Report no. RDM/WMA02/00/CON/1016

DEPARTMENT: WATER AND SANITATION
CHIEF DIRECTORATE: WATER ECOSYSTEMS
DIRECTORATE: RESERVE DETERMINATION

DETERMINATION, REVIEW AND IMPLEMENTATION OF THE RESERVE IN THE OLIFANTS/LETABA SYSTEM

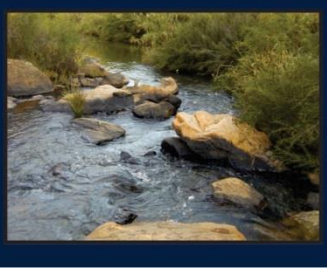
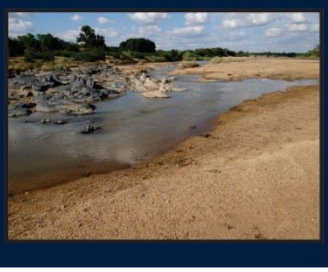
REPORT TITLE: FINAL RDM AND CLOSE-OUT REPORT

FINAL

December 2016

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



DEPARTMENT: WATER AND SANITATION

Directorate: Reserve Determination

DETERMINATION, REVIEW AND IMPLEMENTATION OF THE RESERVE IN THE OLIFANTS/LETABA SYSTEM

WP10940

CLOSE-OUT REPORT

FINAL

REPORT NO.: RDM/WMA02/00/CON/1016

DECEMBER 2016

REFERENCE

This report is to be cited as:

Chief Directorate: Water Ecosystems. Department of Water and Sanitation, South Africa, December 2016. DETERMINATION, REVIEW AND IMPLEMENTATION OF THE RESERVE IN THE OLIFANTS/LETABA SYSTEM: Close-Out Report. Report No: RDM/WMA02/00/CON/1016

Prepared by:

Golder Associates Africa

Golder Associates

Title:	*Close-out Report*
Authors:	*Kylie Farrell, Priya Moodley, Trevor Coleman*
Project Name:	*Determination, Review and Implementation of the Reserve in the Olifants/Letaba System: WP 10940*
DWA Report No:	*RDM/WMA02/00/CON/1016*
Status of Report:	*Draft*
First Issue:	*December 2016*
Final Issue:	*March 2017*

Professional Service Providers: Golder Associates Africa/Wetland Consulting Services/JMM Stassen and WRP Consulting Engineers

Approved for the PSP by:

……

Trevor Coleman

Study Leader

DEPARTMENT OF WATER AND SANITATION

Chief Directorate: Water Ecosystems

Approved for DWS by:

……

Yakeen Atwaru

Director: Reseerve Determination

……

Ndileka Mohapi

Chief Director: Water Ecosystems

DOCUMENT INDEX

Reports as part of this project:

Bold type indicates this report.

REPORT INDEX	REPORT NUMBER	REPORT TITLE
1.0	RDM/WMA02/00/CON/0115	Inception Report
2.0	RDM/WMA02/00/CON/0215	Information and Data Gap Analysis Report
3.0	RDM/WMA02/00/CON/0315	Field Survey Report
4.0	RDM/WMA02/00/CON/0116	Eco-Classification Report
5.0	RDM/WMA02/00/CON/0216	Quantification of Ecological Water Requirements Report
6.0	RDM/WMA02/00/CON/0316	Groundwater Component Report
7.0	RDM/WMA02/00/CON/0416	Wetlands Component Report
8.0	RDM/WMA02/00/CON/0516	Ecological Specifications Report
9.0	RDM/WMA02/00/CON/0616	Scenario Evaluation and Consequences Report
10.0	RDM/WMA02/00/CON/0716	Resource Management and Implementation Plan
11.0	RDM/WMA02/00/CON/0816	Basic Human Needs Report
12.0	RDM/WMA02/00/CON/0916	Issues and Response Report
13.0	**RDM/WMA02/00/CON/1016**	**Close-out Report**

LIST OF ABBREVIATIONS

BHN	Basic Human Needs
CD:WE	Chief Directorate Water Ecosystems
DRM	Desktop Reserve Model
DWS	Department of Water and Sanitation
DWAF	Department of Water Affairs and Forestry
ECOSPECS	Ecological Specifications
EIS	Ecological Importance and Sensitivity
ES	Ecological Sensitivity
EWR	Ecological Water Requirements
FEPA	Freshwater Ecosystem Priority Areas
FIFHA	Flow, Invertebrate, Fish, Habitat Assessment
KSM's	Key Stakeholder Meetings
NWA	National Water Act (No. 36 of 1998)
PES	Presentation Ecological State
RDM	Resource Directed Measures
REC	Recommended Ecological Category
RQOs	Resource Quality Objectives
TEC	Target Ecological Category
WMA	Water Management Area
WRPM	Water Resources Planning Model
WRYM	Water Resources Yield Model

EXECUTIVE SUMMARY

The Chief Directorate: Water Ecosystems in 2015 commissioned the study 'Determination, Review and Implementation of the Reserve in the Olifants/Letaba System'. The water resources in the Olifants Water Management Area (WMA 2) have been classified and Resource Quality Objectives determined. These were gazetted in April 2016 (No. 39943 - Olifants) and December 2016 (No. 40531 – Letaba). The preliminary Reserve (Section 17 of the NWA) has been determined for the Olifants System for the first time in 2001, with updates conducted in 2010, whereas the Preliminary Reserve has been completed in 2006 for the Letaba System. As per Chapter 3, Section 16 of the NWA, as soon as the class of all or part of a water resource has been determined, the Minister must, by notice in the Gazette, determine the Reserve for all or part of that water resource. This Reserve will be gazetted and will supersede all previous Reserves as determined under Section 17.

With the preliminary Reserve having been pre-determined prior to the water resource classification, a review and update was required to ensure that the Reserve is in accordance with the water resource classes and is applicable to the current system needs and demands. The study was aimed at specifically addressing ecological gaps and reviewing and updating the preliminary Reserves that had been previously determined. In addition the hydrology applied to the Olifants preliminary Reserve in 2001, was out of date, and the Eco-Classification models and other tools did not exist or were in its infancy.

With the water resource classes for the Olifants/Letaba system, as well as the Resource Quality Objectives (RQOs) now in place, the Reserve can be determined and gazetted. Therefore, the primary objective of this study was thus to determine, review and implement the Reserve in the Olifants/Letaba System.

The Reserve update study was undertaken over an 18 month period from July 2015 to December 2016. The study was undertaken by Golder Associates Africa (Pty) Ltd in association with Retha Stassen (JMM Stassen), BioAssets Biological Assessments (Dr Wynand Vlok), Wetland Consulting Services (Mr Gary Marneweck and Dieter Kassier), WRP Consulting Engineers and Zitholele Consulting (Pty) Ltd. The study was primarily of a technical nature and was supported and guided by consultative stakeholder participation and engagement.

The Reserve template for Olifants/Letaba System has been completed and finalised. The template agreed upon for The Reserve will be published by way of notice in the Government Gazette as the final step in the process.

This report forms the final deliverable of the study and serves as a feedback on deliverables, milestones, challenges and lessons learnt through the undertaking of the determine, review and implement of The Reserve in the Olifants, Letaba and Shingwedzi systems.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1. INTRODUCTION

1.1 BACKGROUND

Chapter 3 of the National Water Act (Act No. 36 of 1998) (NWA) was specifically developed for the protection of the water resources of the country and requires the implementation of Resource Directed Measures (RDM) that is based on the guiding principles of sustainability and equity (Chapter 3 of the NWA).

Resource Directed Measures provides for the protection of water resources through the **Classification** of water resources, determination and setting of **Resource Quality Objectives** (RQOs) and determination of the **Reserve**. These measures collectively aim to ensure that a balance is reached between the need to protect and sustain water resources on one hand and the need to develop, manage and use them on the other.

The **Reserve** specifies the quantity, quality, habitat and biotic integrity requirements necessary for the protection of the water resources and has priority over all other water uses as per the NWA. The Reserve comprises of two components, namely:

(i) **Basic human needs** (BHN), ensuring that the essential needs of individuals served by the water resource in question are provided for; and
(ii) The **Ecological Component of The Reserve** where the water required to protect the aquatic ecosystems of the water resource, including the riparian habitat, are provided for.

The ecological component of The Reserve is important to maintain aquatic ecosystems (in and out stream) in such a way that their integrity remains intact and they can continue to provide the goods and services to society and is specified for groundwater, wetlands, rivers and estuaries.

The Chief Directorate: Water Ecosystems has through a recently completed study determined the Reserve for the water resources in the Olifants Water Management Area (WMA 2) specifically for the Olifants and Letaba Systems; with a preliminary Reserve determined for the Shingwedzi catchment.

1.2 STUDY OVERVIEW

The purpose of this study was to determine, review and implement the Reserve in the Olifants/Letaba System; with the aim of specifically addressing ecological gaps and reviewing and updating the preliminary Reserves that have been previously determined. Furthermore, it was to prepare the Ecological Water Requirements (EWR) and BHN to be gazetted as per Section 16 of the NWA.

