1 JBS16 (OSAEH 11.4: SCHOONSPRUIT)

1.1 SITE DESCRIPTION

The sampling site is situated in the Schoonspruit approximately 10 km upstream of its confluence with the Vaal River and falls within MRU Schoonspruit D according to DWA (2009b). The only significant change that occurs along these lower reaches below the Klerkskraal Dam is an increase in urban/built up areas and therefore an increase in return flows from these areas into the Schoonspruit. The substratum at the site was covered with benthic algae indicating the presence of excessive nutrients entering the system. The marginal vegetation is very well developed as a result of the available nutrients. Watercress (*Rorippa nasturtium-aquaticum*) was abundant, indicating excessive nutrients entering the system. Due to the dense algal mats present on the cobbles, macroinvertebrate colonization of this substrate is restricted. There was abundant, diverse marginal vegetation present. GSM and SOOC biotopes were also present.

Location	Schoonspruit	**Altitude**	1291 m
Longitude	26.6653	**Latitude**	-26.9333
EcoRegion	Highveld 11.01	**Quaternary catchment**	C24H
Water Management Area	Middle Vaal	**Geomorphological zone**	Lowland River

Site OSAEH 11.4 indicating a riffle section as well as dense algal growth on the substratum.

1.2 SAMPLING CONDITIONS

At the time of sampling, moderate flow was present at the site. The site consisted of pool sections, interspersed with riffle sections. Marginal vegetation was of excellent quality and quantity. The substratum was mostly cobbles, with gravel, sand and mud also present. Some bedrock was also present. Dense algal growth was present on the substratum. Adequate SOOC biotope was also present for sampling purposes.

1.3 PRESENT ECOLOGICAL STATE

IIHI	The Instream Index of Habitat Integrity (IHI) was rated a D (59.5%). This is mostly due to changes in water quality as a result of extensive urban and mining runoff as well as cultivation. The hydrology has probably changed significantly due urban runoff and hardened surfaces.
RIHI	The Riparian Index of Habitat Integrity (RIHI) is a C/D (61.3%) with the main impacts being increased flow peaks from extensive hardened, the presence of exotic vegetation and riparian encroachment due to increased nutrients.
Fish	Four of the ten expected fish species were collected within this Resource Unit (RU) during the present survey suggesting that the FROC of some species have been reduced from reference conditions.

	Based on their abundance, the FROC of smaller species such as *Barbus trimaculatus*, *B. paludinosus* and *P. philander* 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 *T sparrmanii, L umbratus and L. kimberleyensis* 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%).
Inverts	Oct 2010: SASS5 score: 47 No of Taxa: 13 ASPT: 3.6 Key taxa expected but not observed were generally those that are sensitive to water quality changes, such as Perlidae, Hydropsychidae >2spp. and Heptageniidae. Hirudinea, Dytiscidae, Planorbinae, and Oligochaeta were more abundant than expected, while Nepidae and Coenagrionidae were less abundant than expected. The MIRAI model generates a Present Ecological State for macroinvertebrates as a Category C (67.8%).
Rip veg	The RIHI is a C (68.3%) with the main impacts being burning regime, trampling and the presence of exotic vegetation.
Diatoms	The biological water quality at this site was poor with a SPI score of 4.9. This relates to a EC of a D/E. Oxygen saturation was low, and organically bound nitrogen levels were continuously elevated indicating that nutrient loading is problematic at this site. Organic pollution levels were elevated indicating that organics may be problematic at times.

1.4 MAIN IMPACTS AT THE SITE

	PES	Causes	Sources	F/NF
Rip veg	C	Terrestrialisation.	Burning regime out of control. Annual burns enhance the encroachment of terrestrial species into the riparian zone.	NF
		Exotic invasion.	*Salix babylonica, Gleditsia triacanthos,* and *Eucalyptus* sp., and non-woody weeds.	
		Water quality.	Mining, chicken farms, non-point pollution, etc.	F
Fish	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 (*C. carpio*).	
		Presence of migration barriers reduces migration success (breeding, feeding and dispersal) of some species.	Major upstream and downstream dams as well as weirs.	
Inverts	C	Flow modification.	Agriculture.	F
		Water quality and associated benthic growth.	Agriculture, settlements and urbanization.	NF

1.5 BASELINE SURVEY RESULTS: PRESENT ECOLOGICAL STATE

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

The PES is a category C. Reasons for this include flow modification with a resultant decrease in the instream habitat integrity. Increased nutrients, sediments and toxins from diamond and gold mining in the catchment, urban and agricultural areas, impact negatively on the site with a resultant decrease in instream habitat integrity. Erosion, presence of exotic vegetation and instream migration barriers such as dams and weirs also decrease the ecological integrity of the site.

1.6 SITE SUITABILITY

Habitat diversity is fair with a good quantity of cobbles present. However due to the dense benthic algal growth, macroinvertebrate colonization is restricted. Good quantity and quality of marginal vegetation is available for sampling. The site is easily accessible with wadeable areas. An abundance of undercut banks and marginal and/or overhanging vegetation provides suitable habitat for small fish species. The substratum is slightly embedded with sediments. A low diversity of flow velocities is present and is dominated by a slow shallow habitat for fish species. The marginal riparian zone has relatively good vegetation cover, with good species diversity. No erosion is present at the site. Exotic riparian vegetation species are present within the narrow riparian zone.

Access to the site is not problematic.