

# Classification of significant water resources in the Olifants Water Management Area

## Background Information Document - 2

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water affairs

Department:  
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### PURPOSE OF THIS DOCUMENT

The purpose of this background information document (BID) is to assist members of the Project Steering Committee (PSC) in preparing for the upcoming second PSC meeting of 8 November 2011.

It provides:

- A brief overview of the steps of the Water Resource Classification System (WRCS) and the Olifants Water Management Area (WMA) study;
- A brief overview of where we are in the Olifants WMA Classification study process;
- An understanding of the establishment of the ecologically sustainable base configuration (ESBC) scenario; what it is and why it is necessary;
- The base case ecological condition being evaluated as the ESBC for the water resources;
- The main components of the methodology used to establish the ESBC and the scenarios that will be discussed at the meeting; and
- An outline of what is expected of you at the meeting as a PSC member.

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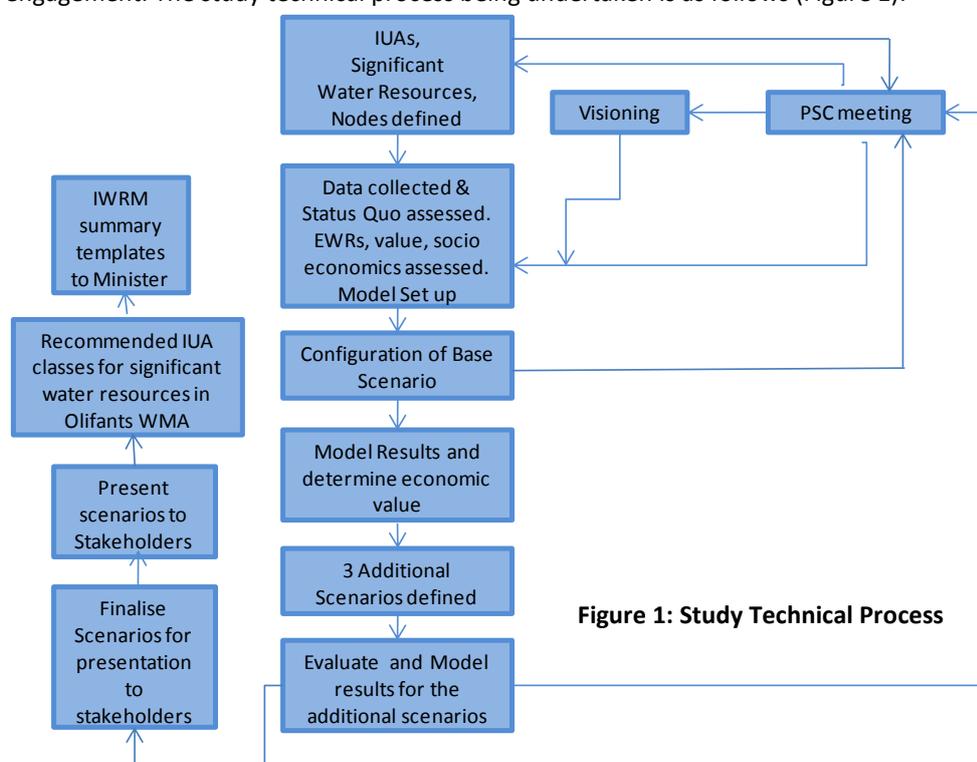
## WATER RESOURCE CLASSIFICATION

Chapter 3 of the National Water Act (NWA, Act 106 of 1998) provides for the protection of water resources through the implementation of resource directed measures (RDM) which includes the classification of water resources, setting the reserve and resource quality objectives. Classification of water resources aims to ensure that a balance is reached between the need to protect and sustain water resources on one hand and the need to develop and use them on the other.

In 2010, the DWA identified the need to undertake the classification of significant water resources in the Olifants Water Management Area (WMA) in accordance with the Water Resource Classification System (WRCS). The ultimate goal of the study is the implementation of the WRCS in the Olifants WMA in order to determine the management class (MC). The purpose of the MC is to establish clear goals relating to the quantity and quality of the relevant water resource.

