PROJECT: Clanwilliam Housing Development and WWTW Expansion, Remainder Erf 279, Clanwilliam

RISK ASSESSMENT MATRIX for Section 21 (c) and (i) Water Use activities (Version 2.1.1)

POTENTIALLY AFFECTED WATERCOURSE/S			FIELD-VERIFIED ASSESSMENT RESULTS				
Watercourse number	**Watercourse name**	**Watercourse type**	**PES**	**EI**	**ES**	**EIS**	**Wetland Importance**
(1)	Central valley-bottom wetland system (Wetlands 1 and 2)	Wetland (incl. pans)	E	Moderate	Moderate	Moderate	Moderate
(2)	Southern seep (south-east of the WWTW)	Wetland (incl. pans)	E	Moderate	Moderate	Moderate	Moderate
(3)	Jan Dissels River and floodplain wetland	River / Natural channel	D	High	Very high	Very high	Very high
(4)	Olifants River and floodplain wetland (below the confluence)	River / Natural channel	D	Moderate	Very high	Very high	Very high
(5)	Historic non-perennial tributaries of the Jan Dissels River	River / Natural channel	E/F	Not assessed	Not assessed	Not assessed	Not assessed

DETAILED PROJECT SPECIFICATIONS:

Please refer to the Aquatic Biodiversity Impact Assessment Addendum:

Van Zyl, K. and Morton, R. 2026. Aquatic Biodiversity Impact Assessment Addendum: Stormwater Management and WWTW Expansion, Clanwilliam Housing Development, Remainder Erf 279, Clanwilliam V1.0. Delta Ecology. RSA.

Activities: (1) construction of stormwater infrastructure (21 headwalls, four attenuation ponds and the piped connection within the central valley-bottom wetland system) and wetland rehabilitation; (2) refurbishment and expansion of the Clanwilliam WWTW (new 1.5 Ml/day module; upgraded works to treat at least 3.6 Ml/day at peak); (3) operation of the stormwater system; (4) operation of the upgraded WWTW and discharge of treated effluent through the southern seep to the Jan Dissels River; (5) irrigation of the golf course with treated effluent.

Control measures assumed in the scoring (Section 6 of the addendum): post-development peak flows attenuated to pre-development levels; stormwater treatment train, including the stormwater from the existing informal settlement; outlets and ponds outside the wetland with energy dissipation and diffuse discharge; no-go areas, dry-season construction, sediment and spill control; no bypass of untreated sewage during tie-ins; effluent treated to the Special Limit Values (GN 665 of 2013) with a specialist process engineer, works manager and operational support; retention of the southern seep reed bed as a polishing wetland; water balance, storage and irrigation management plan; implementation of the Wetland Rehabilitation and Management Plan; monitoring plan including effluent, water quality, SASS5 and fish.

Watercourse importance: central valley-bottom wetland system and southern seep from WET-EcoServices and the wetland EIS (Moderate); Jan Dissels and Olifants rivers from the DWS (2014) desktop PES/EIS (integrated EIS Very High).

RISK RATING TABLES [for Risk Assessment Matrix (version 2.1.1): Section 21 (c) and (i) Water Use Authorisation]

TABLE 1 – IMPORTANCE OF AFFECTED WATERCOURSE/S

What is the overall importance of the watercourse/s, based on the criteria and guidelines provided below?*
(If no formal assessment of EI / EIS / Wetland Importance has been completed, assign rating according to criterion below that results in the highest score)

