

WATER USE AUTHORIZATION APPLICATION RISK MATRIX

**PREPARED FOR:
Swellendam Municipality**

PROPOSED SWELLENDAM HOUSING AND BULK SERVICES UPGRADE PROJECT

SEPTEMBER 2018

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This Risk Matrix was requested by Breede Gouritz Catchment Management Agency (BGCMA) for the Water Use Authorization Application for the development of Swellendam Housing and bulk services upgrade project. Eleven activities trigger water use registration that impacts on the regulated zones. This Risk Matrix assists DWS to determine where the proposed development triggers a Water Use License Authorization (WULA) or Water Use General Authorisation (WUGA). The risk assessment is based on the Department of Water and Sanitation 2015 publication: Section 21c and i water use Risk Assessment Protocol in Government Gazette no. 40229 dated 26 August 2016.

This Risk Matrix must be read in conjunction with the Freshwater Ecosystem Impact Assessment dated September 2018 as conducted by Mr. Nicolaas Hanekom of Eco Impact.

The Swellendam Municipality proposes a subsidised housing project on a Remainder of Erf 1 at Swellendam, comprising of 950 residential erven. As well as 4 erven for community facilities, 2 erven for business, 3 for mixed use and 10 erven for public open space. Associated internal roads and associated services infrastructure.

Upgrades to attenuation dams 4 and 5 as the proposed development's runoff will have a direct influence on the capacity. These attenuation dams are situated in a degraded non-perennial drainage line which runs to the west of the proposed site.

Dam 5 –

- Clear and grub of wall embankments.
- Clear and grub for basin extensions (10,000m²)
- Cut to spoil for basin enlargements (7,100m³)
- Cut to fill wall embankment from selected excavated/imported material (1,000m³)
- Cut to fill berm from selected excavated/imported material (144m³)
- Construction of gabion lined spillway
- Concrete outlet structure (25m³)

Dam 4 –

- Upgrading of the outlet works

Bulk water distribution will need to be upgraded. The following is currently proposed:

- SSW4.1: 94 m x 160 mm Ø parallel reinforcement of main pipe
- SSW4.6: 282 m x 160 mm Ø parallel reinforcement of main pipe
- SSW4.10: 77 m x 160 mm Ø inter-connection pipe
- SSW4.11: 352 m x 160 mm Ø parallel reinforcement of main pipe
- SSW4.17: 300 m x 160 mm Ø parallel reinforcement of main pipe
- SSW4.18: 263 m x 110 mm Ø new supply pipe & connections
- SSW5.2: 140 m x 160 mm Ø new supply pipe & connections

- SSW5.3: 107 m x 110 mm Ø new supply pipe & connections
- SSW4.7a: New 110 mm Ø zone valve
- SSW4.7b: New 75 mm Ø zone valve
- SSW5.1: New 15 ℓ/s @ 20 m booster pump station

Sewer reticulation will need to be upgraded to accommodate the proposed development. The following is currently proposed:

- SSS1.2: 250 mm Ø New flow diversion
- SSS1.3: 84 m x 250 mm Ø New outfall sewer
- SSS1.6: 315 mm Ø New flow diversion
- SSS1.7: 100 m x 315 mm Ø New outfall sewer
- SSS1.8: 229 m x 315 mm Ø Re-align existing bulk sewer
- SSS1.9: 304 m x 315 mm Ø Re-align existing bulk sewer

Based on the impact assessment it is evident that there are six possible impacts on the freshwater ecology of the area observed. In considering the impacts and mitigation, it is assumed that a high level of mitigation will take place without high prohibitive costs. From the table it is evident that prior to mitigation, the impacts on the loss of freshwater ecology habitat, disturbance to subsurface geological layers, degradation / loss of naturally occurring / indigenous flora and habitats are medium level impacts, which can be mitigated and will be reduced to low and very- low level impacts. The other tree impacts identified all has low impacts that is reduce to very low with the proposed mitigation measures.

NON-PERENNIAL RIVER WITH THE PROPOSED WATER PIPELINE UPGRADES, ATTENUATION DAMS UPGRADE AND NEW ROAD CROSSING ACTIVITIES.

