DEPARTMENT: WATER AFFAIRS

Directorate: Water Resource Classification

Progress report on the Classification of the significant water resources in the Vaal Water Management Area (WMA 8, 9, 10)

1. PURPOSE OF THIS DOCUMENT

The purpose of this document is to inform stakeholders about the progress on the classification of the Vaal WMA.

2. BACKGROUND TO THE PROJECT

Following the promulgation of regulations prescribing a Water Resources Classification System (WRCS) in September 2010, the Department of Water Affairs (DWA) initiated a process of classifying significant water resources in the Vaal Water Management Area (WMA).

DWA initiated this project in 2010/2011 financial year with the life span of 24 months, starting October 2010 to September 2012. The Department appointed WRP Consulting Engineers as a service provider in October 2010. WRP consulting helps the Department by coordinating the implementation of the 7 steps process of the Water Resource Classification System (WRCS) to classify all significant water resources in the Vaal WMA in order to determine a suitable Management Class (MC) for the relevant water resources.

The specific tasks of the study as indicated in the Terms of Reference and Inception Report are as follows:

- Study Inception;
- Resource Assessment;
- Implementation of the Water Resources Classification System (WRCS);
- Stakeholder engagement; and
- Skills development and Transfer.

3. METHODOLOGY

To determine the class of 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 management class (MC) which aims to achieve a balance between protection of a water resource and using it to meet social and economic goals. The WRCS therefore places the following principles at the forefront of implementation:

- Maximising economic returns from the use of water resources;
- Allocating and distributing the costs and benefits of utilising the water resource fairly; and
- Promoting the sustainable use of water resources to meet social and economic goals without detrimentally impacting on the ecological integrity of the water resource.

4. PROGRESS TO DATE

See below as indicated on the table the progress to date of the project.

Step	**Description**	**Status**	**Deliverable**
Step 1:	Delineate the units of analysis and describe the status quo of the water resources	Complete	Inception report Integrated report
Step 2:	Link the socio-economic and ecological value and condition of the water resources	Complete	Integrated report status quo

Step	Description	Status	Deliverable
Step 3:	Quantify the ecological water requirements and changes in non-water quality ecosystem goods, services and attributes	Assessment of Reserve Determinations & updated Present Ecological State (PES) information to describe ecological water requirements per hydro node	First draft report
Step 4:	Determine an ecologically sustainable base configuration		
Step 5:	Evaluate scenarios within the integrated water resource management process		
Step 6:	Evaluate the scenarios with stakeholders; and		
Step 7:	Gazette and implement the class configuration.		

The following activities were undertaken during Status Quo assessment in the Vaal WMA:

4.1. DELINEATION OF THE INTEGRATED UNITS OF ANALYSIS

The identification and selection of the Integrated Units of Analysis (IUAs) were based on the following considerations:

- The resolution of the hydrological analysis and available water resource network

configurations currently being modelled.

- Location of significant water resource infrastructure.
- Distinctive functions of the catchments in context of the larger system.
- Available budget for refinement of the existing network and undertaking scenario analysis of each IUA.
- The biophysical nodes and the Present Ecological State (PES) and Recommended Ecological Category (REC) for each node were also considered.

It has been recognised that the characteristics of individual small tributaries can significantly differ from the larger rivers and may warrant a different management class. It was therefore proposed in the Inception Report that a practical qualitative evaluation method be applied where necessary, which only considers the ecological aspects as well as likely implications on goods and services in a qualitative manner.

As already described in the approach to select biophysical nodes, the results (where available) of the current PES and Environmental Importance-Environmental Sensitivity (EI-ES) would also have contributed largely to the delineation of the IUA as the proportions of the different Ecological Categories for all the river reaches could play a vital role in the delineation.

4.2. PROCESS TO DETERMINE THE ECOLOGICAL WATER REQUIREMENTS

EcoClassification includes a range of analysis relevant to EWR sites and nodes. Relevant to this report is the identification of the Present Ecological State (PES) and the reasons for the PES which in essence provides the ecological status quo of the catchment. Additional analysis was undertaken to assess the Ecological, Socio-Cultural and Environmental Importance. This information, as well as considering the PES and the reasons for the PES, provides guidance to derive the Recommended Ecological Category which is set either to maintain or improve the PES.

The EWR sites were assessed during the recent and historic Reserve studies and the EcoClassification Level 4 method was used. A current ongoing DWA/WRC PES and Ecological Importance-Ecological Sensitivity also provided some useful information specifically regarding the sub-quaternary (SQ) reaches of extensive river coverage of the

area. All the information generated during the assessment is available in Excel spreadsheets.

4.3. SOCIO-ECONOMIC ASSESSMENT

The economic modelling systems used are the Water Impact Model (WIM) as well as the Production Industry Model (PIM), based on the SAFRIM model, to make it more WMA friendly. All three of the models are underpinned by a Social Accounting Matrix (SAM) to determine the different economic impacts on the applicable IUAs.

