

# **DWS (DW781) FRESHWATER ECOLOGICAL INFORMATION**

## **PROPOSED HOUSING PROJECT ON ERVEN 10866 and 11008 IDAS VALLEY, STELLENBOSCH**


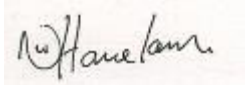
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**November 2014**

## PROJECT DETAILS

		<b>Title:</b> <b>PROPOSED HOUSING PROJECT  ON ERVEN 10866 and 11008  IDAS VALLEY, STELLENBOSCH</b>		
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## **THE CONDITION AND FUNCTIONING OF RIVERS AND WETLANDS IN TERMS OF POSSIBLE CHANGES TO THE CHANNEL, FLOW REGIME AND NATURALLY-OCCURRING RIPARIAN VEGETATION.**

### **General Description of the Catchment**

Two non-perennial rivers are in close proximity to the proposed development. Both non-perennial rivers are tributaries of the Kromme River.

The one non-perennial river on the eastern edge of the development rises in the foothills of the Simonsberg Mountains and flows from north to south on the western edge of Lindida, Idas Valley area of Stellenbosch. The non-perennial river rises at 222m above mean sea level and runs for 1.2km before it reaches the property at 168m above mean sea level.

The other non-perennial tributary rises in the Hottentots Holland mountains and runs through Idas Valley and forms the southern boundary of the proposed development. This river on the southern boundary will not be affected by the proposed development. The development infrastructure, although within 100m of the river, will be developed outside the flood line. The development will therefore not affect the flow or ecological functioning of this river.

However, the non-perennial river that runs from north to south through the eastern section of the development will be affected. There is already a road across this river. This road crossing will be upgraded and used to access the development.

This non-perennial river is defined by a deep narrow channel which is blocked at the road crossing before it meets up with the tributary on the southern boundary. This non-perennial river has a defined channel on the northern and southern edge of the property. However, the middle section of the river is silted up and overgrown with kikuyu grass. This resulted in the river overflowing its banks and running through the proposed development area in winter. It is recommended that the silt be removed and the channel redefined and that the silt that is removed be used to construct a berm to restore the river flow inside the defined river channel.

The National Water Act (Act 36 of 1998) provides for formal structures and processes for integrated water resource management at a catchment and local level, through the establishment of catchment management agencies, with strong user representation. These agencies provide a forum for government authorities and stakeholders to work towards a consensus on the management and development objectives for a catchment, which plays an important role in integrating land-use and water management. The non-perennial river is one of the catchment forums that were established in the Berg River Water Management Area ("WMA").

In general, the non-perennial rivers are impacted upon and in a poor ecological state. The flow regime of the one non-perennial river on the eastern boundary is heavily

affected where the road crosses the river and where silt build-up has occurred. The localised impacts where the river runs through the town have reduced the ecological integrity of the river. These include construction of roads and infrastructure crossings that cause sedimentation and reduced water flow.

Freshwater Ecosystem Priority Areas (FEPAs) are identified strategic spatial priorities for conserving South Africa's freshwater ecosystems and supporting sustainable use of water resources. The receiving environment where the development is proposed is not located within a FEPA and associated sub-quaternary catchment area.

The non-perennial rivers are a designated sensitive area, namely an Ecological Support Area (ESA). The conservation objective for this ESA here is to maintain the ecological processes.

### **Relevance of National Spatial Biodiversity Assessment**

The river component of the National Spatial Biodiversity Assessment was based on a broad scale assessment of aquatic habitat condition undertaken in the National Freshwater Biodiversity Initiative. The assessment found that of South Africa's 120 river signatures, 82% are threatened, 44% are critically endangered, 27% are endangered, 11% are vulnerable, 18% are least threatened. In general, river ecosystems are in a much poorer state than terrestrial ecosystems and therefore require more attention.

The Eerste River, into which the Kromme River and this non-perennial tributary of the Kromme River flow, was classified as having a critically endangered status in National Spatial Biodiversity Assessment due to the moderately modified state of the river. Based on the assessment methodology used in National Spatial Biodiversity Assessment, this non-perennial river has, in this assessment, been classified as critically endangered.