## OLIFANTS WMA CLASSIFICATION STUDY

The Olifants WMA Classification study was initiated in November 2010. The area covered by the study is the Olifants WMA (primary drainage area B). The study is primarily of a technical nature being guided by stakeholder participation and engagement. The study technical process being undertaken is as follows (Figure 1):

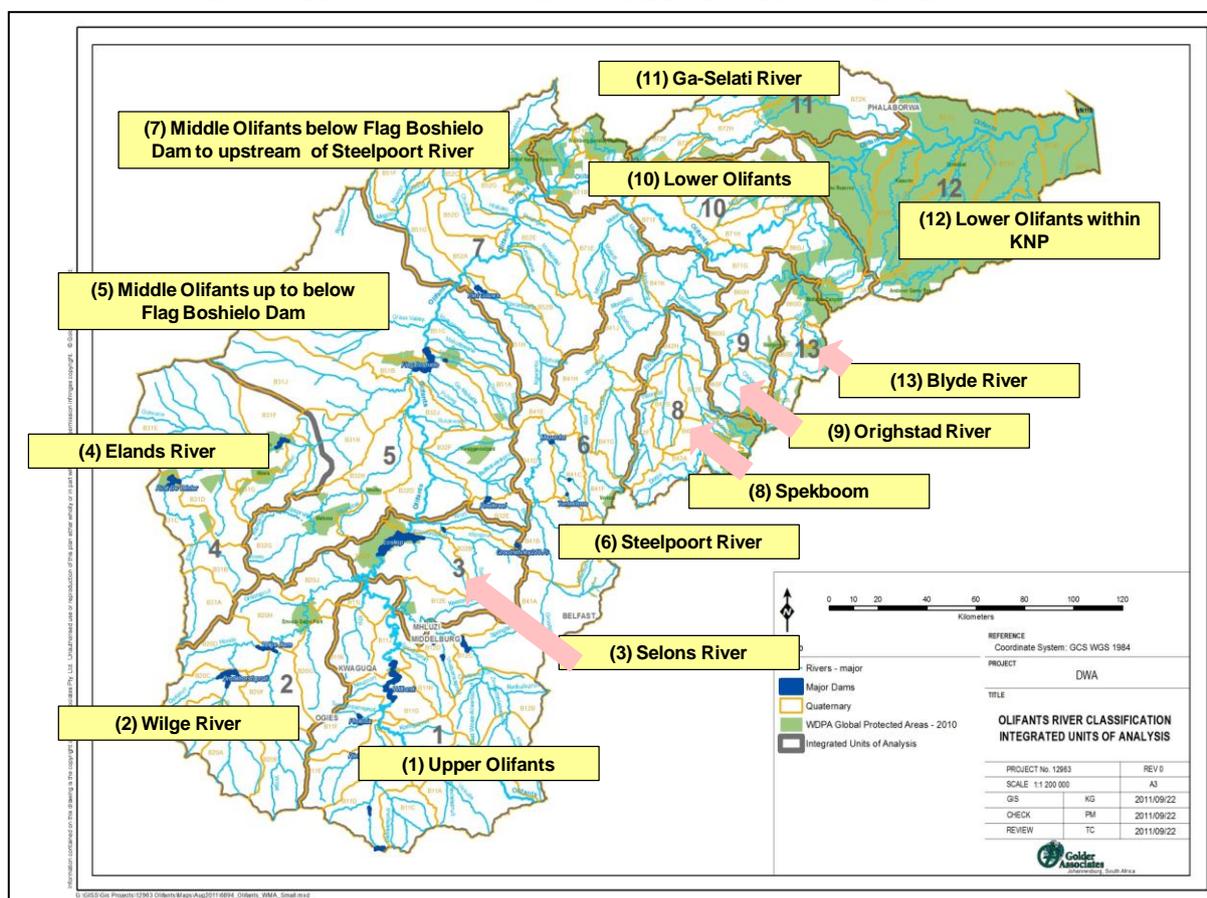


The Olifants WMA classification study has progressed steadily over the past 11 months. The study inception phase included study scope definition and description of the proposed work methodology, and the water resource information and data gathering assessment. In terms of the components of the WRCS process, the outputs that have been completed to date are described in Table 1:

**Table 1: Outputs of the study in terms of the Water Resource Classification Process**

WRCS COMPONENT	Aspects Addressed
<b>Determination of the Integrated Units of Analysis (IUAs)</b>	13 IUAs have been delineated for the Olifants WMA (see Figure 2). This has been based on the socio-economics of the areas, water uses and users, envisaged level of protection required and significance of the resource. Availability of representative Ecological Water Requirement sites (EWR), catchment boundaries and catchment modelling schematics were considered.
<b>Socio-economic: Evaluation and the decision-analysis framework and Method Summary</b>	Definition of the evaluation and decision analysis framework was completed. This framework enables the assessment of the implications of different catchment configuration scenarios at an IUA level on economic prosperity, social wellbeing and ecological condition. A technical task group meeting was held in July 2011 where this framework was accepted by stakeholders.
<b>Ecological Water Requirements (EWRs) quantification</b>	EWRs have been quantified. (From previous Reserve studies or through Rapid Reserve assessments undertaken for the purpose of this classification study).