Previous studies were completed for these systems and were used as baseline to improve on. These included:

- A summary of the PES from 1999 (comprehensive Reserve study);
- 2010 (re-visiting of selected Ecological Water Requirements (EWR) sites for the reconciliation strategy);
- Determination of the preliminary Reserve for the Olifants System (2001) and for the Letaba system (2006); and
- Classification and determination of RQOs for the water resources of the Olifants River catchment (2011-2013) and for the water resources of the Letaba River catchment (2012-2014).

Due to the preliminary Reserve having been determined in 2001 and 2006 prior to the water resource classification in 2011-2014, a review and update was required to ensure that the Reserve is in accordance with the water resource classes gazetted, and that the significant water resources not addressed are included and that it's applicable to the current system which is defined. In addition the hydrology applied to the Olifants preliminary Reserve in 2001, was out of date, and the Eco-Classification models and other tools did not exist or were in its infancy at the time of the preliminary studies, and the use on the system needed to be refined.

As the classes of the water resources for the Olifants/Letaba system have been determined, the Reserve had to be finalised and gazetted, as legally required.

The update and review of the preliminary Reserve included the following:

- Review and analysis of existing information;
- Filling in of the ecological gaps through Rapid III Reserve determinations and biological surveys of the priority sites identified in the Olifants, Letaba and Shingwedzi catchments. Where possible, the EcoClassification models (required to evaluate scenarios) were populated and run to obtain updated results;
- The current EWRs were determined using new hydrology and in other instances, the EWRs were determined by using the new present day hydrology;
- Evaluation and determination of the ecological consequences due to the operational considerations based on planning scenarios that considered the impact of the different ecological categories on the yield of the dams in the system;
- Proposed Target Ecological Categories (TEC) for the scenario analysis and determination of ecological consequences, taking into account the system requirements (dam release capacities, user requirements and yields of dams) at each of the EWR sites. The final TECs approved were thus included in the final Reserve templates for gazetted;
- Adoption of the recommended scenario and defining the ecological specifications and monitoring requirements for maintenance or improvement of the Reserve for the rivers, wetlands and groundwater in the Olifants, Letaba and Shingwedzi catchments;
- Specifications for the groundwater resources and wetlands are also determined based on the assessments undertaken;
- Development of an implementation plan of The Reserve; and
- Drafting of the Reserve templates and gazette notices.

An overview of the study process undertaken is illustrated in **Figure 1**.

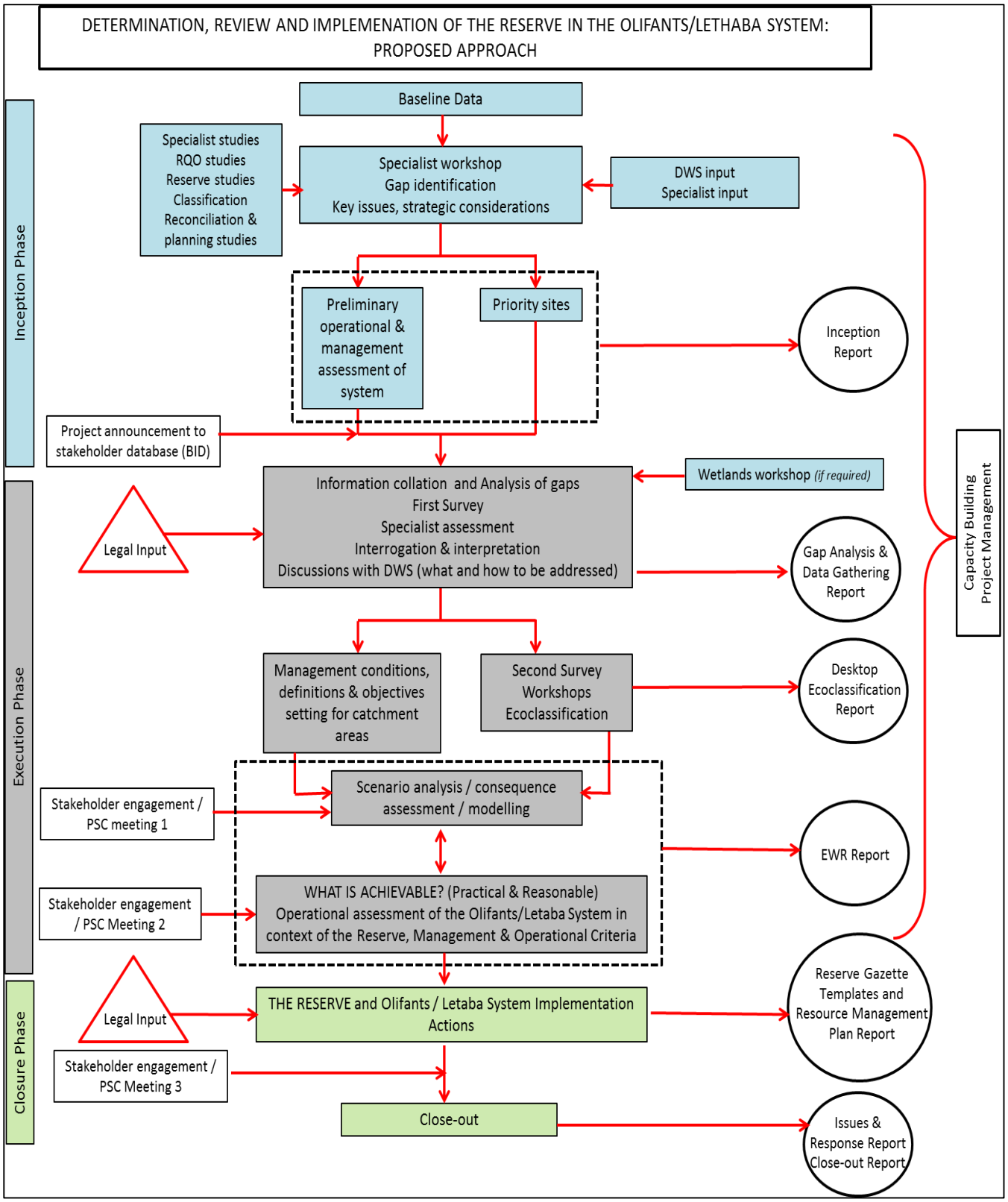


Figure 1: The Study Approach

1.3 STUDY AREA

The study area incorporated the Olifants WMA (WMA 2) which includes the Olifants, Letaba and Shingwedzi systems. The spatial extent of the area included tertiary drainage regions B11, B12, B20, B31, B32, B41, B42, B51, B52, B60, B71, B72 and B73 in the Olifants system, B81, B82 and B83 in the Letaba area, and B90, the Shingwedzi catchment (Error! Reference source not found. and Error! Reference source not found.).

The Olifants WMA is a highly utilised and regulated catchment and like many other WMAs in South Africa, its water resources are becoming more stressed due to an accelerated rate of development and the associated demand on the already scarce water resources. There is an urgency to ensure that water resources in the Olifants WMA are able to sustain their level of uses and be maintained or managed to adhere their desired ecological states.

The overview maps of the Olifants and Letaba and Shingwedzi catchments are depicted in Error! Reference source not found. and Error! Reference source not found. respectively. These maps include the existing EWR sites which were re-surveyed using Rapid III surveys, additional EWR sites taken from the preliminary Reserve for the Olifants System (2001) and for the Letaba system (2006), as well as additional biological sites (sites assigned with an S and a number) which were surveyed from a biological perspective where gaps were identified in the system (**Table 1**).

Figure 4 and **Figure 5** depict the identified priority sites which will be gazetted for The Reserve.

Please note when reviewing this report in relation to the gazette, the site names have changed. Please refer to

below for orientation between the old site names (first column) and the new gazetted site names (second column).

Refer to* Table 2 *for the orientation of site names for the additional biological sites that were surveyed and included in the Ecological Specification Report (Report number: RDM/WMA02/00/CON/0516) and Eco-classification Report (Report number: RDM/WMA02/00/CON/0116).