4.4. PROCESS TO DETERMINE THE GOODS & SERVICES STATUS QUO

Information on the Goods and Services (G&S) of the Vaal River is available and has been used as a basis for this purpose. It should be noted that the objective in describing and valuing the use of aquatic ecosystems is to determine the way in which aquatic ecosystems are currently being used in each socio-economic zone, and to estimate the value generated by that use. This provides the baseline against which the socio-economic and ecological implications of different catchment configuration scenarios can be compared. The most important Goods and Services associated with the overall system and likely to be impacted by changes in operational and management scenarios are the following:

- Recreational fishing
- Subsistence fishing
- Other recreational aspects associated with the rivers
- Riparian vegetation usage
- Waste water dilutions
- Floodplain agricultural usage of subsistence purposes.

Furthermore, each quaternary catchment of the Vaal has been examined in detail via the analysis of Socio-Cultural Importance. The Socio-Cultural Importance (SCI) was determined from:

- A site visit that covered points along the river, and
- extrapolation to sites not visited by reference to available literature as well as to exiting mapping.

4.5. ECOLOGICAL STATUS

Two of the major impacts dominating the Vaal Catchment are water quality impacts and changes in the flow regime. Changes in the flow regime range from too little flow but the most severe impacts are from too much flow and changes in seasonality which mainly relate to transfers, releases, irrigation return flows, mining and urban runoff.

Areas of highest water quality impact across the Vaal River catchments are as follows:

- *Rietspruit (C1Riet-Amers): The quality is a D category, largely due to extensive agricultural activities with highly elevated nutrients and salts.*
- *The condition of the lower Klip River (north-west flowing Klip River) catchment is poor, with sites ranging from a D to a D/E category. The main landuse is still agriculture, although there are discharges around certain urban areas (e.g. Vrede) which reduce the water quality category.*
- *Rietspruit and Klip rivers (Gauteng) - Note that the water quality state of this portion of the Upper Vaal catchment is severely impacted and improvements in present state cannot occur without addressing water quality related problems, e.g. through implementation of the Integrated Water Quality Management Plan set up for the Vaal (DWAF, 2009).*
- *Lower Suikerbosrand and Blesbokspruit – The quality of the Suikerbosrand River is driven by the poor quality of the Blesbokspruit River. Impacts include mine water decants, diffuse runoff, urban runoff and point source discharges.*
- *Waterval catchment - Landuse in the upper part of the catchment includes agricultural activities; Sasol petrochemical industry; Secunda town; coal mining in the Bethal to Secunda area (C11 and C12 tertiary catchments); and gold mining in the upper Waterval catchment. Impacts include elevated salts and nutrients, particularly phosphate. Some irrigation takes place in the lower part of the catchment, with issues related to elevated salts and nutrients, particularly phosphate. Water quality is poor across the area (D category) due to impacts of Sasol and Secunda and pivot irrigation.*

- *EWR 5 downstream of the Vaal Barrage – The salinity and nutrient impacts from the Klip, Riet, Suikerbosrand and Waterval rivers are combined in the Vaal Barrage and released downstream to this site on the Vaal River.*
- *The impact of Grootvlei Mine results in water quality deterioration to a D on the Molspruit tributary of the Vaal River.*
- *Mooi River (Upper Vaal catchment) - The main impact in the area is the uranium-laden effluent from the Wonderfonteinspruit. Impacts across the area are due to agricultural activities, urban runoff and the discharge of mining effluent.*
- *Middle Vaal River: EWR 12 at Vermaasdrift – Elevated nutrients and salts contribute to the poor water quality state.*
- *Tributaries of the Middle Vaal - Water quality is poor across this area, i.e. a D/E on the Koekemoerspruit to an E category elsewhere. Impacts are largely due to agriculture and urban / mining impacts. The Schoonspruit also runs through the urban areas of Klerksdorp and Kanana as well as the gold mining impacted areas (AngloGold Ashanti Vaal River Operations and Harmony).*
- *Vaal River (EWR 13) downstream of the Schoonspruit, Koekemoerspruit, Renoster and Vierfonteinspruit confluences in the Middle Vaal catchment.*
- *Lower Sand catchment - Water quality in the area is worst where mining impacts around Welkom and Virginia dominate. Here water quality is assumed to be a D category.*
- *Harts River (EWR 17 at Lloyds weir) – High salt and toxic concentrations due to agriculture and diamond mining impacts.*
- *Riet River – Impacts are high salts and high nutrient levels.*

Due to the economic importance of this area and the important role the Vaal System plays in conveying and supplying the water resource to this economic hub, it is understandable that most of the system is in a C Ecological Category (EC) or poorer condition.

