

**WATER USE AUTHORIZATION APPLICATION
RISK MATRIX**

PREPARED FOR:
Kliphoek Rivieroord
P.O. Box 168
Veldrif
7365
Tel: 022 783 0822
Email: kliphoekinfo@kliphoek.co.za

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This Risk Matrix was requested by Department of Water and Sanitation (DWS) for the Water Use Authorization Application. DWS has perused the document and has noted that the proposed activities trigger water uses in terms of Section 21(c) and Section 21(i) of the NWA. This is because the proposed extension impacting the banks of the Berg River.

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.

The site is located within the G10M quaternary catchment. The Berg River Estuary is located on the West Coast of South Africa approximately 130 km north of Cape Town with tidal influence measurable up to ~70 km from the mouth¹. The Berg River Estuary is one of three permanently open estuaries on the west coast, and one of the largest estuaries in the country, with a total area of 61 km². The extensive floodplains, extensive dry pans, tidal flats and marsh areas in the middle and upper reaches of the system and the estuary's shallow gradient (rising 1 m in the first 50 km) make it atypical in relation to most South African estuaries. The estuary is considered one of the most important estuaries in South Africa in terms of conservation value - the system has been identified as an important bird area, and is also considered of high national conservation importance for estuarine fish, invertebrates and vegetation. Anthropogenic threats to the system include water abstraction and dams (there are four major dams within the Berg River Estuary catchment), agricultural and urban encroachment, specifically in terms of changes in hydrodynamics and water quality, frequency and intensity of the flooding of the floodplain and reduction of natural vegetation on the floodplain. The Berg River Estuary meets the ocean at St Helena Bay, a region that is influenced by the Benguela Current System, which is characterised by the upwelling of colder nutrient-rich deep water. The estuary has a permanently open mouth that was canalised in the late 1960s in an attempt to develop the estuary into a fishing harbour, and ensures a relatively unconstructed exchange of water between the estuary and ocean. A consequence of this stabilised mouth is a strong tidal current in the lower and middle reaches of the estuary. Sediment in the lower reaches is extremely soft, and indicative of a high percentage of fine sediment particles and high organic content. The main channel at Velddrif is 100-200 m wide, and becomes progressively narrower and shallower moving upstream. The average depth ranges between 3-5 m, but reaches as

¹ Wright A.G. and Clark BM. 2017. Estuarine specialist study and impact assessment for the proposed expansion of Kliphoek Resort, Velddrif. Report prepared by Anchor Environmental Consultants (Pty) Ltd for Eco Impact Legal Consulting (Pty) Ltd. 43pp.



much 9 m in areas, with the lower 4 km of the estuary dredged to a depth of at least 4 m to allow for boat navigation.

The Kliphoek site vegetation includes supratidal salt marsh, and reed and sedge marsh areas. This vegetation is sensitive to trampling and grazing by livestock (Anchor 2010). The eastern and south eastern proposed development area (i.e. area where existing jetties are to be restored) is characterised by low gradients and extensive beds of *Phragmites australis*, which form persistent and dense monospecific stands that outcompete other indigenous estuary-associated species and encroach into the open water area. In terms of benthic invertebrates, the site is dominated by the polychaeta *Capitella capitata*, *Desdemona ornate* and *Ceratonereis erythraeensis*; the Anomuran *Callianassa kraussi* and the amphipod *Grandidierella lutosa*. Although the numbers of fish species present in west coast estuaries is low, they do represent a relatively high proportion (79%) of the total west coast inshore fish community, many of which are endemic to southern Africa and some of which are considered threatened. Marine migrant fish species in the Berg Estuary are represented mostly by juveniles. Some 127 water-associated species (passerine and non-passerine) have been recorded on the estuary and adjacent floodplain. The area is host to significant populations of several threatened bird species, including African marsh harrier and Caspian tern, Lesser flamingo, Black harrier, African black oystercatcher, Eastern white pelican, Cape cormorant, Greater flamingo, Greater painted snipe, and Chestnut-banded Plover. Waders are particularly attracted to the floodplain pans and artificial salt pans as their water levels drop, feeding on the newly exposed shorelines and in shallow water. The Kliphoek site is considered a very important winter feeding ground for wading birds and waterfowl. As such, the estuary is considered a top priority in terms of its overall biodiversity conservation importance. The economic valuation of the estuary has been estimated at R 75.6 million, which makes it one of the most valuable temperate estuaries in South Africa. The largest component of this value was derived from turnover in the property sector (R 48.6 million), followed closely by visitor expenditure (R 18.3 million) while subsistence and existence value made relatively small contributions to total estimated economic value.