Table 1: Site name orientation for the purpose of the gazette

EWR site (Field survey site names)	Corresponded Gazette site names	Quaternary Catchment	Water Resource
Olifants-S1	Olifants_ELA1	B31C	Upper Elands
Olifants-S2 (Olifants-EWR4)	Olifants_EWR4	B20J	Lower Wilge
Olifants S3	Olifants_WIL1	B20F	Wilge River
Olifants-S5 (Olifants-EWR1)	Olifants_EWR1	B11J	Olifants
Olifants-S6 (Olifants-EWR3)	Olifants_K-OLI1	B12D	Klein Olifants
Olifants-S7 (Olifants-EWR2)	Olifants_EWR2	B32A	Olifants
Olifants-S8 (OLI-EWR3)	OLI_EWR3	B32A	Kranspoortspruit
Olifants-S9	Olifants_SEL1	B32C	Selons
Olifants-S10 (Olifants-EWR8)	Olifants_EWR8	B71D	Olifants
Olifants-S11	Olifants_SPE1	B42H	Lower Spekboom

EWR site (Field survey site names)	Corresponded Gazette site names	Quaternary Catchment	Water Resource
Olifants-S12	Olifants_BLY1	B60B	Upper Blyde
Olifants-S13 (Olifants-EWR11)	Olifants_EWR11	B71J	Olifants
Olifants-S14 (Olifants-EWR12)	Olifants_EWR12	B60J	Lower Blyde
Olifants-S15 (Olifants-EWR13)	Olifants_EWR13	B72D	Olifants
Olifants-S16 (Olifants-EWR16)	Olifants_EWR16	B73H	Olifants
Let2 (Letaba-EWR7)	Letaba_EWR7	B83D	Letaba
Let14 (EWR2)	Letaba_EWR2	B81D	Letsitele
Let16 (EWR1)	Letaba_EWR1	B81B	Great Letaba
Let18	Letaba_BRO1	B81A	Broederstroom
Shi1	Shingwedzi_SHI1	B90H	Shingwedzi
Olifants-EWR3	Olifants-EWR3	B12D	Klein Olifants
Olifants-EWR5	Olifants-EWR5	B32D	Olifants
Olifants-EWR6	Olifants-EWR6	B31G	Lower Elands
Olifants-EWR7	Olifants-EWR7	B51G	Olifants
Olifants-EWR9	Olifants-EWR9	B41H	Steelpoort
EWR 14b	EWR 14b	B72K	Lower Ga-Selati
SPK_EWR1	SPK_EWR1	B11H	Spookspruit
DWA_EWR1	DWA_EWR1	B41H	Dwars
Olifants_EWR10	Olifants_EWR10	B41K	Steelpoort
OLI_EWR8	OLI_EWR8	B60H	Ohrigstad
Olifants_EWR14a	Olifants_EWR14a	B72H	Upper Ga-Selati

Additional biological site name changes for the purpose of the Ecological Specification Report. These additional sites were surveyed owing to gaps identified in the Olifants WMA.

Table 2: Site name orientation for the purpose of the biological sites in the Ecological Specification Report

Biological site (study site names)	New Biological site name in accordance to the Ecological Specification Report	Quaternary Catchment	Water Resource
Olifant			
B1	Olifants_STE1	B11E	Steenkoolspruit
B2	Olifants_BRO1	B20D	Bronkhorstspruit
B4	Olifants_TIM1	B73G	Timbavati
E2	Olifants_LAK1	B41A	Lakenvleispruit
E3	Olifants_GRO1	B41A	Grootspruit

E4	Olifants_LAN1	B41A	Langspruit
E5	Olifants_MAS1	B41C	Masala
E7	Olifants_KLI1	B41F	Klip
H7	Olifants_DWA1	B41H	Dwars
X1	Olifants_STE2	B11C	Steenkoolspruit
X2	Olifants_DWA2	B11D	Dwars-in-die-wegspruit
X3	Olifants_STE3	B11D	Steenkoolspruit
X5	Olifants_OLI1	B11L	Olifants
X6	Olifants_K-OLI1	B12B	Klein Olifants
X7	Olifants_K-OLI2	B12C	Klein Olifants
X10	Olifants_ELA2	B31A	Elands
X17	Olifants_G-DWA1	B41G	Groot Dwars
X18	Olifants_STEP1	B41H	Steelpoort
X19	Olifants_MOH1	B71C	Mohlapitse
X20	Olifants_MOH2	B71D	Mohlapitse
X21	Olifants_MOT1	B71E	Motse
X23	Olifants_OLI2	B73J	Olifants
Letaba and Shingwedzi			
Let1	Letaba_LET1	B83E	Letaba River
Let3	Letaba_TSE1	B83B	Tsende River
Let4	Letaba_LET2	B83A	Letaba River
Let5	Letaba_K-LET1	B82J	Klein Letaba River
Let6	Letaba_G-LET1	B81J	Groot Letaba River
Let8	Letaba_NSA1	B82H	Nsama River
Let9	Letaba_K-LET2	B82G	Klein Letaba River
Let12	Letaba_G-LET2	B81F	Groot Letaba River
Let13	Letaba_G-LET3	B81E	Groot Letaba River
Let15	Letaba_G-LET4	B81C	Groot Letaba River
Let17	Letaba_BRO2	B81A	Broederstroom
Let19	Letaba_POL1	B81B	Politsi River
Shi2	Shingwedzi_SHIS1	B90D	Shisha River
Shi3	Shingwedzi_MPH1	B90D	Mphongolo River
Shi4	Shingwedzi_MPH2	B90B	Mphogolo River

Shi5	Shingwedzi_PHU1	B90C	Phugwane River
Shi6	Shingwedzi_SHI2	B90F	Shingwedzi River
Shi8	Shingwedzi_SHI3	B90G	Shingwedzi River

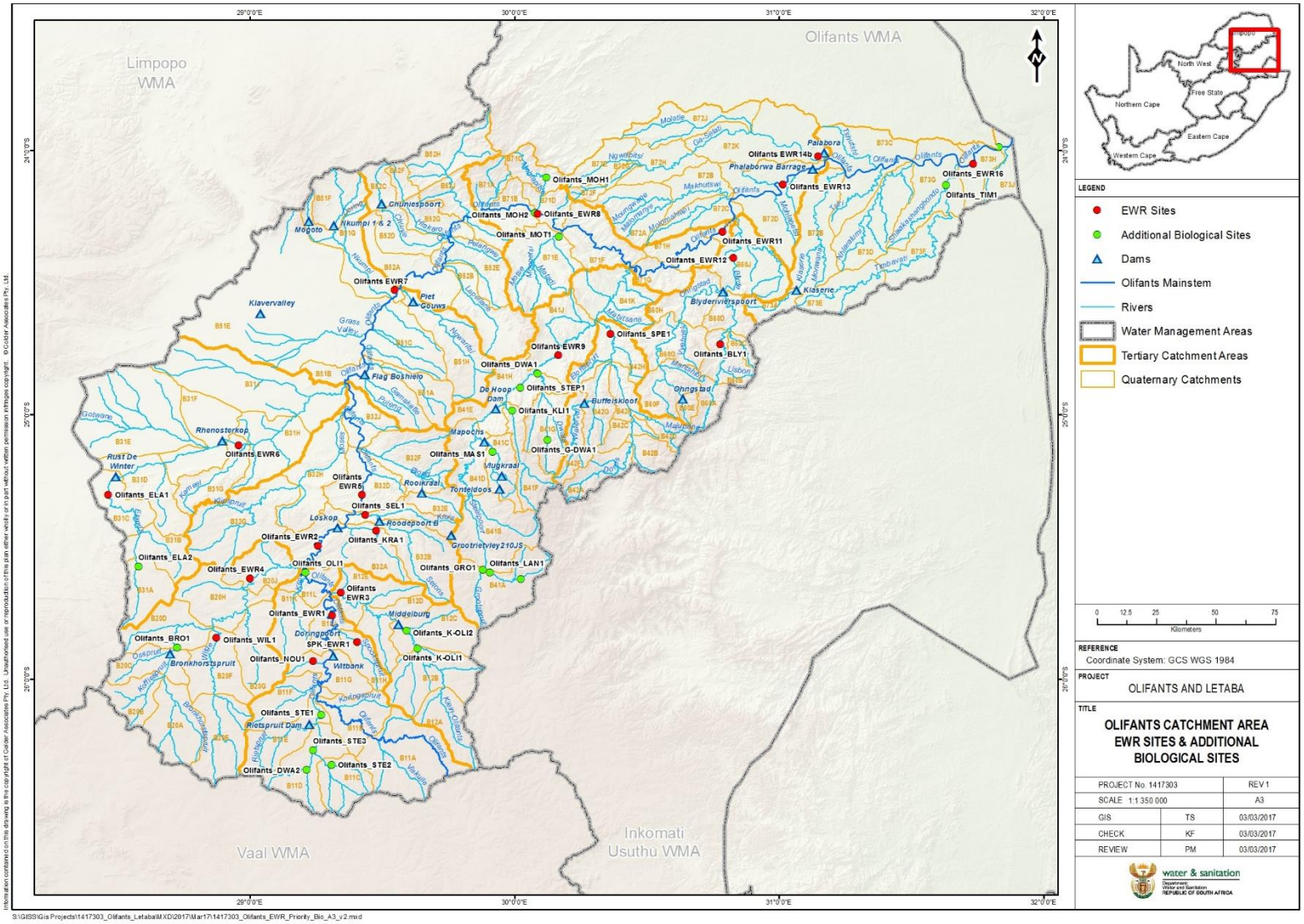


Figure 2: Olifants Water Management Areas including EWR sites (Rapid III surveys and comprehensive EWR sites) as well as additional biological monitoring sites