### **Fresh Water Species**

No endangered species are known to occur in this non-perennial river and it is unlikely that any fish species will occur in this section of the river as the river is completely dry during periods of the year.

### **Ecological Classification of the Stream**

In order to assess the condition, ecological importance and sensitivity of the stream, it is necessary to understand how the stream might have appeared prior to any impacting conditions. This is achieved by classifying rivers according to their ecological characteristics, in order that they can be compared to ecologically similar rivers. Fortunately there are examples available of similar rivers in a natural state.

River typing or classification involves the hierarchical grouping of rivers into ecologically similar units so that inter- and intra-river variation in factors that influence water

chemistry, channel type, substratum composition and hydrology are best accounted for. Any comparative assessment of river condition should only be done between rivers that share similar physical and biological characteristics under natural conditions.

Thus, the classification of rivers provides the basis for assessing river condition to allow comparison between similar river types. The primary classification of rivers is a division into eco regions. Rivers within an eco-region are further divided into sub-regions. Eco regions group rivers within South Africa that share similar physiography, climate, geology, soils and potential natural vegetation. For the purposes of this study, the eco regional classification presented in DWAF (1999), which divides the country's rivers into 18 eco regions, was used.

Sub-regions (or geomorphological zones) are groups of rivers or segments of rivers, within an eco-region, which share similar geomorphological features, of which gradient is the most important. The use of geomorphological features is based on the assumption that these are a major factor in the determination of the distribution of the biota.

**Eco region:**

South Western Coastal Belt

**Geology:**

Table Mountain Group (quartzitic sandstone), Cape Granite, Malmesbury Group (shale) and sandy sediments

**Mean annual Precipitation:**

Less than 907mm

**WHAT IS RIVER HEALTH?**

Healthy rivers provide goods and services (water supply, breakdown of pollutants, conservation, flood attenuation, natural products, recreation and spiritual rituals) which contribute to human welfare and economic growth. When people use rivers, they impact on river health. The National River Health Programme assesses the health of rivers by measuring selected ecological indicator groups that represent the condition of the larger ecosystem. The data are simplified and represented as indices.

**Table 1:** River Health Rating Methodology Index.

River Health Category	Ecological Perspective	Management Perspective
Natural (N)	No or negligible modification from natural	Relatively little human impact
Good (G)	Biodiversity and integrity largely intact	Some human-related disturbance but ecosystems essentially in good state

Fair (F)	Sensitive species may be lost; tolerant or opportunistic species dominate	Multiple disturbances associated with the need for socio-economic development
Poor (P)	Mostly tolerant species; alien invasion, disrupted population dynamics; organisms often diseased	High human densities or extensive resource exploitation
Unacceptable (U)	Critical modification; almost complete loss of natural habitat & species; severe alien invasion	Very high human density/resource exploitation
* The “unacceptable” river health category was introduced in this report to reflect the status and trends of degraded urban rivers		

### **INDEX OF HABITAT INTEGRITY (IHI)**

The availability and diversity of habitats are major determinants of what aquatic biota is present. The IHI assesses the impact of human disturbance on the riparian and in stream habitats.

### **RIPARIAN VEGETATION INDEX (RVI)**

Healthy riparian zones help to maintain the form of river channels and serve as filters for sediment, nutrients and light. Plant material from the riparian zone is an important source of food for aquatic fauna. RVI is a measure of modification of riparian vegetation from its natural state.

### **FISH INDEX (FI)**

Fish are good indicators of long-term influences on general habitat conditions within a reach. The FI is an expression of the degree to which a fish assemblage deviates from its undisturbed condition.

### **SOUTH AFRICAN SCORING SYSTEM (SASS)**

Aquatic invertebrates (e.g. insects) require specific aquatic habitats and water quality conditions. They are good indicators of recent localised conditions in a river. SASS is a relatively simple index, based on invertebrate families found at a site. Take note that SASS5 cannot be done for non-perennial rivers. However, a sample can be taken during river flow and the aquatic invertebrates collected can be used to determine river health to an extent. This can then be used as a base line for future monitoring.

### **WATER QUALITY**

Water quality indicates the suitability of water for aquatic ecosystems. This assessment is based on the total phosphate, total nitrogen, and ammonia and dissolved oxygen measured in water samples from each sampling site.