Low or Very Low EI / EIS / Wetland Importance rating; OR, If EI/EIS has not been determined, Low rating based on presence of: - no areas identified to be of conservation importance (i.e. CESA at most); and/or - only species/habitats of Least Concern on the IUCN Red List or on a regional/national Red List (including freshwater ecosystem types of Least Concern in terms of the NBA); and/or - only species which are common and widespread and/or habitats of low conservation interest; and/or - highly degraded habitat of extremely small size	Low / Very low = 2
Medium EI / EIS / Wetland Importance rating; OR, If EI/EIS has not been determined, Moderate rating based on presence of: - CESAs; and/or - species/habitats listed as VU or NT on the IUCN Red List or on a regional/national Red List (including VU/NT freshwater ecosystem types in terms of the NBA); and/or - functionality as an important ecological corridor or buffer area	Moderate = 3
High EI / EIS / Wetland Importance rating; OR, If EI/EIS has not been determined, High rating based on presence of: - CBA2; and/or - species or degraded habitats (in poor condition) listed as EN or CR on the IUCN Red List or on a regional/national Red List (including EN/CR freshwater ecosystem types in terms of the NBA)	High = 4
Very high EI / EIS / Wetland Importance rating; OR, If EI/EIS has not been determined, Very high rating based on presence of: -CBA1; and/or - FEPA; and/or - species or intact habitats (in fair or good condition) listed as EN or CR on the IUCN Red List or on a regional/national Red List (including EN/CR freshwater ecosystem types in terms of the NBA); and/or - KBA or IBA or Ramsar site	Very high = 5

* EI=Ecological Importance; EIS=Ecological Importance & Sensitivity; OESA=Other Ecological Support Areas; IUCN=International Union for Conservation of Nature; CESA=Critical Ecological Support Area; NBA=National Biodiversity Assessment; VU=Vulnerable; NT=Near Threatened; EN=Endangered; CR=Critically Endangered; CBA=Critical Biodiversity Area; FEPA=Freshwater Ecosystem Priority Area; KBA=Key Biodiversity Area; IBA=Important Bird Area.

TABLE 2- INTENSITY OF IMPACT

What is the intensity of the impact on the resource quality (hydrology, water quality, geomorphology, biota)?

Negative Impacts	
Negligible / non-harmful; no change in PES	0
Very low / potentially harmful; negligible deterioration in PES (<5% change)	+1
Low / slightly harmful; minor deterioration in PES (<10% change)	+2
Medium / moderately harmful; moderate deterioration in PES (>10% change)	+3
High / severely harmful; large detrioration in PES (by one class or more)	+4
Very high / critically harmful; critrical deterioration in PES (to E/F or F class)	+5
Positive Impacts	
Negligible; no change in PES	0
Very low / potentially beneficial; negligible improvement in PES (<5% change)	-1
Low / slightly beneficial; minor improvement in PES (<10% change)	-2
Medium / moderately beneficial; moderate improvement in PES (>10% change)	-3
Highly beneficial; large improvement in PES (by one class or more) and/or increase in protection status	-4
Very highly beneficial; improvement to near-natural state (A or A/B class) and/or major increase in protection status	-5

NOTE: Positive Impacts must be given a negative Intensity Score

***PES of affected watercourses must be considered when scoring Impact Intensity**

TABLE 3 – SPATIAL SCALE (EXTENT) OF IMPACT

How big is the area that the activity is impacting on, relative to the size of the impacted watercourses?

Very small portion of watercourse/s impacted (<10% of extent)	1
Moderate portion of watercourse/s impacted (10-60% of extent)	2
Large portion of watercourse/s impacted (60-80%)	3
Most or all of watercourse/s impacted (>80%)	4
Impacts extend into watercourses located well beyond the footprint of the activities	5

TABLE 4 – DURATION OF IMPACT

How long does the activity impact on the resource quality?

Transient (One day to one month)	1
Short-term (a few months to 5 years) OR repeated infrequently (e.g. annually) for one day to one month	2
Medium-term (5 – 15 years)	3
Long-term (ceases with operational life)	4
Permanent	5

TABLE 5 – LIKELIHOOD OF THE IMPACT

What is the probability that the activity will impact on the resource quality?

Improbable / Unlikely	20%
Low probability	40%
Medium probability	60%
Highly probable	80%
Definite / Unknown	100%

TABLE 6: RISK RATING CLASSES

RATING	CLASS	MANAGEMENT DESCRIPTION
1 – 29	**(L) Low Risk OR (+) Positive (+ +) Highly positive**	Acceptable as is or with proposed mitigation measures. Impact to watercourses and resource quality small and easily mitigated, or positive.
30 – 60	**(M) Moderate Risk**	Risk and impact on watercourses are notable and require mitigation measures on a higher level, which costs more and require specialist input. Licence required.
61 – 100	**(H) High Risk**	Watercourse(s) impacts by the activity are such that they impose a long-term threat on a large scale and lowering of the Reserve. Licence required.