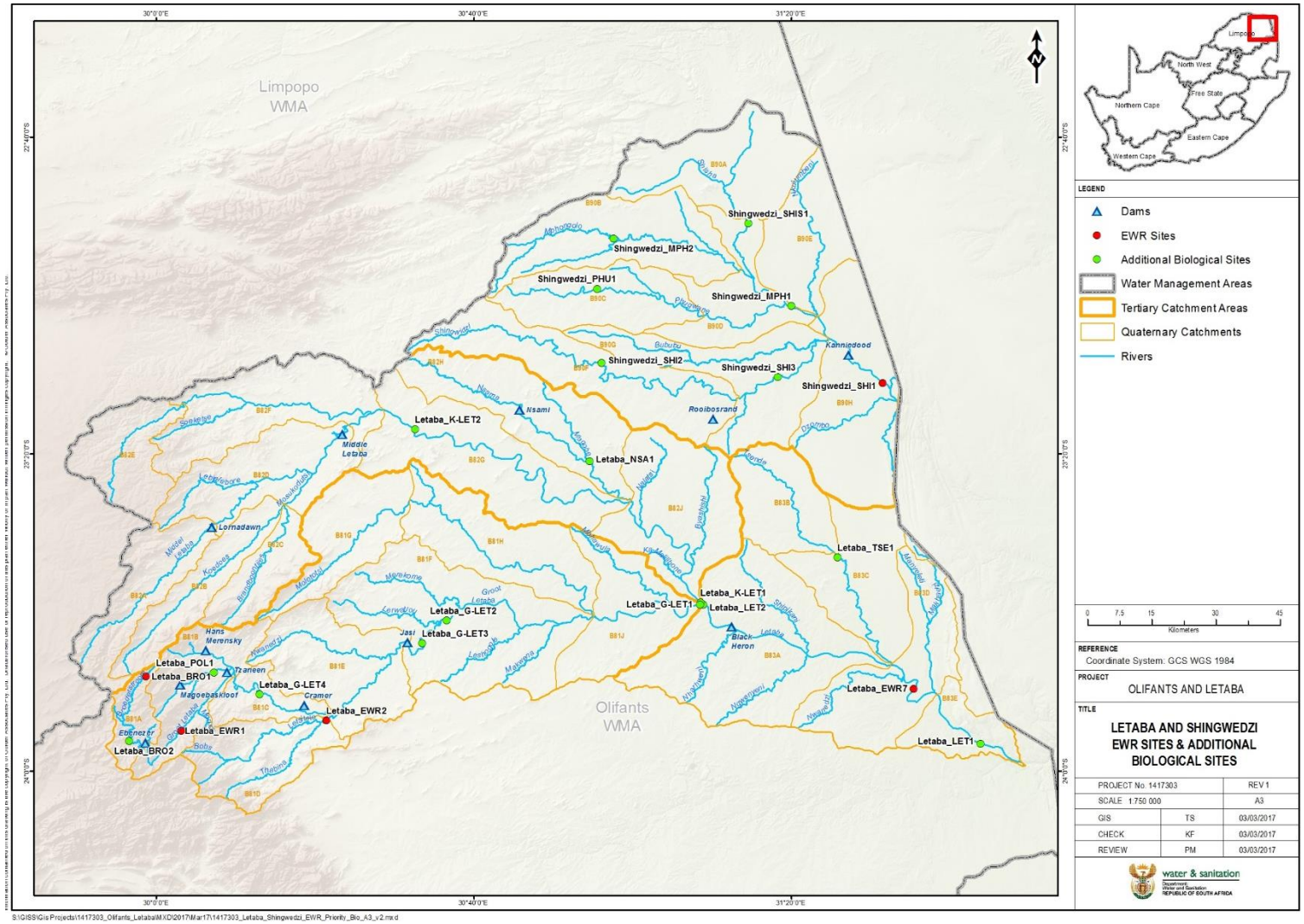


Figure 3: Letaba/Shingwedzi Water Management Areas including EWR sites (Rapid III surveys) as well as additional biological monitoring sites

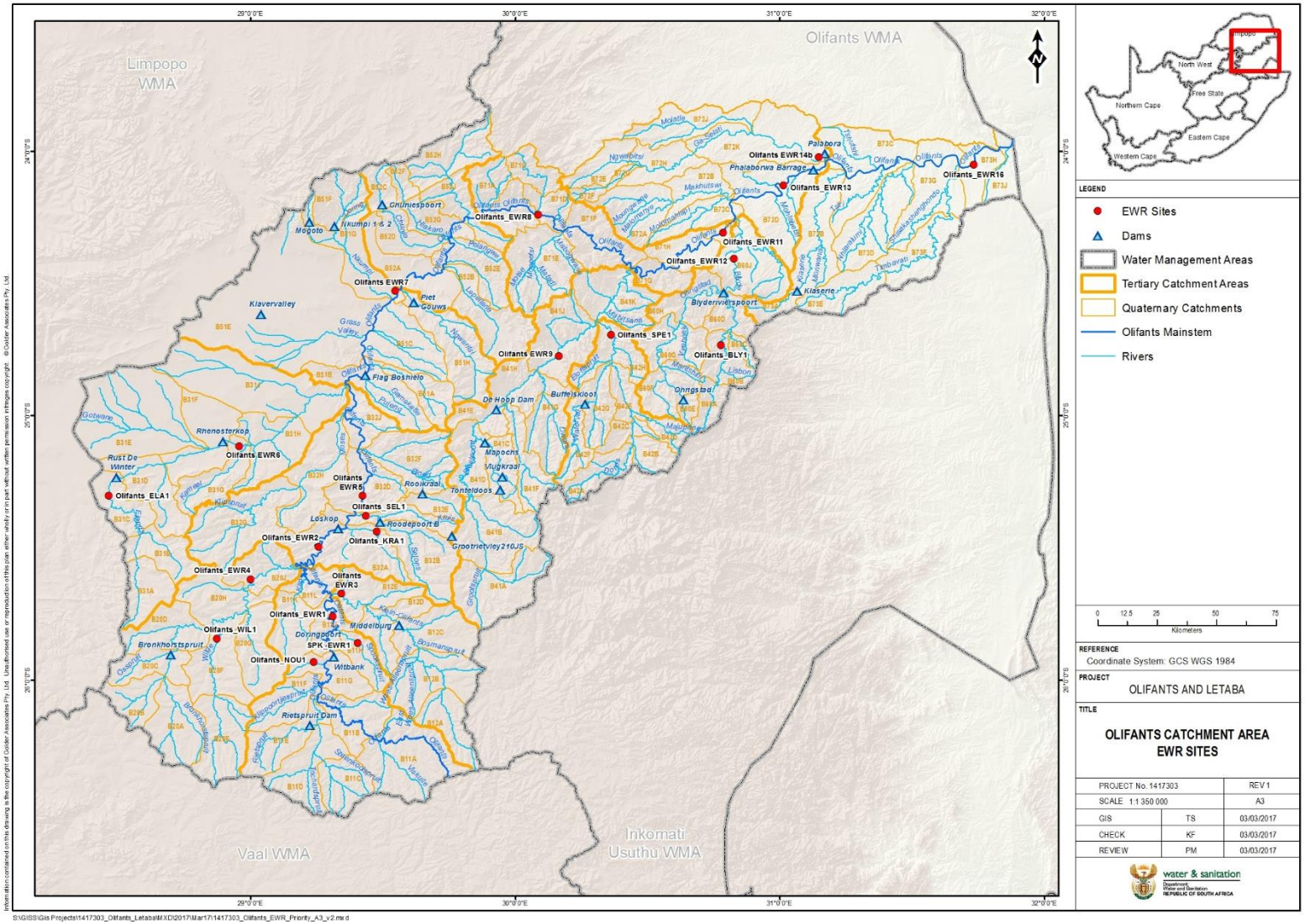


Figure 4: Olifants Water Management area illustrating the priority EWR sites to be gazetted for The Reserve