The biophysical nodes that scored a high Environmental Importance are listed in ***Table 1*** *below.*

***Table 1*: Summary of the desktop biophysical nodes and EWR sites with a High Environmental Importance**

IUA	VC node	SQ reach	PES	FLOW RELATED	NON FLOW RELATED	EIS	EI	REC
UV-A	8VF5	C11A-01460	B/C		Yes	MODERATE	HIGH	B
UV-A	EWR 1	C11J-01838	B/C	Yes	Yes	HIGH	HIGH	B/C
UV-B	UV Uklip	C13C-02550	B		Yes	HIGH	HIGH	B
UV-B	C13C	C13D-	B/C		Yes	HIGH	HIGH	B

IUA	VC node	SQ reach	PES	FLOW RELATED	NON FLOW RELATED	EIS	EI	REC
		02416						
UV-B	C1KLIP-UNSPE1	C13D-02284	B/C	Yes	Yes	MODERATE	HIGH	B
UV-B	C13E	C13E-02228	B/C	Yes	Yes	MODERATE	HIGH	B
UV-C1	EWR 7	C81A-02790	A/B		Yes	HIGH	HIGH	A/B
UV-C1	8WF1	C81A-02790	B		Yes	MODERATE	HIGH	B
UV-C1	UV25	C81L-02594	B		Yes	MODERATE	HIGH	B
UV-C2	GG	C81G-02882	B		Yes	MODERATE	HIGH	B
UV-D	VC16	C83G-02364	B/C		Yes	MODERATE	HIGH	B
UV-D	VC17	C23H-02395	B/C		Yes	MODERATE	HIGH	B
UV-H	C21A	C12A-01567	B/C	Yes	Yes	MODERATE	HIGH	B
UV-H	EWR 9	C21C-01675	C	Yes	Yes	HIGH	HIGH	B/C
UV M	EWR 4	C22F-01737	C	Yes	Yes	HIGH	HIGH	B/C
UV M	EWR 5	C22L-01792	C/D	Yes	Yes	HIGH	HIGH	C
LV A4	VC59	C91D-02838	A/B		Yes	Yes	HIGH	A/B
LV B	VC60	C91D-02838	A/B		Yes	Yes	HIGH	A/B

As can be seen from **Table 1**, most of the High Environmental Importance (EI) nodes lie in the Upper Vaal, none in the Middle Vaal and two ephemeral small river reaches within the Lower Vaal. Apart from EWR 4, 5, and 9, all these sites are in a reasonable to good PES and the majority of those in a B/C EC (that should improve to a B EC) will require non-flow related intervention to achieve the required improvements.

In summary, the following can be noted:

- Some of the biggest water quality problems in South Africa occur within the study area.
- Many areas in the Vaal System (especially the Upper Vaal) are dominated by more flow than the natural flow regime (elevated flows).
- Although this river system is so heavily utilised (generally in a C category or worse condition) some features warrant protection and improvements are required where at all possible.
- The Vaal River is one of the few large rivers in South Africa; this fact on its own

makes the Vaal River important.

- Protection of the Vredefort Dome. The Vaal River is a key feature within the Vredefort Dome especially around the town of Parys. Water quality issues are a serious concern – especially from the human use perspective and all the recreational activities.
- The presence of the Red Data listed Barbus kimberleynsis (yellow fish) and various riparian vegetation species.
- Endangered bird species are found within the study area, especially in upper reaches of Vaal and Wilge river catchments which are dominated by oxbows and wetland features.
- Seekoeivlei RAMSAR wetland in the Klip River.
- Blesbokspruit RAMSAR wetland in the Blesbokspruit.
- Barbers- and Leeu Pans RAMSAR Convention accredited wetland in the Harts River catchment.
- Wolwespruit Provincial (North West Province) Nature Reserve which includes the Vaal River.

All of the above-mentioned features result in an extremely complicated set of challenges to be dealt with in the Vaal Catchment

5. STAKEHOLDER ENGAGEMENT

The identification of key stakeholders is an on-going process and it will be refined throughout the process as on the ground understanding of affected stakeholders improve throughout interaction with various stakeholders in the three Vaal WMA. Identification of key stakeholders was done in collaboration with DWA, PSP and stakeholders in the study area.

- The first PSC meeting was held on 22 February 2011
- The second PSC meeting will be held on the **10 November 2011 at DWA, Head Office.**

6. CAPACITY BUILDING

The study team through the execution of work, is facilitating knowledge sharing to capacitate identified DWA officials. The Capacity Building activities involve demonstrations, training instructions with practical applications of processes and supervision of tasks.

7. PROJECT INFORMATION

The information documents are available in the Departmental web site: *http://www.dwa.gov.za/rdm/WRCS/default.aspx*

- Inception report
- Background information document
- Newsletter
- Status Quo report

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