Habitat Assessment

From the results of the application of the IHIA to the impacted site, it is evident that the rivers reach is modified and that the loss of natural habitat, biota and basic ecosystem functions is extensive. Instream impacts included a large impact from flow modifications, inundation as well as bed and channel modifications. Overall, the site achieved a 78.44 % score for instream integrity.

Riparian impacts included a large impact from flow modifications, inundation, alien vegetation encroachment as well as bed and channel modifications. Overall, the site achieved an 74.24 % score for instream integrity.

The site obtained an overall IHIA rating of 76.34%, which indicates the loss of natural habitat, biota and basic ecosystem functions is extensive. (Class E conditions).

Riparian Vegetation Response Assessment Index (VEGRAI)

The score attained for the VEGRAI indicated that the riparian system falls into the category F. This indicates that the loss of natural habitat, biota and basic ecosystem functions is extensive. Modifications have reached a critical level and the system has been modified completely with almost complete loss of natural habitat and biota. In worst instances basic ecosystem functions have been destroyed and changes are irreversible.

Ecological Importance and Sensitivity (EIS)

EIS considers a number of biotic and habitat determinants surmised to indicate either importance or sensitivity. The determinants are rated according to a four-point scale. The median of the resultant score is calculated to derive the EIS category.

The non-perennial river is considered to be of moderate ecological importance.

PERENNIAL KOORNLANDS RIVER WITH THE PROPOSED SEWER PIPELINE UPGRADES

Habitat Assessment

From the results of the application of the IHIA to the impacted site, it is evident that the rivers reach is modified and that the loss of natural habitat, biota and basic ecosystem functions is extensive. Instream impacts included a large impact from flow modifications, inundation as well as bed and channel modifications. Overall, the site achieved a 78.44 % score for instream integrity.

Riparian impacts included a large impact from flow modifications, inundation, alien vegetation encroachment as well as bed and channel modifications. Overall, the site achieved an 74.24 % score for instream integrity.

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Riparian Vegetation Response Assessment Index (VEGRAI)

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Based on the findings of this study it is the opinion of the freshwater ecologists that the proposed construction activities be considered favourably, from a freshwater ecological point of view, provided that the mitigatory measures presented in this report are strictly adhered to.

Ecological Importance and Sensitivity (EIS)

EIS considers a number of biotic and habitat determinants surmised to indicate either importance or sensitivity. The determinants are rated according to a four-point scale. The median of the resultant score is calculated to derive the EIS category.

The perennial river is considered to be of high ecological importance.

Risk Assessment Matrix - Total Severity Score with Mitigation

No	Phases	Activity	Aspect	Impact	Severity				Total Severity Score
					Flow Regime	Physico & Chemical (Water Quality)	Habitat (Geomorph + Vegetation)	Biota	
1	Construction phase	Construction of the proposed housing and upgrades to the water, sewerage pipelines, new road crossing and attenuation dams.	Site clearance and construction of proposed infrastructure will impact on the non-perennial river and Koorlands perennial river.	Riparian zone Earthworks in the vicinity of river systems leading to increased runoff and erosion and altered runoff patterns. Construction of the attenuation dams and new road crossing altering stream flow patterns and water velocities. Alien invasive vegetation encroachment. Erosion and incision of riparian zone.	1- The non-perennial river had no flow and the Koorlands river a moderate flow at the time of the site inspection. The constructed sewer pipeline will not have an impact on the flow regime of the river if the mitigation measures are adhered to. The attenuation dams will	1- Water quality good at the time of the assessment. The water quantity is however affected by the on site, upstream and downstream impacts on the non-perennial river. This will however not be altered as a result of the upgrades and new construction.	1- Wetland related vegetation was recorded in the impacted areas. Riparian related vegetation or fauna species within or along the non-perennial drainage river is limited due to the degraded nature of the non-perennial river. It is therefore not expected	1- Wetland related vegetation was recorded in the impacted areas. Riparian related vegetation or fauna species within or along the non-perennial drainage river is limited due to the degraded nature of the non-perennial river. It is therefore not expected that the proposed development will have any	1