**13 INTEGRATED UNITS OF ANALYSIS DELINEATED IN THE OLIFANTS WMA**



**Figure 2: 13 IUAs delineated in the Olifants WMA**

**WHERE ARE WE IN THE CLASSIFICATION PROCESS?**

To classify a water resource, the WRCS lays out a set of procedures grouped together in 7 steps that, when applied to a specific catchment, will result in the determination of a MC.

The study process is now at **Step 4** in terms of the WRCS (Figure 3), 'the determination of the ecologically sustainable base configuration (ESBC) scenario'.

Determining the class of a water resource in terms of the process, involves taking into account the social, economic and ecological landscape in a catchment in order to assess the

costs and benefits associated with utilisation versus protection of a water resource.

As such, classification is not carried out in isolation, but is integrated within the overall planning for water resource protection, development and use and the broader goals of the IUA and WMA.

The basis for determining the MC is the determination of the ecologically sustainable level of protection that is required for water resources and integrating this with the economic and

social goals. It is therefore important that an appropriate ecological protection base level (base condition) is established for the water resources; and from this determine what is feasible by understanding the economic and social implications of attaining the minimal (sustainable) level of ecological protection.

Once this sustainable ecological protection level is understood, various levels of resource directed protection can be assessed in terms of the overall implications to the IUA and WMA.

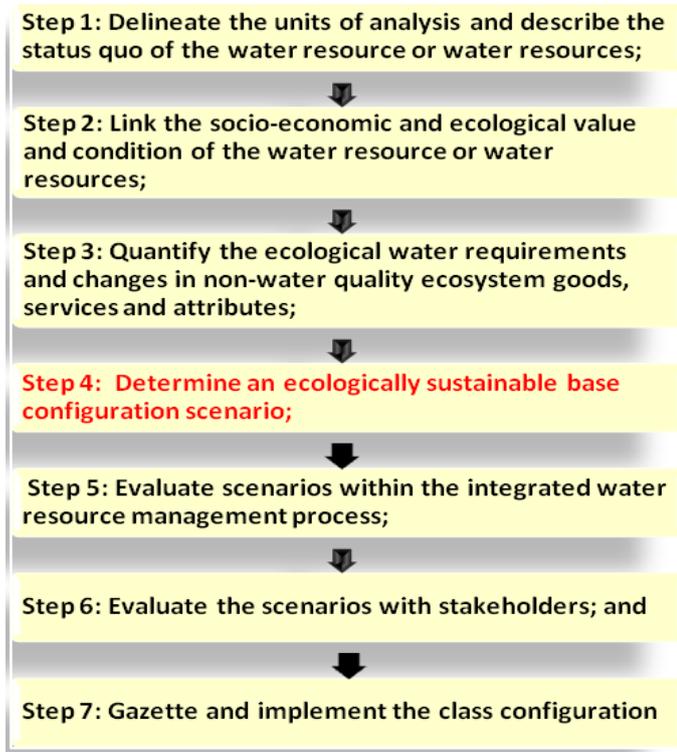


Figure 3: 7-Step WRCS Process

## ECOLOGICALLY SUSTAINABLE BASE CONFIGURATION SCENARIO

The Ecologically Sustainable Base Configuration (ESBC) is defined as the lowest theoretical level of protection required for the sustainable use of the water resources of a catchment.

It is not the target scenario but informs the minimal protection level required constructed as a starting point for the hydrological analysis of the water resource system.

A scenario can be defined as “a story of what could happen in the future”, and is used to understand different ways that

future events might unfold. 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. Analysis thereof gives the ability to compare the implications of one scenario against another, with the ultimate aim to make a selection of the preferred scenario.

In terms of the classification of water resources, a ESBC scenario is established in order to understand what the result would be in terms of system yield of implementing the minimum base level of ecological protection required to ensure sustainable use of the catchment water resources (consideration of ecological, water quality and quantity needs).

The ESBC scenario defines the base ecological condition (ecological category of A, B, C or D) for each water resource (and the EWRs required for maintaining that category), and the yield that would result.

This involves the linking of the flow and resource condition using the lowest ecological category as a starting point, ensuring that the river reaches are maintained in their minimal sustainable condition.