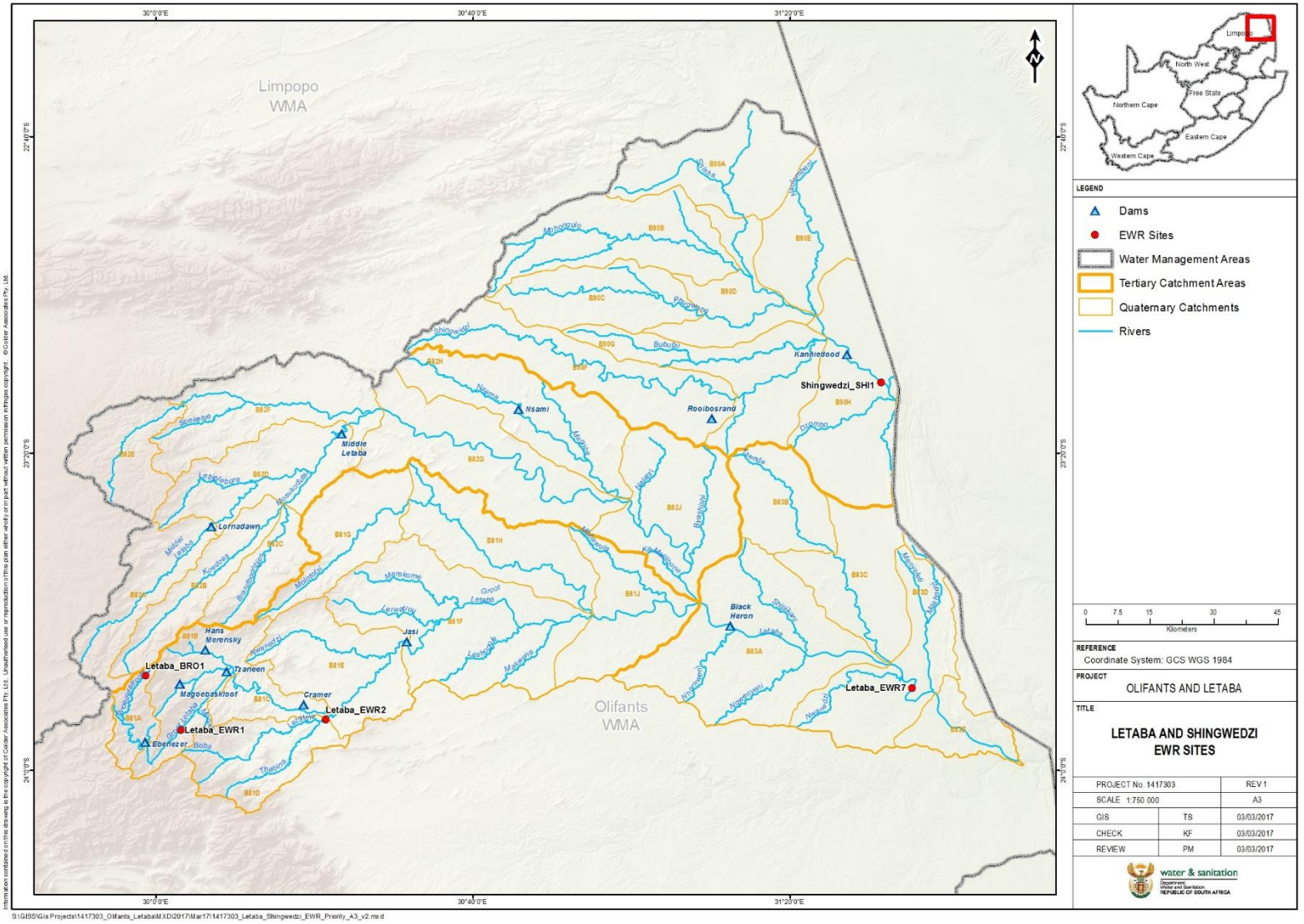


Figure 5: Letaba and Shingwedzi Water Management area illustrating the priority EWR sites to be gazetted for The Reserve

1.4 PURPOSE OF THIS REPORT

This report forms the final deliverable of the study and serves as a feedback on final deliverables, milestones, challenges and lessons learnt through the undertaking of the study, 'Determination and Review of the Reserve in the Olifants, Letaba and Shingwedzi Catchments. It comprises the reporting on these aspects and makes some recommendations for future studies.

2. STUDY DELIVERABLES

The deliverables for the Determination, Review and Implementation of the Reserve in the Olifants/Letaba System study outlined per task are as follows in **Error! Reference source not found.**.

Table 3: Summary of study deliverables

Task No.	Task description, purpose of the report and key information provided in the report	Deliverables
Task 1	**Project Inception**	
	This Inception Report was a deliverable from the first task of the study, the inception phase, and described the proposed activities and tasks that were carried out. The inception report was produced to better define the scope of work for the study, document any changes to the scope of work from the proposal, describe the information available to support the study, highlight related considerations that could influence the study, confirm the study programme and the associated study budget based on the initial assessments and reviews undertaken during the inception phase of the study.	**Project Inception Report** (Report number: RDM/WMA02/00/CON/0115)
Task 2	**Water Resources and Information Gathering**	
	A specialist workshop was held on 27 – 31 July 2015 with the aim to identify ecological gaps related to the existing preliminary Ecological Water Requirements (EWRs) and specify ecological specifications that have not been addressed through the previous studies. This involved the identification of the priority quaternary catchments (with associated river reaches) that are important to the system from an ecological perspective or support the system to achieve the desired ecological condition. This process also addressed wetland and groundwater systems and included catchments where water quality served as the driver. The outcomes from the information reviewed and gap analysis undertaken in the workshop was captured in a Gap Analysis Report. This task had also included an assessment of the models that were to be used for the scenario analysis and consequences evaluation.	**Information and Data Gap Analysis Report** (Report number: RDM/WMA02/00/CON/0215)

Task No.	Task description, purpose of the report and key information provided in the report	Deliverables
	For the rivers component of the Reserve determination, two field surveys were conducted where the gaps for the rivers were addressed either by (i) Rapid III assessments, (ii) re-survey of hydraulics at existing EWR sites, including biological surveys or (iii) biological surveys only. The first of the surveys undertaken in an attempt to address the ecological gaps for the Olifants catchment was a dry season survey during October 2015 where 16 identified EWR sites (on a Rapid III level) were surveyed and 20 biological sites assessed. The field survey of the Letaba/Shingwedzi catchment was undertaken in April 2016 where 4 and 1 identified EWR sites were surveyed in the Letaba and Shingwedzi catchments respectfully and 13 and 9 biological sites surveyed in the Letaba and Shingwedzi catchments respectively. A field survey report was subsequently compiled, documenting the details of the field surveys undertaken, the sites which were surveyed including site photos. Further to the above, wetland surveys and groundwater assessments were undertaken to support the definition of the ecological specifications required. This was determined through the gaps analysis step as well, and prioritised to the extent that the system will be adequately protected by the selection of sites that best serve the needs of the system.	Field Surveys; and **Field Survey Report** (Report number: RDM/WMA02/00/CON/0315)
	The information from these surveys was used to revise the eco-status, re-assess the EWRs, especially at the previous comprehensive sites on the main stem rivers and major tributaries and to assess ecological consequences for the operational scenarios. Where current EWR sites could not be used, new sites were identified for the required assessments as specified above. This Eco-Classification process was applied through a specialist workshop (7 – 9 March 2016 and 10 – 11 May 2016) to determine the EcoStatus of the priority sites. This report served to document the results of the Eco-Classification process for the rivers of the Olifants, Letaba and Shingwedzi catchments. The results were provided per site and included an updated Present Ecological State (PES) of the EWR sites and recording information for all biological sites assessed.	**Eco-Classification Report** (Report number: RDM/WMA02/00/CON/0116)

Task No.	Task description, purpose of the report and key information provided in the report	Deliverables
	Based on the results of the survey and the observations noted, monitoring measures were also proposed at identified strategic sites.	
Task 3	**Study implementation of the EWR**	
	An EWR specialist workshop was held on 6-10 June and 1-5 August 2016. The Desktop Reserve Model (DRM) within SPATSIM was run for the integration of data produced from the surveys and Eco-classification to quantify the EWRs. Results from the hydraulic modelling (cross-sectional profile and discharge) was conducted to evaluate the DRM requirements and the evaluation of the water quality at specific selected sites where quality was identified as an issue was undertaken. An EWR Report was compiled quantifying the Ecological Water Requirements (EWR), based on the Rapid III level of detail for the Priority Rivers as identified for the Olifants Water Management Area.	**Quantification of Ecological Water Requirements Report** (Report number: RDM/WMA02/00/CON/0216)
	A groundwater assessment and report was compiled that supported the finalisation of the Groundwater component of the Reserve.	**Groundwater Component Report** (Report number: RDM/WMA02/00/CON/0316)
	A wetland study and report was compiled to support update and determination of the wetland Reserve.	**Wetland Component Report** (Report number: RDM/WMA02/00/CON/0416)
	An assessment of the operational flow scenarios was conducted as part of the implementation component to evaluate the ecological consequences in order to assess the Ecological Water Requirements that can be met. The primary aim of this task was to determine any consequences of the revised EWR requirements through the running of the Water Resource Yield Model (WRYM) and the Water Resource Planning Model (WRPM).	**Scenario Evaluation and Consequence Report** (Report number: RDM/WMA02/00/CON/0616)

Task No.	Task description, purpose of the report and key information provided in the report	Deliverables
	The operational scenarios were defined, taking into account the scenarios that were assessed during the WRCS study and then tested against the system water resource balance to determine what needs to be met and its achievability. Linkages with the Olifants Reconciliation Strategy Maintenance Study' were made. Five flow scenarios were assessed for the Olifants-Letaba System using the Water Resource Planning Model (WRPM). The ecological consequences of these scenarios at selected key and priority sites were evaluated during workshops held in August and November 2016. Furthermore, the alignment to the Classification base scenario and the ecological configurations were checked to ensure that the Reserve and the Management Classes supported each other. The final selected scenario has been used to set the recommended Ecological Reserve (REC). Operational rules will need to be defined with specific goals to improve the system as part of the implementation of the Reserve.	
	This report described the ecological specifications (EcoSpecs) and monitoring requirements for attainment of the Reserve in the water resources of the Olifants, Letaba and Shingwedzi catchment area as they relate to hydrology, water quality, habitat and biota of rivers, groundwater and wetlands. **The ecological specifications are not intended as a stand-alone report, and should be read in conjunction with the Eco-classification Report (Report No. RDM/WMA02/00/CON/0116) and the Quantification of the Ecological Water Requirements (Report No. RDM/WMA02/00/CON/0216),** as the ecological consequences and much of the background information and reasoning behind the EcoSpecs and related monitoring activities presented in here is contained in these reports.	**Ecological Specification Report** (Report number: RDM/WMA02/00/CON/0516)