				<p>Instream zone Loss of aquatic refugia. Altered substrate conditions due to the deposition of silt Altered depth and flow regimes in the major drainage systems Alien vegetation proliferation</p>	<p>impact and affect the flow regime, but this will not deteriorate the river system due to the degraded ecological state it is in and the existing structures affecting the current flow regime.</p>		<p>that the proposed development will have any significant negative impact on wetland/riparian habitat. The riparian vegetation of the Koorndlands river is in a good condition. The impacted zones are however already altered as a result of the existing infrastructure that needs to be upgraded.</p>	<p>significant negative impact on wetland/riparian habitat. The riparian vegetation of the Koorndlands river is in a good condition. The impacted zones are however already altered as a result of the existing infrastructure that needs to be upgraded.</p>	
2	Operational Phase	Operation of the proposed infrastructure through and within 100m and 500m	Possible pollution and erosion of affected rivers as a result of poor	<p>Riparian zone Earthworks in the vicinity of river systems leading to increased</p>	<p>1- The non-perennial river had no flow and the Koorndlands river a</p>	<p>1- Water quality good at the time of the assessment. The water</p>	<p>1- Wetland related vegetation was recorded in the impacted</p>	<p>1- Wetland related vegetation was recorded in the impacted</p>	1

		regulated zones	<p>maintenance and infrastructure failure.</p>	<p>runoff and erosion and altered runoff patterns. Maintenance of the attenuation dams and new road crossing altering stream flow patterns and water velocities. Alien invasive vegetation encroachment. Erosion and incision of riparian zone.</p> <p>Instream zone Loss of aquatic refugia. Altered substrate conditions due to the deposition of silt. Altered depth and flow regimes in the major drainage</p>	<p>moderate flow at the time of the site inspection. The constructed sewer pipeline will not have an impact on the flow regime of the river if the mitigation measures are adhered to. The attenuation dams will impact and affect the flow regime, but this will not deteriorate the river system due to the degraded ecological state it is in and the existing structures</p>	<p>quantity is however affected by the on site, upstream and downstream impacts on the non-perennial river. This will however not be altered as a result of the upgrades and new construction.</p>	<p>areas. Riparian related vegetation or fauna species within or along the non-perennial drainage river is limited due to the degraded nature of the non-perennial river. It is therefore not expected that the proposed development will have any significant negative impact on wetland/riparian habitat. The riparian vegetation of the Koorlands river is in a good condition.</p>	<p>areas. Riparian related vegetation or fauna species within or along the non-perennial drainage river is limited due to the degraded nature of the non-perennial river. It is therefore not expected that the proposed development will have any significant negative impact on wetland/riparian habitat. The riparian vegetation of the Koorlands river is in a</p>	
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				systems Alien vegetation proliferation	affecting the current flow regime.			The impacted zones are however already altered as a result of the existing infrastructure that needs to be upgraded.		good condition. The impacted zones are however already altered as a result of the existing infrastructure that needs to be upgraded.	
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Risk Assessment Matrix – Final Risk Rating

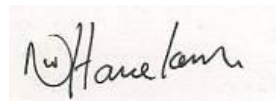
No.	Severity	Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal issues	Detection	Likelihood	Significance	Risk Rating
1	1	1	1	3	1	3	1	2	7	21	Low
2	1	1	4	6	5	3	1	2	11	66	Moderate

Risk Assessment Matrix – Confidence Level and Proposed Post Control/Mitigation Measures

No.	Risk Rating	Confidence level	Control measures	Borderline LOW – MODERATE Rating Classes	PES and EIS of Watercourses
1	21 Low	90%	Refer to Freshwater Ecosystem Impact Assessment Report (Eco Impact, September 2018) which lists all the proposed mitigation measures to be implemented during the construction and operational phases of the proposed activity.	Low and unchanged	Refer to Freshwater Ecosystem Impact Assessment Report (Eco Impact, September 2018)
2	66 Moderate	90%	Refer to Freshwater Ecosystem Impact Assessment Report (Eco Impact, September 2018) which lists all the proposed mitigation measures to be implemented during the construction and operational phases of the proposed activity.	After considering both the construction and operational phases of the activity, the potential impacts/risks of the activity to the resource quality post mitigation measures, the sensitivity (EIS) and status (PES) of the watercourse receptor and the mitigation measure to be implemented we recommend that the risk rating stay unchanged at moderate.	Refer to Freshwater Ecosystem Impact Assessment Report (Eco Impact, September 2018)

Recommendations in Terms of Water Use Application Requirements

The overall risk rating of potential Impacts on the applicable rivers after mitigation is rated as low and moderate negative. A sewer pipeline is proposed to cross and is located within 100m of the river and therefore the WUA must be a license.