A low risk class must be obtained for all activities to be considered for a GA

TABLE 7: CALCULATIONS AND MAXIMUM VALUES

Intensity = Maximum Intensity Score (negative value for positive impact) X 2	MAX = 10
Severity = Intensity + Spatial Scale + Duration (<Intensity - Spatial Scale - Duration> for positive impact)	MAX = 20 (MIN = -20 for +ve impacts)
Consequence = Severity X Importance rating	MAX = 100
Significance\Risk = Consequence X (Likelihood / 100)	MAX = 100

RISK ASSESSMENT MUST BE CONDUCTED BY A SACNASP REGISTERED PROFESSIONAL MEMBER AND THE ASSESSOR MUST:

1) CONSIDER ALL THE RELEVANT PHASES OF PROPOSED ACTIVITIES (CONSTRUCTION AND OPERATIONAL PHASES, AS A MINIMUM);

2) CONSIDER RISKS TO RESOURCE QUALITY WITH THE PROPOSED CONTROL MEASURES (AS SPECIFIED) ASSUMED TO BE IN PLACE;

3) CONSIDER THE PRESENT ECOLOGICAL STATUS (PES) AND ECOLOGICAL IMPORTANCE & SENSITIVITY (EIS) OF THE WATERCOURSE AS RECEPTOR OF RISKS POSED;

4) RATE POSITIVE IMPACTS/RISKS REDUCTION USING NEGATIVE IMPACT INTENSITY SCORES IN THE RISK ASSESSMENT MATRIX;

5) INDICATE CONFIDENCE LEVEL OF SCORES PROVIDED IN THE LAST COLUMN AS A CATEGORY (LOW / MEDIUM / HIGH).

ON THE EXCEL SPREADSHEETS, ROWS THAT ARE NOT NEEDED CAN BE DELETED AND ADDITIONAL ROWS CAN BE ADDED IF REQUIRED

OPTIONAL: SUMMARY OF RISK ASSESSMENT

To create a summary of the Risk Assessment, complete the following steps:

(1)	Right-click "Risk Assessment" worksheet tab
(2)	Select "Move or Copy…" option
(3)	In the dialogue box that pops up, tick the "Create a copy" tick-box (at the bottom) and select a location for the summary worksheet [e.g. "(move to end)" of active workbook]
(4)	Unprotect the duplicated worksheet that is created ["Risk Assessment (2)"], if it is still protected, by right-clicking the worksheet tab and selecting (by left-click) "Unprotect Sheet…"
(5)	In the duplicated worksheet that is created ["Risk Assessment (2)"], delete Row 6 (with red text) and any other superfluous rows
(6)	In the duplicated worksheet, select columns D through to X, then right-click the selected area and left-click "Hide" in the pop-up box that appears
(7)	OPTIONAL: Rename the worksheet by right-clicking the worksheet tab and selecting "Rename"

PROJECT: **Clanwilliam Housing Development and WWTW Expansion, Remainder Erf 279, Clanwilliam**

RISK ASSESSMENT MATRIX for Section 21 (c) and (i) Water Use activities - Version 2.1.1

Name of Assessor: Kimberley van Zyl **Signature:** #VALUE!

SACNASP Registration Number: Pr. Nat. Sci. Reg. No.117097 (Ecological

Date of assessment: 13-Oct-26

Risk to be scored for all relevant phases of the project (factoring in specified control measures). MUST BE COMPLETED BY SACNASP PROFESSIONAL MEMBER REGISTERED IN AN APPROPRIATE FIELD OF EXPERTISE.

