1   JBS13 (EWR 12: VERMAASDRIFT (VAAL RIVER))

The information is summarised from DWA (2009a, b; 2010b).

1.1   SITE DESCRIPTION

For the purposes of the EWR study, the Vaal River from the start of WMA 9 at Vermaasdrift on Vaal River to Bloemhof Dam was delineated into four Management Resource Units (MRU Vaal F – J) (DWA, 2009b). EWR 12 falls within MRU Vaal F which is the delineated reach from the start of WMA 9 at Vermaasdrift on Vaal River to just upstream of the Schoonspruit River. This reach is important to understand the influence of the Upper Vaal WMA as it is just downstream of the Upper Vaal WMA (downstream of the Mooi River confluence).

EWR 12 is situated downstream of Parys and upstream of the confluence with the Koekemoerspruit at Vermaasdrift on the main stem of the Vaal River. The site is a single thread straight channel with a flat bed which is alluvial controlled. A fixed boulder floor with sand dominates the reach. Fish habitat is well represented at site as well as flow-depth categories and cover. Macroinvertebrate survey habitat availability is moderate at EWR 12 and is not a limiting factor of macroinvertebrate diversity. The site is not ideal for vegetation assessment as vegetation in the area has been disturbed by the construction of the bridge at Vermaasdrif and is not representative of the vegetation along this reach of the Vaal River.

Location	EWR 12 Vermaasdrift	Altitude	1348 m
Longitude	26.85025	Latitude	-26.93615
EcoRegion	Highveld 11.01	Quaternary catchment	C24A
Water Management Area	Middle Vaal River	Geomorphological zone	Lower Foothills

EWR 12, Vermaasdrift

1.2   PRESENT ECOLOGICAL STATE (PES)

Geom	Wet season baseflows and small and moderate floods have been reduced from natural within this

		reach, whilst dry season baseflows are elevated. This has degraded the in-channel condition of the river through reduced scour and bed activation events. Large dams far upstream have also likely reduced some of the sediment supply, but large tributaries do reinstate some of this. Elevated salinity also helps reduce sediment loads by encouraging flocculation.
WQ		The present state is based on data collected from C2H018. The data indicated that the nutrients are stable with slightly higher salts (EC) and sulphates. The system is driven by DO (oxygen fluctuations due to releases) all year round. This increases turbidity, pH, temperature and toxicants. Large algal diversity on the rocks, traps suspended solids (sedimentation) and decreases turbidity.
Fish		The EC of D at site EWR 12 can be ascribed to the absence of 4 expected species namely *A. sclateri*, *B. anoplus*, *L. umbratus* and *T. sparrmanii* from the observed fish assemblage. The introduced species, G. affinis occurred at this site.
Inverts		Sep 07: SASS5 score: 106 No of Taxa: 21 ASPT: 5 Apr 08: SASS5 score: 76 No of Taxa: 19 ASPT: 4 The assemblage is characterised by tolerant taxa.
Rip veg		The Vaal river system (particularly the section falling within the Highveld Alluvial vegetation type) is highly degraded, due to the introduction of exotic species and other anthropogenic impacts. The area is currently considerably degraded due to the introduction of a number of exotic species. The exotic species in the area, in fact, contribute to a total of almost 50% of the total number of species identified during the surveys. Furthermore, the lack of stochastic events, such as fire and flooding, are causing homogenization of the riparian vegetation.
Diatoms		Diatom results are based on a sample taken during 2007 and a 12 month data set taken during 2002-2003. The Ecological Category (EC) was a D, mainly to high nutrient and organic loading. The 2002-2003 data indicated continual pollution and during the survey the diatoms remained in a D EC for 10 of the 12 months.

1.3   MAIN IMPACTS AT THE SITE

	PES	Causes	Sources	F/NF
WQ	D/E	High salts.	Mining impacts.	F
		High nutrients.	Waste Water Treatment Works (WWTW) discharge.	
Geom	C/D	Decreased intra-annual floods and high flow events.	Operation of the system.	F
Rip veg	C	Terrestrial exotic invasive species.	Anthropogenic.	NF
		Aquatic exotic invasive species.	Anthropogenic.	F
Fish	D	Non availability of specific habitat cover units due to the explosive growth of invasive aquatic macrophytes.	Primarily due to WWTW.	NF
		Lack of access to upstream river reaches for fish species with this migratory requirement	Gauging weirs without fish ladders.	
		Lack of suitable refugia in tributaries. Available tributaries all highly impacted – Mooi River and Koekemoerspruit.	Mining, WWTW.	
Inverts	C/D	Poor water quality.	Mine effluent, agriculture run off and waste water treatment works.	NF
		Poor habitat availability.	Due to algal blooming due to eutrophication.	F

1.4

1.5 RESULTS: PRESENT ECOLOGICAL STATE

Driver Components	PES	Trend
GEOMORPHOLOGY	C/D	Stable
WATER QUALITY	D/E	Stable
DIATOMS	D	
Response Components	PES	Trend
FISH	D	Stable
MACRO INVERTEBRATES	C/D	Stable
INSTREAM	C/D	
RIPARIAN VEGETATION	C	Negative
ECOSTATUS	D	

The main reasons for the PES are altered flow regime and deteriorated water quality. Due to the Vaal Dam and Vaal Barrage upstream of the site the altered flow regime has resulted in increased winter base flows in the Middle Vaal River and reduced flood peaks in summer. Poor water quality impacts biota and habitat availability. Exotic riparian vegetation species also have an impact.

1.6 SUITABILITY AS FUTURE BIOMONITORING SITE

The site is adequate for biotic monitoring and important to understand the influence of the Upper Vaal WMA. The Vaal River up to Schoonspruit is highly regulated due to releases made from Vaal Dam and Vaal Barrage and this along with impaired water quality from WWTW and abstraction for mining and irrigation the PES is a D at this site. Tributaries occurring within this reach are also impacted by anthropogenic activities and therefore play a diminished role as refugia. Due to elevated flows habitat availability may not always be conducive to aquatic monitoring and therefore future monitoring should occur at lower flows when all habitats are available.