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Director

27 September 2018



THE SOUTH AFRICAN COUNCIL
FOR
NATURAL SCIENTIFIC PROFESSIONS

herewith certifies that

Nicolaas Williem Hanekom

Registration number: 400274/11

is registered as a

Professional Natural Scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)

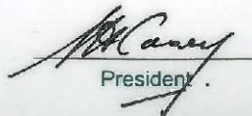
in the following field(s) of practice
(Schedule I of the Act)


Ecological Science

27 July 2011

27 July 2011

Pretoria


President


Chief Executive Officer

RISK ASSESSMENT KEY (Referenced from DWD 2015 publication: Section 21 c and i
water use Risk Assessment Protocol)

Negative Rating

TABLE 1- SEVERITY	
How severe does the aspects impact on the environment and resource quality characteristics (flow regime, water quality, geomorphology, biota, habitat)?	
Insignificant / non-harmful	1
Small / potentially harmful	2
Significant / slightly harmful	3
Great / harmful	4
Disastrous / extremely harmful and/or wetland(s) involved	5
Total severity score calculation – (Flow Regime) + (Physico&Chemical) + (Habitat) + (Biota) =? x 25 = ?/100 = Total Severity Score	
Where "or wetland(s) are involved" it means that the activity is located within the delineated boundary of any wetland. The score of 5 is only compulsory for the significant rating	

TABLE 2 – SPATIAL SCALE	
How big is the area that the aspect is impacting on?	
Area specific (at impact site)	1
Whole site (entire surface right)	2
Regional / neighbouring areas (downstream within quaternary catchment)	3
National (impacting beyond secondary catchment or provinces)	4
Global (impacting beyond SA boundary)	5

TABLE 3 – DURATION	
How long does the aspect impact on the environment and resource quality?	
One day to one month, PES, EIS and/or REC not impacted	1
One month to one year, PES, EIS and/or REC impacted but no change in status	2
One year to 10 years, PES, EIS and/or REC impacted to a lower status but can be improved over this period through mitigation	3
Life of the activity, PES, EIS and/or REC permanently lowered	4
More than life of the organisation/facility, PES and EIS scores, a E or F	5

TABLE 4 – FREQUENCY OF THE ACTIVITY	
How often do you do the specific activity?	
Annually or less	1
6 monthly	2
Monthly	3

Weekly	4
Daily	5

TABLE 5 – FREQUENCY OF THE INCIDENT/IMPACT	
How often does the activity impact on the environment?	
Almost never / almost impossible / >20%	1
Very seldom / highly unlikely / >40%	2
Infrequent / unlikely / seldom / >60%	3
Often / regularly / likely / possible / >80%	4
Daily / highly likely / definitely / >100%	5

TABLE 6 – LEGAL ISSUES	
How is the activity governed by legislation?	
No legislation	1
Fully covered by legislation (wetlands are legally governed)	5
Located within the regulated areas	

TABLE 7 – DETECTION	
How quickly can the impacts/risks of the activity be observed on the environment (water resource quality characteristics), people and property?	
Immediately	1
Without much effort	2
Need some effort	3
Remote and difficult to observe	4
Covered	5

TABLE 8: RATING CLASSES		
RATING	CLASS	MANAGEMENT DESCRIPTION
1 – 55	(L) Low Risk	Acceptable as is or consider requirement for mitigation. Impact to watercourses and resource quality small and easily mitigated. Wetlands may be excluded.
56 – 169	M) Moderate Risk	Risk and impact on watercourses are notably and require mitigation measures on a higher level, which costs more and require specialist input. Wetlands are excluded.

170 – 300	(H) High Risk	Always involves wetlands. Watercourse(s) impacts by the activity are such that they impose a long-term threat on a large scale and lowering of the Reserve.
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A low risk class must be obtained for all activities to be considered for a GA

TABLE 9: CALCULATIONS
Consequence = Severity + Spatial Scale + Duration
Likelihood=Frequency of Activity + Frequency of Incident +Legal Issues + Detection
Significance \Risk= Consequence X Likelihood