Phase	Activity	Impact	Potentially affected watercourses			Intensity of Impact on Resource Quality					Overall Intensity (max = 10)	Spatial scale (max = 5)	Duration (max = 5)	Severity (max = 20)	Importance rating (max = 5)	Consequence (max = 100)	Likelihood (Probability) of impact	Significance (max = 100)	Risk Rating	Confidence level
						Abiotic Habitat (Drivers)			Biota (Responses)											
			Name/s	PES	Overall Watercourse Importance	Hydrology	Water Quality	Geomorph	Vegetation	Fauna										
CONSTRUCTION	<1> Construction of stormwater infrastructure (headwalls, outlets, attenuation ponds and the piped connection) in and next to the central valley-bottom wetland system, and wetland rehabilitation works	<1a> Disturbance of wetland habitat (IA Impact 1)	Central valley-bottom wetland system	E	Moderate	1	1	2	2	1	**4**	2	2	**8**	**3**	**24**	60%	**14.4**	L	High
		<1b> Erosion and sedimentation of the wetland (IA Impact 2)	Central valley-bottom wetland system	E	Moderate	1	1	2	1	1	**4**	2	2	**8**	**3**	**24**	60%	**14.4**	L	High
		<1c> Sediment carried downstream to the Jan Dissels River (IA Impact 2)	Jan Dissels River and floodplain wetland	D	Very high	0	1	1	0	1	**2**	1	2	**5**	**5**	**25**	40%	**10**	L	Medium
	<2> Refurbishment and expansion of the WWTW, including tie-ins of new units	<2a> Water quality impairment from temporary deterioration or bypass during tie-ins (IA Impact 3)	Southern seep	E	Moderate	0	2	0	1	1	**4**	2	2	**8**	**3**	**24**	60%	**14.4**	L	Medium
		<2b> Water quality impairment from temporary deterioration or bypass during tie-ins (IA Impact 3)	Jan Dissels River and floodplain wetland	D	Very high	0	2	0	0	1	**4**	2	2	**8**	**5**	**40**	40%	**16**	L	Medium
OPERATION	<3> Operation of the stormwater system: discharge of treated and attenuated stormwater from the development and the existing informal settlement into the central valley-bottom wetland system	<3a> Altered hydrological regime of the wetland (IA Impact 4)	Central valley-bottom wetland system	E	Moderate	2	1	1	2	1	**4**	2	4	**10**	**3**	**30**	80%	**24**	L	Medium
		<3b> Erosion at stormwater outlets (IA Impact 5)	Central valley-bottom wetland system	E	Moderate	1	0	2	1	0	**4**	1	4	**9**	**3**	**27**	60%	**16.2**	L	High
		<3c> Water quality impairment from urban stormwater (IA Impact 6)	Central valley-bottom wetland system	E	Moderate	0	2	1	1	1	**4**	2	4	**10**	**3**	**30**	80%	**24**	L	Medium
		<3d> Water quality impairment of the Jan Dissels River from urban stormwater (IA Impact 6)	Jan Dissels River and floodplain wetland	D	Very high	0	1	0	0	1	**2**	1	4	**7**	**5**	**35**	60%	**21**	L	Medium
	<4> Operation of the upgraded and expanded WWTW: discharge of treated effluent through the southern seep to the Jan Dissels River	<4a> Treated effluent quality in the Jan Dissels River (IA Impact 7)	Jan Dissels River and floodplain wetland	D	Very high	0	2	0	1	2	**4**	2	4	**10**	**5**	**50**	80%	**40**	M	Medium
		<4b> Altered flow regime of the Jan Dissels River from the housing development's effluent, about 640 m^3/day (IA Impact 8a)	Jan Dissels River and floodplain wetland	D	Very high	1	1	1	1	1	**2**	2	4	**8**	**5**	**40**	60%	**24**	L	Medium
		<4c> Altered flow regime of the Jan Dissels River from the full 1.5 Ml/day expansion (IA Impact 8b)	Jan Dissels River and floodplain wetland	D	Very high	2	1	1	1	1	**4**	2	4	**10**	**5**	**50**	80%	**40**	M	Medium
		<4d> Altered hydrological regime and extent of the southern seep (IA Impact 12)	Southern seep	E	Moderate	1	0	1	1	1	**2**	4	5	**11**	**3**	**33**	80%	**26.4**	L	Medium
		<4e> Treated effluent quality in the southern seep (IA Impact 13)	Southern seep	E	Moderate	0	1	0	1	1	**2**	4	4	**10**	**3**	**30**	80%	**24**	L	Medium
		<4f> Water quality impairment in the Olifants River downstream of the confluence (IA Impact 10)	Olifants River and floodplain wetland	D	Very high	0	1	0	0	1	**2**	1	4	**7**	**5**	**35**	60%	**21**	L	Medium
		<4g> Altered flow regime of the Olifants River downstream of the confluence (IA Impact 11)	Olifants River and floodplain wetland	D	Very high	1	0	0	0	0	**2**	1	4	**7**	**5**	**35**	40%	**14**	L	Medium
	<5> Irrigation of the golf course with treated effluent	<5a> Nutrient and salt loading of the central valley-bottom wetland system (IA Impact 9)	Central valley-bottom wetland system	E	Moderate	1	2	0	1	1	**4**	2	4	**10**	**3**	**30**	60%	**18**	L	Medium
		<5b> Nutrient and salt loading of the southern seep (IA Impact 9)	Southern seep	E	Moderate	1	2	0	1	1	**4**	2	4	**10**	**3**	**30**	60%	**18**	L	Medium