The River Health Assessment for this non-perennial river was not done in the Greater Cape Town’s Rivers (2005) assessment. An assessment based on the River Health

Assessment methodology was done for the general ecological state and River Health of the Kromme River. Below are the results of the applicable aspects of the River Health Assessment:

### **The non-perennial tributaries and the Kromme River**

**Index of Habitat Integrity: Fair in the upper reaches and Poor in the lower reaches where the river flows through urban and agricultural areas**

**Riparian Vegetation Index: Poor**

**South African Scoring System: Fair**

Take note that SASS5 was done on the Kromme River which is a perennial river. It could not be done for the non-perennial river.

Hydrology is a major factor controlling the structure and function of river ecosystems. In contrast to perennial rivers, temporary rivers have periods where surface flow ceases resulting in a highly variable flow regime. A comparison among macro invertebrate sensitivity in perennial, ephemeral and seasonal rivers indicated that ephemeral rivers had a higher proportion of insensitive taxa. Variable and limited habitats, dominance by generalist taxa and variable flow/no-flow periods impeded the application of SASS and MIRAI (macro invertebrate response assessment index) to temporary rivers.

Invertebrates that either lack desiccation-tolerant stages or are poor re-colonists will be eliminated from intermittent streams when they run dry. Permanent streams will contain both species that are opportunistic and found in nearby intermittent streams as well as long-lived aquatic stages (> 1 year) and limited powers of dispersal.

Aquatic invertebrates such as the *Chironomidae* (midguts or blood worms), *Pleidae*, *Chironomidae* and *Dytiscidae* would be likely to be recorded in this section of the non-perennial River.

**Fish Index: Fair for the Kromme River and Poor for the non-perennial rivers.**

**Water Quality: Fair**

Eco-Status is classified as good and the desired state as fair for the Kromme River.

An assessment based on the River Health Assessment methodology for the non-perennial rivers was done for the general ecological state and River Health of the non-perennial rivers and for the impacted area. Below are the results of the applicable aspects of the River Health Assessment:

## The impacted area of the non-perennial rivers

### Index of Habitat Integrity: **Poor to Unacceptable**

The non-perennial river to be impacted upon on the eastern boundary is defined by a deep narrow channel which is blocked at the road crossing before it meets up with the tributary on the southern boundary. This non-perennial river has a defined channel on the northern and southern edge of the property. However, the middle section of the river is silted up and overgrown with kikuyu grass. This resulted in the river overflowing its banks and running through the proposed development area in winter.

The non-perennial river on the southern boundary has a defined river channel and bank, but the bank is invaded by alien plants.

### Riparian Vegetation Index: **Poor to Unacceptable**

Most of the non-perennial rivers channel is already invaded by alien trees.

### South African Scoring System: **Poor**

Take note that SASS5 could not be done for the sites and river as they are non-perennial rivers.

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Aquatic invertebrates such as the *Chironomidae* (midguts or blood worms), *Pleidae*, *Chironomidae* and *Dytiscidae* would be likely to be recorded in this section of the Buffels River.

### Fish Index: **Poor**

### Water Quality: **Fair**

Eco-Status is classified as poor and the desired state as fair to poor.



## Conclusion

The condition and functioning of this non-perennial river in terms of possible changes to the channel, flow regime and naturally-occurring riparian vegetation will not be altered from its current state as a result of the proposed construction of the housing project infrastructure and formalization of the river channel and berm.

Care must be taken that the necessary engineering interventions are put in place to prevent erosion of the river banks and berm to ensure that the river does not overflow and result in the flooding of the houses.

The proposed housing and infrastructure will not alter the current ecological functioning of the river due to its degraded state.

Storm water structures must be designed to prevent flooding of the river banks and to prevent litter from entering the non-perennial rivers.

The river banks not impacted upon and the non-development areas next to the river and the river itself must be cleared of aliens to allow for the natural riparian vegetation to establish. These management actions will improve the current ecological state and functioning of the river.



**Photo 1:** Ecological characteristics of the upper reaches of the impacted area of the river.



**Photo 2:** Ecological characteristics of the middle section of the impacted area of the river (river channel that is silted up and overgrown with kikuyu grass).



**Photo 3:** Ecological characteristics of the lower section of the impacted area of the river (deep river channel area).