Potential impacts

Potential negative impacts that may arise from the proposed construction phase include ecological effects due to:

- Disturbance to or alteration of soft sediment estuarine habitat;
- temporary loss of artificial wood/concrete habitat;
- mobilisation of contaminants in terrestrial sediments through construction activities and subsequent run-off into the estuary;
- mobilisation of sediment in the water column;
- loss of vegetation (including intact vegetation, ecologically important species and species of conservation concern);



- loss of ecological processes associated with the loss of intact vegetation, ecologically important species and species of conservation concern;
- generation and disposal of waste;
- increased noise and vibration; and
- spillage of hazardous substances.

Possible environmental impacts caused during the operational phase that are likely to impact on estuarine communities include the effects of:

- altered quay design affecting hydrodynamics and sediment movement;
- increased foot and vessel traffic affecting sensitive biota;
- generation and disposal of waste; and,
- noise and vibration.

After mitigation, none of the impacts are assessed as being above LOW significance. Cumulative estuarine environmental impacts associated with this project are primarily related to operational impacts resulting from increased vessel traffic and wastewater discharge, as well as increased risks from hazardous substances. It is envisioned that only minor routine maintenance will be required over the course of the design life of the proposed development. Impacts expected in the decommissioning phase have been dealt with in the construction phase.



Risk Matrix without mitigation

No	Phases	Activity	Aspect	Impact	Severity				Severity
					Flow Regime	Physico & Chemical (Water Quality)	Habitat (Geomorph + Vegetation)	Biota	
1	Construction of infrastructure and jetties.	Jetties on the river bank and infrastructure within 100m from the Berg River.	Sediment and contaminated stormwater entering the Berg River estuary. Erosion of estuary bank.	Refer to Anchor Environmental Impact Assessment December 2017 ESTUARINE SPECIALIST STUDY AND IMPACT ASSESSMENT FOR THE PROPOSED EXPANSION OF KLIPHOE	The Berg River is reported to have a catchment of approximately 9 000 km ² (Ractliffe 2007). The river flows through mountainous terrain from its source at an altitude of 1 522 m in the Groot Drakenstein Mountains, to the town of Paarl and then	The problem of litter entering the aquatic environment has escalated dramatically in recent decades, with an ever-increasing proportion of litter consisting of non-biodegradable plastic materials. In order to reduce this, all domestic and general waste generated must be disposed of responsibly. All reasonable measures must be implemented to ensure there is	<i>The Kliphoek site vegetation includes supratidal salt marsh, and reed and sedge marsh areas. This vegetation is sensitive to trampling and grazing by livestock (Anchor 2010). The eastern and south eastern proposed development area (i.e. the area affected by jetty restoration) is characterised by low gradients and extensive beds of Phragmites australis, which form persistent and dense monospecific</i>	Some planned development activities (i.e. the construction of new jetties) is likely to cause disturbance to shallow, subtidal sediment adjacent to the construction footprint. The impact of this is rated 'insignificant' as the size of the area likely to be impacted is very small.	1