Task No.	Task description, purpose of the report and key information provided in the report	Deliverables
	The purpose of this report was to update the Basic Human Needs Reserve in the Olifants/Letaba system for the population directly reliant on the rivers for their basic water supply, *i.e.* sufficient quantity and quality of water to support life and personal hygiene. The finalisation of the EWRs for the Olifants/Letaba system incorporated the basic human needs component of the Reserve. The results of the preliminary Reserve was compared to the requirements contained in the Reconciliation Strategy, and adjustments were made if required.	**Basic Human Needs Report** (Report number: RDM/WMA02/00/CON/0816)
	The Resource and Implementation Plan was to provide a context of the integrated water resource management environment in the Olifants WMA and provide recommendations on implementation actions for the attainment of the Reserve.	**Resource and Implementation Plan** (Report number: RDM/WMA02/00/CON/0716)
Task 4	**Communication and Liaison**	
	The stakeholder consultation formed a key component of the process and stakeholders were brought along with the process to ensure that engagement undertaken supported the Reserve update process that was followed. A focused stakeholder engagement process was undertaken that was aligned to the technical steps of the study. Key stakeholders within the Water Management Area were identified and it was the intention that these member representatives communicate the key outcomes and decisions of the study back to their constituencies and communities. Two key stakeholder meetings (KSM) were held for the project. The first was held on 25 and 26 May 2016 at the Loskop Forever Resort and Tzaneen Country Lodge respectively. The second round of KSM was held on 29 and 30 November 2016 at the Olifants river Lodge (Middleburg) and Tzaneen Country Lodge respectively. Stakeholders representing specific sectors of society (e.g. agriculture, mines, conservation, government, catchment based organisations) were identified and invited to both stakeholder meetings.	Stakeholder database Background Information Document Key stakeholder meeting Invitations Meeting minutes, Presentation, Attendance registers (25- 26 May and 29 – 30 November 2016 - Appendix A)

Task No.	Task description, purpose of the report and key information provided in the report	Deliverables
	Means of inviting the stakeholder was conducted through the distribution of an invitation accompanied by the background information document via email, calendar requests and updated calendar reminders and by SMS. Following both meetings, the KSM minutes, together with a copy of the presentation, was circulated to all stakeholders who attended the meetings.	
	An Issues and Responses Report has been compiled and updated through the study. This report lists the comments from stakeholders (which were received primarily via input at the stakeholder meetings) and responses from the project team and the DWS.	**Issues and Response Report** (Report number: RDM/WMA02/00/CON/0916)
Task 5	**Capacity Building**	
	In terms of building capacity and ensuring skills transfer to DWS staff, nine individuals were identified through the DWS project and were involved in the execution of specific tasks on the project and attended training workshops addressing specific components or disciplines. The following trainings/workshops which the DWS individuals attended were as follows: • Gap analysis workshop held on 27 – 31 July 2015; • Involvement of personnel in the Olifants, Letaba and Shingwedzi biological and hydraulic field surveys conducted in October 2015 and April 2016; • Involvement of personnel in the Olifants, Letaba and Shingwedzi wetland field surveys conducted in February 2016; • A formal training session was conducted on 10 June 2016 which illustrated the process of collecting biological, hydrological and hydraulics data and the process of integrating the information to quantify the EWRs using the Desktop Reserve Model (DRM); • A formal training session was conducted on 18 February 2016 on groundwater assessment and classification; • A formal training session was conducted on 7 April 2016 on wetland assessment and classification; and	Capacity Building Workshops Attendance registers (Appendix B)

Task No.	Task description, purpose of the report and key information provided in the report	Deliverables
	• EWR workshop held on 1 – 5 August 2016.	
Task 6	**Study Management, Co-ordination and External Review**	
	Mr Trevor Coleman was the study leader responsible for overall project direction and management. Mr Coleman was supported by Ms Kylie Farrell and Ms Priya Moodley with the management and coordination of the study. Liaison with the DWS Study Manager included the following activities: • Co-ordination on the arrangement for the Project Management Committee (PMC) meetings during the course of the study; • Establishing interim communication (between meetings) to advise the DWS Study Manager of, *inter alia*, important events or problem situations, possible changes to the scope of work, appointment of sub-consultants, etc.; and • Attending and addressing administrative and project management related requests. Progress reports, cash flow charts and invoices were submitted to DWS on a monthly basis. Expert peer reviewer was conducted on the EWR Report and expert advise was provided for the Fish, Invertebrate, Flow, Habitat Assessement (FIFHA) model by Ms Delana Louw and Pieter Van Rooyen. A workshop was held on 21 October 2016 with the external review panel and study team.	Monthly Study Progress reports (including financial and administration information) Signed minutes of Project Management Committee meetings Project Management Committee meeting presentations
Task 7	**Final RDM and Study Close Out**	
	This report forms the final deliverable of the study and serves as a feedback on final deliverables, milestones, challenges and lessons learnt through the undertaking of the study, Determination and Review of the Reserve in the Olifants, Letaba and Shingwedzi Catchments. It comprises the reporting on these aspects and makes some recommendations for similar future studies.	**Close-out Report (This report)** (Report number: RDM/WMA02/00/CON/01016)

Task No.	Task description, purpose of the report and key information provided in the report	Deliverables
	The draft gazette templates as specified and provided by the Directorate: Reserve Determinations has been populated. The template has been submitted to the Department who will review and circulate for public comment for a period of 60 days by means of the Government Gazette. The template will subsequently be finalised once comments have been addressed.	Draft Gazette Template

3. MAJOR MILESTONES

The following can be considered as major milestones of the study:

- Inception phase;
- Gap analysis;
- Biological, hydrological, wetland and groundwater data collection from the two field surveys;
- Eco-status determination during the eco-classification phase;
- Quantification of the EWRs;
- Identification of the Recommended Ecological Condition (REC) and subsequently the Target Ecological Category (TEC);
- Scenario evaluation and consequences assessment;
- Finalisation of the recommended operational flow scenario;
- Two key stakeholder meetings;
- Agreement on the recommended TECs following discussions with the stakeholders;
- Ecological specifications for surface water, ecology, groundwater and wetlands;
- Compilation of the Resource and Implementation Plan;
- Setting the Ecological Reserve;
- Specifying the Basic Human Needs Reserve; and
- Templates for Government Notices for Gazetting.

3.1 PROJECT DELIVERABLES AS PER FINANCIAL YEAR

Refer to Table 4 for the project deliverables as per the financial year.

Table 4: Project deliverables as per the financial year

Quarter	Months	Deliverables
Financial Year: 2015/2016		
Q3	December 2015	• Draft Inception Report • Gap Analysis Report • Field surveys • Field survey Report
Q4	January 2016	• Inception Report
Financial Year: 2016/2017		
Q1	May 2016	• Draft Eco-classification Report
Q1	June 2016	• Draft EWR Report • Draft Key Stakeholder Engagement Meeting 1, meeting minutes
Q2	August 2016	• Final Eco-classification Report • Draft Ecological Specifications Report

Quarter	Months	Deliverables
Q2	September 2016	• Updated EWR Report • Draft gazette templates • Draft Implementation Plan
Q3	November 2016	• Final EWR Report • Draft Implementation and Resource Management Plan
Q3	December 2016	• Draft Key Stakeholder Engagement Meeting 2, meeting minutes • Draft Issues and Response Report • Final EWR Report • Final Draft Ecological Specifications Report • Final Draft Gazette template • Final Draft Implementation and Resource Management Plan • Draft RDM and Study Close-out Report

4. STAKEHOLDER CONSULTATION

The study process has been supported by a focused stakeholder engagement that was aligned to the technical steps of the study.

An extensive stakeholder database for the Olifants Water Management Area (WMA) was setup at the onset of the study and has been updated on an ongoing basis. In March 2016 the study was announced to the stakeholders and a letter of invitation addressed to all Interested and Affected Parties (I&APs) currently on the database inviting them to the first key stakeholder meeting (KSM) in May 2016. The letter was accompanied by a Background Information Document (BID) and a reply sheet for I&APs to register as stakeholders and RSVP to the meeting. In addition to the above calendar invitations were emailed and SMS's were sent. The same procedure was followed for the second KSM.

The first KSM was held on 25 and 26 May 2016 at the Loskop Forever Resorts and Tzaneen Country Lodge respectively. The second key stakeholder meeting (KSM) was held on 29 and 30 November 2016 at the Olifants River Lodge and Tzaneen Country Lodge respectively. This was the final KSM for the study.