PROJECT: **Clanwilliam Housing Development and WWTW Expansion, Remainder Erf**

RISK ASSESSMENT MATRIX for Section 21 (c) and (i) Water Use activities - Version 2.1.1

Name of Assessor: Kimberley van Zyl
SACNASP Registration Number: Pr. Nat. Sci. Reg. No.117097 (Ecological
Date of assessment: 13-Oct-26

Phase	Activity	Impact	Significance (max = 100)	Risk Rating	Confidence level
CONSTRUCTION	<1> Construction of stormwater infrastructure (headwalls, outlets, attenuation ponds and the piped connection) in and next to the central valley-bottom wetland system, and wetland rehabilitation works	<1a> Disturbance of wetland habitat (IA Impact 1)	**14.4**	**L**	High
		<1b> Erosion and sedimentation of the wetland (IA Impact 2)	**14.4**	**L**	High
		<1c> Sediment carried downstream to the Jan Dissels River (IA Impact 2)	**10**	**L**	Medium
	<2> Refurbishment and expansion of the WWTW, including tie-ins of new units	<2a> Water quality impairment from temporary deterioration or bypass during tie-ins (IA Impact 3)	**14.4**	**L**	Medium
		<2b> Water quality impairment from temporary deterioration or bypass during tie-ins (IA Impact 3)	**16**	**L**	Medium
OPERATION	<3> Operation of the stormwater system: discharge of treated and attenuated stormwater from the development and the existing informal settlement into the central valley-bottom wetland system	<3a> Altered hydrological regime of the wetland (IA Impact 4)	**24**	**L**	Medium
		<3b> Erosion at stormwater outlets (IA Impact 5)	**16.2**	**L**	High
		<3c> Water quality impairment from urban stormwater (IA Impact 6)	**24**	**L**	Medium
		<3d> Water quality impairment of the Jan Dissels River from urban stormwater (IA Impact 6)	**21**	**L**	Medium
	<4> Operation of the upgraded and expanded WWTW: discharge of treated effluent through the southern seep to the Jan Dissels River	<4a> Treated effluent quality in the Jan Dissels River (IA Impact 7)	**40**	**M**	Medium
		<4b> Altered flow regime of the Jan Dissels River from the housing development's effluent, about 640 m^3/day (IA Impact 8a)	**24**	**L**	Medium
		<4c> Altered flow regime of the Jan Dissels River from the full 1.5 Ml/day expansion (IA Impact 8b)	**40**	**M**	Medium
		<4d> Altered hydrological regime and extent of the southern seep (IA Impact 12)	**26.4**	**L**	Medium
		<4e> Treated effluent quality in the southern seep (IA Impact 13)	**24**	**L**	Medium
		<4f> Water quality impairment in the Olifants River downstream of the confluence (IA Impact 10)	**21**	**L**	Medium
		<4g> Altered flow regime of the Olifants River downstream of the confluence (IA Impact 11)	**14**	**L**	Medium
	<5> Irrigation of the golf course with treated effluent	<5a> Nutrient and salt loading of the central valley-bottom wetland system (IA Impact 9)	**18**	**L**	Medium
		<5b> Nutrient and salt loading of the southern seep (IA Impact 9)	**18**	**L**	Medium