				<p>K RESORT, VELDDRI F</p>	<p>through undulating agricultural lands from Paarl towards the sea. The main channel at Velddrif is 100-200 m wide, becoming progressively narrower and shallower moving upstream. The average depth ranges between 3 and 5 m, but reaches as much as 9 m in areas, with the lower 4 km of the estuary dredged to a</p>	<p>no littering and that construction waste is adequately managed. Staff must be regularly reminded about the detrimental impacts of pollution on aquatic species and suitable handling and disposal protocols must be clearly explained and sign boarded. The 'reduce, reuse, recycle' policy must be implemented. This impact is rated as 'moderate' without mitigation and is reduced to 'low' by implementing the actions</p>	<p><i>stands that outcompete other indigenous estuary-associated species and encroach into the open water area.</i></p>		
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					<p>depth of at least 4 m to allow for boat navigation (DWA 2010). The Kliphoek site vegetation includes supratidal salt marsh, and reed and sedge marsh areas. This vegetation is sensitive to trampling and grazing by livestock (Anchor 2010).</p>				
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No	Phases	Activity	Aspect	Impact	Severity				Severity
					Flow Regime	Physico & Chemical (Water Quality)	Habitat (Geomorph + Vegetation)	Biota	
2	Operation Phase	Jetties on the river bank and infrastructure within 100m from the Berg River.	Sediment and contaminated stormwater entering the Berg River estuary. Erosion of estuary bank.	Refer to Anchor Environmental Impact Assessment December 2017 ESTUARINE SPECIALIST STUDY AND IMPACT ASSESSMENT FOR THE PROPOSED EXPANSION OF KLIPHOEK RESORT,	The Berg River is reported to have a catchment of approximately 9 000 km ² (Ractliffe 2007). The river flows through mountainous terrain from its source at an altitude of 1 522 m in the Groot Drakenstein Mountains, to the town of Paarl and then through undulating	The problem of litter entering the aquatic environment has escalated dramatically in recent decades, with an ever-increasing proportion of litter consisting of non-biodegradable plastic materials. In order to reduce this, all domestic and general waste generated must be disposed of responsibly. All reasonable measures must be implemented to ensure there is no littering and that construction	<i>The Kliphoek site vegetation includes supratidal salt marsh, and reed and sedge marsh areas. This vegetation is sensitive to trampling and grazing by livestock (Anchor 2010). The eastern and south eastern proposed development area (i.e. the area affected by jetty restoration) is characterised by low gradients and extensive beds of Phragmites australis, which form persistent and dense monospecific stands that outcompete other</i>	Some planned development activities (i.e. the construction of new jetties) is likely to cause disturbance to shallow, subtidal sediment adjacent to the construction footprint. The impact of this is rated 'insignificant' as the size of the area likely to be impacted is very small.	1



				<p>VELDDRI F</p> <p>agricultural lands from Paarl towards the sea. The main channel at Velddrif is 100-200 m wide, becoming progressively narrower and shallower moving upstream. The average depth ranges between 3 and 5 m, but reaches as much as 9 m in areas, with the lower 4 km of the estuary dredged to a depth of at least 4 m to</p>	<p>waste is adequately managed. Staff must be regularly reminded about the detrimental impacts of pollution on aquatic species and suitable handling and disposal protocols must be clearly explained and sign boarded. The 'reduce, reuse, recycle' policy must be implemented. This impact is rated as 'moderate' without mitigation and is reduced to 'low' by implementing the actions</p>	<p><i>indigenous estuary-associated species and encroach into the open water area.</i></p>		
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					allow for boat navigation (DWA 2010). The Kliphoek site vegetation includes supratidal salt marsh, and reed and sedge marsh areas. This vegetation is sensitive to trampling and grazing by livestock (Anchor 2010).							
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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	1	5	1	8	24	Low
2	1	1	1	3	1	1	5	1	8	24	Low



Risk Matrix with mitigation

No.	Risk Rating	Confidence level	Control measures	Borderline LDW Moderate Rating Classes	PES and EIS of Watercourses
1	Low	90%	Independent monitoring will be conducted via a competent specialist. The specialist will be responsible for monitoring, reviewing, reporting and verifying compliance with the Water Use Authorization, EMP, Environmental Authorisation (EA), Water Use Authorisation/license and all other specialist recommendations by all contractors and site management.	NA	<p>The proposed development, other than the jetties and lapa is above the 6m above mean sea level contour and an adequate buffer is in place. After mitigation, none of the impacts are assessed as being above LOW significance. Cumulative estuarine environmental impacts associated with this project are primarily related to operational impacts resulting from increased vessel traffic and wastewater discharge, as well as increased risks from hazardous substances. It is envisioned that only minor routine maintenance will be required over the course of the design life of the proposed development. Impacts expected in the decommissioning phase have been dealt with in the construction phase. Mitigation measures, both best practise and essential, include the following:</p> <ul style="list-style-type: none"> • Inform all staff about responsible disposal of waste and reduce, reuse, recycle philosophy; • The intentional disposal of any substance into the estuarine environment must be strictly prohibited, while accidental spillage must be prevented, contained and reported immediately; • All fuel and oil must be stored with adequate spill protection, and no leaking vehicles or vessels are to be permitted on