The Reserve will be published by way of notice in the Government Gazette, and the public have further opportunity to comment by submitting their written comments over a 60 days public comment period.

Refer to **Table 5** below for a summary of the KSMs.

Table 5: Key stakeholder engagement meetings summary

Date	Venue	Total present*	Organisations represented	Information presented at the KSM
KSM 1: Introduction to the study				
25 May 2016	Loskop Dam Forever Resorts	20	Exxaro, Department of Environmental Affairs, Cullinan Diamond Mine, Chamber of Mines, South 32, Glencore Coal, DWS	• Introduction to the study, including explaining the methodology in the determination of the Reserve; • Study objective; • The study area with map illustrations; • The ecological, water quality, wetland and groundwater status of the water resources following the field surveys; and • Next steps in the study.
26 May 2016	Tzaneen Country Lodge	30	Olifants River Joint Water Forum, South African National Parks, ZZ2, Shingwedzi Sub-Catchment, AWARD, Phalaborwa Mining Company Ltd, Letaba Water Users Association, Kruger2Canyons BR/SanParks BSP, Mopani District Municipality, IWR Water Resources, Department of Agriculture, Exxaro, Lomin Akanani, DWS	
KSM 2: Final meeting providing results on the proposed Reserve				
29 November 2016	Olifants River Lodge	27	Exxaro, Loskop Irrigation Board, Eskom Duvha Power Station, Chamber of Mines, DWS	• Provided a reiteration to the study background and area; • Provided feedback on the progress to date on the determination of the Reserve; • Provided the necessary information to stakeholders on the: ❖ Final Ecological Water Requirements at the EWR sites; ❖ Ecological consequences and scenario analysis; ❖ Final proposed recommended scenario; ❖ Ecological specifications; and ❖ Implementation Actions. • Provided an overview of the way forward.
29 November 2016	Tzaneen Country Lodge	28	Bosveld Phosphate, South African National Parks, LEDET, AWARD, Phalaborwa Mining Company Ltd, Letaba Water Users Association, Exxaro, Lomin Akanani, DWS	

*Attendance Registers for the Stakeholder Meetings are included as Appendix A.

5. ISSUES AND CHALLENGES

Some of the challenges and issues encountered in the determination of this Reserve study were as follows:

- Ecological information and Ecological Water Requirements were not available for all IUAs to the same extent. Some IUAs had EWRs determined at a comprehensive level (previous Reserve studies) where in some cases information from Rapid studies had to be used. The confidence between site information thus varied;
- The availability of monitoring data (biological, flow, water quality, groundwater, wetlands) proved to be challenging. Limited data is available due to the inadequacy of the current monitoring networks and monitoring programmes;
- The model for Fish, Invertebrate, Flow and Habitat Assessment (FIFHA) which was used to assess the biotic consequences of the various scenarios was found to be too conservative at certain sites and was thus decided to use the Fish Response Assessment Index (FRAI) model to assess the rest of the biotic consequences for the five scenarios. This in itself posed some challenges since this only provided information on one indicator species;
- Owing to the drought conditions and thus limited water in the system at the time of the field surveys, it was a challenge to identify the recommended scenario based on the outputs of the Reconciliation Strategy and Classification studies for the Olifants/Letaba System. Out of the five identified scenarios, not all sites could meet the recommended TEC from a biotic perspective during the dry and wet seasons. The sites which could not meet the TECs included:
    - Olifants_EWR8 (Olifants – B71D);
    - Olifants_SPE1 (Lower Spekboom – B42H);
    - Olifants_EWR11 (Olifants – B71J); and
    - Olifants_EWR16 (Olifants – B73H).

  Subsequently, new recommended TECs were applied, discussed with the stakeholders and agreed upon for these sites;
- Stakeholder fatigue and lack of attendance at the KSMs. This may be owing to the fact that there are various projects taking place concurrently within the WMAs, each having their independent meetings and thus the stakeholders are being subjected to information overload. The CMAs need to expand their forums within the WMA and ensure that all studies/projects are driven through this process. This will aid in improved meeting attendance as it will reach the broader stakeholders. Furthermore, it will provide a good opportunity to ensure the key contributors namely the Department of Mineral Energy (DMR) attend such forums;
- A primary challenge in the project was time constraints and the inflexibility of the deliverable submissions to the department despite a number of issues raised during the project. It is recommended that in future, a contingency time period is allocated within the contract in order to allow for potential red flags which may occur within the study (as did during this study during the FIFHA modelling and scenario evaluations);
- It is important that the Chief Directorate: WE create the necessary linkages and integration to the other DWS initiatives and Directorates/Region prior to the studies being initiated.

This internal DWS integration will facilitate a more informed implementation of The Reserve. Such an example was to aim to link this projects key stakeholder meetings, with that of the Integrated Water Management Plan for the Olifants River System's meetings; and

- The gazetting of the RQOs in the Olifants WMA in April 2016 brought some challenges to this project, as some RQOs identified during this project required to be amended from the gazetted ones. This challenge was communicated to the Department during the first Project Management Committee (PMC) meeting in July 2015. Changes to the gazetted RQOs were presented to DWS and to the key stakeholders which all approved. It is now the responsibility of the Planning and related Directorates to ensure the water is made available or necessary management actions be implement to achieve the new requirements.

6. LESSONS LEARNED

Some of the lessons learnt in the determination of The Reserve study were as follows:

- It is our professional opinion that unnecessary time was spent re-surveying existing EWR sites and additional biological sites, especially during a time of drought. The results did not provide data representative of the river systems surveyed due to the unnatural conditions experienced at the time of the surveys;
- Hydraulics was also re-done at some of the EWR sites as per the request from the Department. However, the question posed is that every time the river profile changes, does hydraulics need to be re-done? It is of the opinion that should the river profile change significantly during a flood, then hydraulics should be conducted in conjunction with the use of the Rapid Habitat Assessment Method (RHAM) in order to correlate the flow, cross section and habitat strata;
- In terms of the Olifants Classification study, the scenario analysis was largely driven by the planning scenarios due to the water stress in the WMA, and not from the ecological perspective;
- It may have been useful if one could have the Scenario options determined earlier in the process. This would help define the information requirements for the economic modelling and scenario analysis. This will also help with refinement of the scenarios;
- Owing to the conservative nature that the project team experienced when running the FIFHA model, it is suggested that the model be reviewed and published;
- The nomenclature regarding the EWR and biological site names should have been revised and finalised following the completion of the site surveys. This would have avoided confusion when reviewing several reports concurrently;
- The capacity building programme undertaken as part of the determination of The Reserve should be adapted, revised and built upon for future studies so that the needs of departmental officials are met and the knowledge gaps are closed. In addition, the departmental officials need to consistently participate in the capacity building programme to derive the necessary benefit. It was noted that the practical sessions (field surveys) were a success; and
- No health and safety incidents were reported following any of the field surveys or stakeholder meetings during the course of this project. It is essential to ensure good health and safety standards and procedures when conducting such projects going forward.

7. BENEFIT TO THE CLIENT

7.1 GENERAL

- The objectives of the study have been achieved despite budget and timeframe constraints;
- The Reserve has been included with the Gazette template and available for public comment;
- The stakeholders are comfortable with the proposed TECs and the process undertaken;
- Buy-in with sector and stakeholder groups has been achieved to the greater extend;
- Department personnel have derived benefit from the process and activities undertaken; and
- Linkages and alignment with other studies and initiatives have been achieved (Classification Study, Reconciliation Study).

7.2 CAPACITY BUILDING

Ongoing capacity building was undertaken as part of the determination of The Reserve as the study unfolded. Capacity building and knowledge transfer for DWA officials and stakeholders was done at key points in the study through forums namely specialist workshops, meetings and field surveys. The nature of the capacity building was that of presentations, discussions of approaches and processes and interactive discussions. Furthermore, some of the officials accompanied the specialists into the field during the field surveys in October 2015 and April 2016.

In terms of the DWS officials identified for the capacity building programme, there was a lack of continuity in the attendance of study meetings and workshops thus the DWS representatives while aware of the process and approach may not be fully capacitated in terms of its application.

Furthermore, there were instances where the DWS officials did not feel incapacitated especially during specialist workshops where various and different models were being run. The issue was that the officials did not have the respective programmes and/or licenses for such models. However, the learning for future reference will be to assign each specialist with an official to take them through the models step by step throughout the workshops.

8. CONCLUSION

The aquatic ecosystems of the Olifants, Letaba and Shingwedzi Rivers are under stress and on a negative trajectory due to extensive water use for irrigation and domestic purposes in the various catchments, return flows from waste water treatment works and from mining activities. Afforestation in the upper catchments of the Great Letaba River also reduces the base flows in the rivers further. Large dams in especially the Olifants and Letaba catchments have a severe impact on the moderate flows (freshets), as a number of these dams do not have the release capacities.

