

# 1 JBS14 (OSAEH 11.1: WOLWESPRUIT (VAAL RIVER) – OSAEH 11.5)

## 1.1 SITE DESCRIPTION

This site is situated in the Wolwespruit Nature Reserve, on the Vaal River main stem. The river is approximately 100 m wide with small, vegetated islands which provide diverse marginal vegetation. The site has extensive cobble beds for sampling purposes; however dense benthic algal growth is present on the cobbles. There is a good diversity of instream habitats present. The sampling site is situated approximately 128 km upstream of Bloemhof Dam. The river channel is scoured locally as a result of upstream impoundments.

From Google imagery it was determined that the originally proposed site had limited instream habitat available for sampling purposes, hence the Wolwespruit site was selected as an appropriate monitoring site for this project. This new site in the Wolwespruit Nature Reserve provides unique/different habitat types when compared to the originally proposed site. Furthermore, the land use impact within the Nature Reserve is less than outside the Reserve which is that of agricultural use.

<b>Location</b>	Wolwespruit Nature Reserve	<b>Altitude</b>	1242 m
<b>Longitude</b>	26°19'48.1"	<b>Latitude</b>	27°24'06.2"
<b>EcoRegion</b>	Highveld 11.08	<b>Quaternary catchment</b>	C24J
<b>Water Management Area</b>	Middle Vaal	<b>Geomorphological zone</b>	Lowland River
			
Site OSAEH 11.1 indicating extensive runs over mainly cobble substrate.			

## 1.2 SAMPLING CONDITIONS

The site, at the time of sampling, was dominated by extensive instream runs, with dense algal growth occurring on the substratum. Marginal vegetation was of excellent quality and quantity, with limited stones out of current biotope present. The substratum was mostly cobbles, gravel and sand, with some boulders present.

## 1.3 PRESENT ECOLOGICAL STATE

<b>IIIH</b>	The Instream Index of Habitat Integrity (IHI) was rated a C/D (59.5%). This is mostly due to changes in water quality as a result of extensive cultivation as well as urban and mining runoff in upstream tributaries. The hydrology has also changed significantly due to upstream inundation and flow modification.
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<b>RIHI</b>	The Riparian Index of Habitat Integrity (RIHI) is a C (68.5%) with the main impacts being substrate exposure due to extensive cultivation and diamond mining as well as the presence of exotic vegetation.
<b>Fish</b>	Seven of the ten expected fish species were collected at this site during the recent survey within this Resource Unit (RU) suggesting that the FROC of some species have been reduced from reference conditions. Alien and invasive species such as <i>Ctenopharyngodon idella</i> and <i>C. carpio</i> and were notably abundant at the site. <i>L. aeneus</i> were notably less abundant than <i>C. carpio</i> at this site probably as a result of habitat deterioration (benthic algae and sedimentation). Based on their abundance, the FROC of smaller species such as <i>B. trimaculatus</i> , <i>B. paludinosus</i> and <i>P. philander</i> at this site was rated to be close to reference and can be contributed to plentiful marginal vegetation and slightly turbid waters, providing suitable cover. Although <i>T sparrmanii</i> , <i>L umbratus</i> and <i>L. kimberleyensis</i> was not collected at this site during the present survey, it is probable that these species are still present at the site. The FRAI model rates the Present Ecological State for fish as a Class C (64.5%).
<b>Inverts</b>	Oct 2010: SASS5 score: 110 No of Taxa: 19 ASPT: 5.8  Key taxa expected but not observed were generally those that are sensitive to water quality changes, such as Perlidae and Heptageniidae. The dense algal growth has a negative impact on the instream habitat available for macroinvertebrate colonization and can be seen in the high rating for the cobble habitat (3.5). Taxa expected but not observed in this biotope include Aeshnidae, Ecnomidae, Libellulidae and Psephenidae. Tricorythidae were more abundant than expected, while Atyidae, Coenagrionidae and Hydrophilidae were less abundant than expected. The MIRAI model generates a Present Ecological State for macroinvertebrates as a Category C (65.9%).
<b>Rip veg</b>	The main impacts are substrate exposure due to overgrazing, trampling and the presence of exotic vegetation. An easy distinction can be made between marginal and non-marginal riparian vegetation. The marginal zone exhibits relatively good vegetation cover. The site is dominated by exotic pioneer species mainly in the marginal zone. Bank slumping and undercutting is prevalent, whilst the slope of the non-marginal zone is steep. Agricultural activities present adjacent to the left bank.
<b>Diatoms</b>	The SPI score at this site was 11.7, a C EC. The community indicated fairly high oxygen saturation with elevated levels of organically bound nitrogen. Organic pollution levels are low and overall the site is moderately polluted.