The base condition for each water resource is at minimum established as either a D category or as whichever higher category is required to maintain all downstream nodes in at least a D category. However where the ecological condition requires it, a higher ecological category needs to be set.

The ESBC scenario is established once this base condition is hydrologically and ecologically tested to ensure that it is feasible and can be achieved *i.e.* This result will reflect if the catchment water balance would be in a surplus or deficit by implementing a D category EWR.

Once this is assessed, some catchment areas may require a better than D category condition due to ecological importance or conservation criteria. The ESBC then needs to be adjusted to account for this increase in ecological condition in these areas. Sub-nodes are set within the IUAs to provide the necessary protection.

## APPROACH TO ESTABLISHING THE ESBC PER IUA

The establishment of the ESBC requires the running of a hydrological model using the base condition Ecological Water Requirements (EWRs) (water quality and quantity) as the hydrology, to test whether these EWRs for all nodes can be met.

In terms of the Olifants WMA the D ecological category (EC) was not selected as the default ESBC. The selected EC was rather based on the assessment of the Present Ecological State (PES) and ecological/conservation importance of water resources within the IUAs.

These resulting ECs being tested as the ESBC per IUA are listed in Table 2. Indicative management classes (MCs) are reflected for purposes of illustration of which class the ecological category could potentially translate into. The overall ESBC ecological category is indicated per IUA.

An overall ESBC ecological category for each IUA is representative of all biophysical nodes within that IUA.

However where a biophysical node is different to the overall IUA ESBC ecological category, this higher ecological category was accounted for in the hydrological model by the inclusion of the sub node.

**Table 2: Outputs of the study in terms of the Water Resource Classification Process**

IUA	Catchment area	Ecological Category (ESBC)	Indicative Management Class
1	Upper Olifants River catchment	D	III
2	Wilge River catchment area	C	II
3	Selons River area including Loskop Dam	C	II
4	Elands River catchment area	D	III
5	Middle Olifants up to Flag Boshielo Dam	D	III
6	Steelpoort River catchment	D	III
7	Middle Olifants below Flag Boshielo Dam to upstream of Steelpoort River	D	III
8	Spekboom catchment	C	II
9	Ohrigstad River catchment area	D	III
10	Lower Olifants	C	II
11	Ga-Selati River area	D	III
12	Lower Olifants within Kruger National Park	C	II
13	Blyde River catchment area	A/B	I

## ESBC SCENARIO

Having established the minimal ECs required for the sustainable use of the water resources in the Olifants WMA (the PES represented per IUA above), the ESBC scenario that is being tested in the hydrological model includes:

- System as it exists with current level of development (Base Case) with the EWRs.

The Yield model for the Olifants WMA has been setup and calibrated, and run with the ESBC scenario. The assessment allows for evaluation of the yield that would result in the catchment with the EWRs required for maintaining the PES ecological category.

This allows for the assessment of the water balance (surpluses/deficits) per IUA. The planning scenarios for the

WMA are also considered at this point to understand the availability of water and the expected growth.

A preliminary socio-economic assessment of the ESBC scenario was then undertaken using the economic model set up for the Olifants WMA as part of the classification process. This allows for evaluation of the scenario implications for the IUA and WMA as a whole. The above results and analysis thereof will be presented and discussed at the PSC meeting.

At this point, this economic evaluation exercise was undertaken to understand the implications of the ESBC scenario and to guide the establishment of alternative catchment configuration scenarios.

## CATCHMENT CONFIGURATION SCENARIOS

Once the ESBC is established, the classification process requires that overall catchment Resource Directed Measures (RDM) scenarios are configured for the IUAs within the WMA to assess the resulting yields of alternate ecological protection categories; conservation targets and future use and development to determine what is most feasible.

The additional catchment scenarios being proposed include:

- Adjusted ESBC (different ECs– level of protection);
- ESBC with future development; and
- Adjusted ESBC with future development.

The finalisation of the above additional catchment configuration scenarios will be confirmed at the PSC meeting.

## PROJECT STEERING COMMITTEE

ESBC scenario forms the pre-cursor to the determination of the MC, and thus is a critical component to the WRCS process. It is an integral component of the stakeholder engagement process and of the technical process going forward. Thus this PSC meeting has been scheduled to enable relevant role-players to contribute effectively to the

finalisation of the catchment configuration scenarios of the classification process in the Olifants WMA. Direction and acceptance from the PSC members on the ESBC and the proposed additional scenarios is required. Given the importance of this component to the broader process, participation is strongly encouraged.

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