Olifants River catchment

The scenario evaluation of the Olifants River catchment shows that the EWR could not be met at most of the identified key and priority site during present day conditions (Scenario 1). The other scenarios provided a mix of success to meet the EWR, with Scenario 2 (full EWR) giving the best results for the protection of the aquatic ecosystems. However, this scenario has a detrimental impact on the yields of the large dams, and the availability of water for the water users in the catchment.

In terms of water quality, for most part of the Olifants system the flow scenarios were not significant enough to result in a change in water quality status to another category. However the higher discharges associated with scenarios 2 and 3 will in general result in an improvement water quality. EWR sites EWR4 (Lower Wilge), EWR7 (Middle Olifants) and EWR14b (Lower Ga-Selati) is where the improve flows would impact and improve water quality status. The better quality resulting from the higher flows are due to the diluting effect of the pollution. In most cases the water quality status is driven by non-flow related activities (viz. mining and industrial impacts, agricultural runoff, urbanisation and dense settlements and poorly treatment sewage effluent).

The final recommended scenario (scenario 5) with some changes to the Target Ecological Categories of sites in the middle and lower Olifants River provided the best results to protect the aquatic ecosystems, and still has water available for the water users.

Letaba River catchment

Various scenarios have been evaluated in detail during the classification of the water resources of the Letaba River catchment. The final accepted scenario and corresponding ecological specifications as provided in the Government Gazette No. 39614, dated 22 January 2016 should be complied with to ensure that the water resources of the Letaba River are protected.

Shingwedzi River catchment

The Shingwedzi River is an ephemeral system with almost no flows during the months of April to August. However, water use outside the Kruger National Park has impacted on the moderate flows mainly due to a number of dams not releasing the smaller freshets. The present day water use should be monitored closely and any further water use in this system should ensure that the freshets are not reduced.

It is important that the ecological specifications (quantity, quality, habitat and biota) as specified in the various study reports be met to ensure that the resources of the Olifants, Letaba and Shingwedzi Rivers and their tributaries can provide the goods and services.

Overall, the preliminary determination of the reserve and ecological categorisation for water quality (river) in terms of section 17 (1) (a) are summarised below (**Table 6**). This table includes the key EWR sites coupled with their associated quaternary catchment and the water resource. The table further provides the Present Ecological State (PES), the Recommended Ecological Condition (REC) and the Target Ecological Conditions (TEC) which is the ultimate target to achieve a sustainable system both ecologically and economically taking into account the PES and REC. Furthermore, the table includes The Total Reserve which accounts for both the Ecological Reserve and the Basic Human Needs Reserve. Lastly the table includes the Natural Mean Annual Runoff at each EWR site. It is this table that will be gazetted.

Table 6: Preliminary determination of the reserve and ecological categorisation for water quality (river) in terms of section 17 (1) (a)

Key EWR Sites	Quaternary Catchment	Water Resource	PES	REC	Ecological Category which is being recommended for approval (TEC)[5]	Ecological Reserve[3]		BHN Reserve[4]		Total Reserve[2]		
						MCM	% of NMAR	MCM	% of NMAR	MCM	% of NMAR	NMAR (MCM)[1]
Olifants_ELA1	B31C	Upper Elands	C/D	C	C	6.485	20.87	0.0002	0.003	6.4852	20.873	31.08
Olifants_EWR4	B20J	Lower Wilge	C	B	B	63.698	36.28	0.00227	0.013	63.70027	36.293	175.59
Olifants_WIL1	B20F	Wilge River	C/D	C	C	6.763	15.11	0.00159	0.008	6.76459	15.118	44.76
Olifants_EWR1	B11J	Olifants	D	C/D	D	32.845	17.8	0.00673	0.052	32.85173	17.852	184.54
Olifants_EWR2	B32A	Olifants	C	B/C	B/C	149.36	29.83	0.00295	0.008	149.36295	29.838	500.63
OLI_EWR3	B32A	Kranspoortspruit	C	B	B	4.194	30.26	0.00295	0.008	4.19695	30.268	13.858
Olifants_SEL1	B32C	Selons	D	C	C	7.237	21.86	0.00196	0.02	7.23896	21.88	33.11
Olifants_EWR8	B71D	Olifants	C	C	C/D	123.53	15.19	0.00841	0.02	123.53841	15.21	813.17
Olifants_SPE1	B42H	Lower Spekboom	C	B/C	C	34.316	23.16	0.00729	0.091	34.32329	23.251	148.19
Olifants_BLY1	B60B	Upper Blyde	C	B	B	75.78	46.08	0.00479	0.005	75.78479	46.085	164.45
Olifants_EWR11	B71J	Olifants	C	C	C/D	169.27	12.81	0.00502	0.052	169.27502	12.862	1321.9
Olifants_EWR12	B60J	Lower Blyde	C	B	B	119.39	31.14	0.01041	0.052	119.40041	31.192	383.27
Olifants_EWR13	B72D	Olifants	C	B/C	C	394.26	22.37	0.01239	0.301	394.27239	22.671	1762.1

Key EWR Sites	Quaternary Catchment	Water Resource	PES	REC	Ecological Category which is being recommended for approval (TEC)[5]	Ecological Reserve[3]		BHN Reserve[4]		Total Reserve[2]		
						MCM	% of NMAR	MCM	% of NMAR	MCM	% of NMAR	NMAR (MCM)[1]
Olifants_EWR16	B73H	Olifants	D	B/C	C	403.96	21.06	0.00016	0.002	403.96016	21.062	1918.3
Letaba_EWR7	B83D	Letaba	C/D	C	C	112.05	17.34	0.00004	0	112.05004	17.34	646.28
Letaba_EWR2	B81D	Letsitele	D	D	D	20.497	17.59	0.07078	0.078	20.56778	17.668	116.55
Letaba_EWR1	B81B	Great Letaba	C/D	C	C	24.72	24.76	0.01966	0.03	24.73966	24.79	99.85
Letaba_BRO1	B81A	Broederstroom	B/C	B/C	B/C	3.257	49.22	0.00519	0.012	3.26219	49.232	6.68
Shingwedzi_SHI1	B90H	Shingwedzi	C	B/C	B/C	19.449	22.5	0.00071	0.004	19.44971	22.504	86.42
Olifants-EWR3	B12E	Klein Olifants	D	C	C/D	16.146	19.8	0.00142	0.009	16.14742	19.809	81.54
Olifants-EWR5	B32D	Olifants	C	C	C	71.449	12.51	0.00483	0.06	71.45383	12.57	571.13
Olifants-EWR6	B31G	Lower Elands	C/D	C/D	D	6.319	10.48	0.00326	0.033	6.32226	10.513	60.32
Olifants-EWR7	B51G	Olifants	E	D	D	72.915	9.89	0.0137	0.365	72.9287	10.255	736.94
Olifants-EWR9	B41H	Steelpoort	D	C/D	C/D	32.079	23.33	0.19505	3.086	32.27405	26.416	137.50
Olifants_EWR 14b	B72K	Lower Ga-Selati	E	D	D	14.15	19.45	0.00488	0.043	14.15488	19.493	72.74
SPK_EWR1	B11H	Spookspruit	C	C	C	2.808	30.12	0.00011	0.001	2.80811	30.121	9.322
DWA_EWR1	B41H	Dwars	B/C	B/C	B/C	8.144	31.24	0.19505	3.086	8.33905	34.326	26.1

Key EWR Sites	Quaternary Catchment	Water Resource	PES	REC	Ecological Category which is being recommended for approval (TEC)[5]	Ecological Reserve[3]		BHN Reserve[4]		Total Reserve[2]		
						MCM	% of NMAR	MCM	% of NMAR	MCM	% of NMAR	NMAR (MCM)[1]
Olifants_EWR10	B41K	Steelpoort	D	D	D	43.503	12.69	0.07358	0.48	43.57658	13.17	342.75
OLI_EWR8	B60H	Ohrigstad	C	C	C	11.785	17.41	0.07142	0.512	11.85642	17.922	67.79
Olifants_EWR14a	B72H	Upper Ga-Selati	C	C	C	14.37	27.53	0.00249	0.123	14.37249	27.653	52.2

1) Natural Mean Annual Runoff at EWR site.

2) The total Reserve amount accounts for both the Ecological Reserve and the Basic Human Needs Reserve.

3) The volume and % represent the long term mean based on the nMAR. If the nMAR changes, this volume will also change.

4) Represents the cumulative volume and percentage of BHN.

5) Target Ecological Category (TEC)

Therefore taking into account scenario 5 and the associated consequences, it can be resolved that the objectives of the study have been achieved. The Reserve for the Olifants/Letaba System has been reviewed and updated, and the templates have been completed and finalised. The template agreed upon for The Reserve will be published by way of notice in the Government Gazette as the final step in the process.

The implementation actions proposed would need to be taken forward for the attainment of the Reserve. This will require integration and co-ordination among a number of Directorates with the Department as well as the Regional Office.

APPENDIX A – KEY STAKEHOLDER MEETINGS

APPENDIX B – CAPACITY BUILDING