#### 1.4 MAIN IMPACTS AT THE SITE

	PES	Causes	Sources	F/NF
<b>Rip veg</b>	C	Vegetation removal.	Trampling/grazing by game/cattle and some fishermen activity.	NF
		Exotic invasion.	<i>S. babylonica</i> , <i>G. triacanthos</i> , and <i>Eucalyptus</i> sp., and dominant non-woody weeds.	
		Bank undercutting and scouring	Substrate of site consists out of sand and alluvial material. Due to dynamics of aggradation and degradation habitat change is constant. Bank instability and the impact of trampling and exotic vegetation among others, contribute towards bank erosion.	F
<b>Fish</b>	C	Loss of habitat diversity as a result of flow modification.	Inundation upstream and flow modification.	F
		Decreased water quality affect species with requirement for high water quality.	Increased nutrients, sediments and toxins from urban areas diamond and gold mines and agricultural areas.	NF
		Increased turbidity and disturbed bottom substrates.	Erosion and presence of bottom feeding alien ( <i>C. carpio</i> ).	
		Presence of migration barriers reduces migration success (breeding, feeding and dispersal) of some species.	Major upstream and downstream dams as well as weirs.	
<b>Inverts</b>	C	Loss of habitat diversity.	Inundation upstream and flow modification.	F
		Water quality and associated benthic growth of algae.	Agriculture, mining and urbanization.	NF



## 1.5 BASELINE SURVEY RESULTS: PRESENT ECOLOGICAL STATE

Driver Components	PES	Trend
IHI: INSTREAM	C/D	
IHI: RIPARIAN	C	
DIATOMS (WQ)	C	
Response Components	PES	Trend
FISH	C	Stable
MACRO INVERTEBRATES	C	Stable
INSTREAM	C	
RIPARIAN VEGETATION	C	Stable
<b>ECOSTATUS</b>	<b>C</b>	

The PES EcoStatus for this site is a category C. Reasons for this include flow modification due to major dams and weirs upstream and downstream of the site which impact negatively on the available instream habitat. Increased nutrients, sediments and toxins from mining, urban and agricultural areas with a resultant decrease in instream habitat integrity is also a main reason for the overall condition of the site. Erosion, presence of exotic vegetation, vegetation removal, bank undercutting, scouring and instream migration barriers such as dams and weirs, impact negatively on the site, thus decreasing the ecological integrity of the site.

## 1.6 SUITABILITY AS FUTURE BIOMONITORING SITE

Good habitat diversity is available at the site for SASS sampling, including excellent quantity of cobble biotope, excellent quantity and quality of marginal vegetation, limited SOOC biotope available and good GSM biotope present. A fair diversity of velocities was present. The site has few localised impacts due to the fact that it is situated in the Wolwespruit Nature Reserve.

The site is easily accessible with wadeable areas. For fish sampling there is abundant fast, deep habitat available, providing good cover for larger species, as well as diverse substratum providing good cover for all fish species. An abundance of undercut banks and overhanging vegetation provides suitable habitat for small fish species. The substratum is slightly embedded with sediments.

**Access** to the site is gained via entry into the Wolwespruit Nature Reserve. The site is easily accessible once in the Reserve.