					<p>site;</p> <ul style="list-style-type: none"> • Use bunding where possible, minimise top-soil run-off as much as possible and collect and dispose of polluted soil at appropriate bio-remediation sites; • Use dust suppression techniques all dust generating surfaces and to enforce strict construction and private vehicle speed limits; and • The immediate rehabilitation of any areas disturbed as a result of construction activities. <p>Based on the impacts assessed in this report, it is recommended that the proposed development proceed with the implementation of strict environmentally responsible practices as outlined in the recommended mitigation measures².</p>
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No.	Risk Rating	Confidence level	Control measures	Borderline LDW Rating Classes	Moderate	PES and EIS of Watercourses
2	Low	90%	Independent monitoring will be conducted via a competent specialist. The specialist will be responsible for monitoring, reviewing, reporting and verifying compliance with the Water Use Authorization, EMP, Environmental	NA		The proposed development, other than the jetties and lapa is above the 6m above mean sea level contour and an adequate buffer is in place. After mitigation, none of the impacts are assessed as being above LOW significance. Cumulative estuarine environmental impacts associated with this project

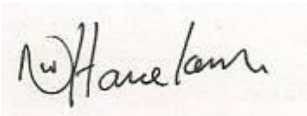
² Wright A.G. and Clark BM. 2017. Estuarine specialist study and impact assessment for the proposed expansion of Kliphoek Resort, Velddrif. Report prepared by Anchor Environmental Consultants (Pty) Ltd for Eco Impact Legal Consulting (Pty) Ltd. 43pp.



			<p>Authorisation (EA), Water Use Authorisation/license and all other specialist recommendations by all contractors and site management.</p>		<p>are primarily related to operational impacts resulting from increased vessel traffic and wastewater discharge, as well as increased risks from hazardous substances. It is envisioned that only minor routine maintenance will be required over the course of the design life of the proposed development. Impacts expected in the decommissioning phase have been dealt with in the construction phase. Mitigation measures, both best practise and essential, include the following:</p> <ul style="list-style-type: none"> • Inform all staff about responsible disposal of waste and reduce, reuse, recycle philosophy; • The intentional disposal of any substance into the estuarine environment must be strictly prohibited, while accidental spillage must be prevented, contained and reported immediately; • All fuel and oil must be stored with adequate spill protection, and no leaking vehicles or vessels are to be permitted on site; • Use bunding where possible, minimise top-soil run-off as much as possible and collect and dispose of polluted soil at appropriate bio-remediation sites; • Use dust suppression techniques all dust generating surfaces and to enforce strict construction and private vehicle speed limits; and • The immediate rehabilitation of any areas disturbed as a result of construction
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					<p>activities.</p> <p>Based on the impacts assessed in this report, it is recommended that the proposed development proceed with the implementation of strict environmentally responsible practices as outlined in the recommended mitigation measures³.</p>
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Nicolaas Hanekom Pri Sci Nat (Ecology)
400274/11
Director
26 February 2018

³ Wright A.G. and Clark BM. 2017. Estuarine specialist study and impact assessment for the proposed expansion of Kliphoeck Resort, Velddrif. Report prepared by Anchor Environmental Consultants (Pty) Ltd for Eco Impact Legal Consulting (Pty) Ltd. 43pp.





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)

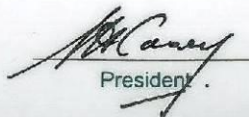
in the following field(s) of practice
(Schedule I of the Act)

Ecological Science

27 July 2011

27 July 2011

Pretoria


President


Chief Executive Officer

