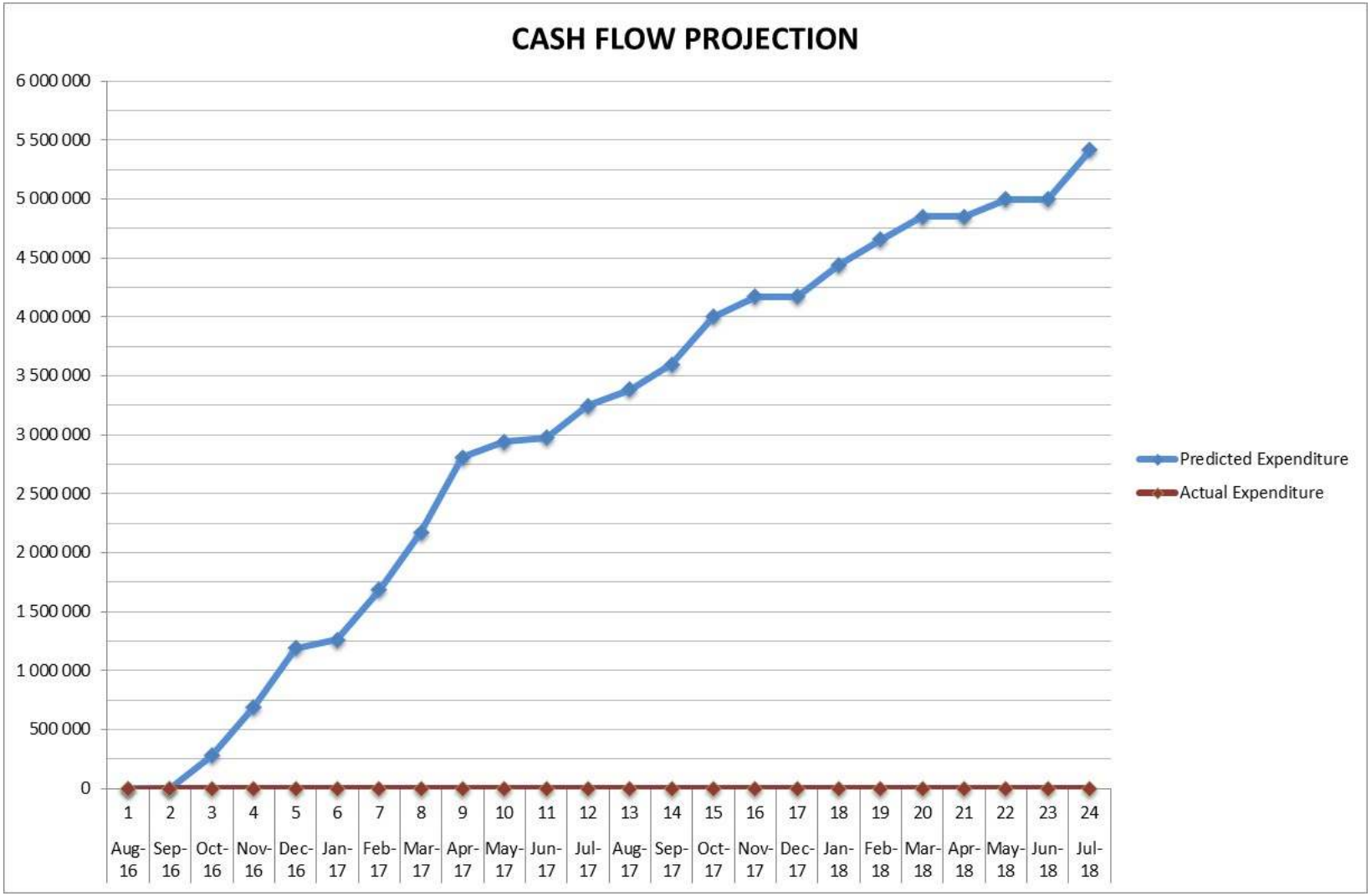

Figure 7.1 Cash flow projection graph

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