

APPENDIX C: DWS RISK ASSESSMENT MATRICES

RISK MATRIX (Based on DWS 2015 publication: Section 21 c and I water use Risk Assessment Protocol)

Risk to be scored for construction and operational phases of the project. MUST BE COMPLETED BY SACNASP PROFESSIONAL MEMBER REGISTERED IN AN APPROPRIATE FIELD OF EXPERTISE.

Upgrade of existing district roads to widening / strengthen current crossings for some of the road options but not all of the projects

Severity

No. Phases	Activity	Aspect	Impact	Flow Regime	Physico & Chemical (Water Quality)	Habitat (Geomorph + Vegetation)	Biota	Severity	Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Risk Rating	Confidence level	Control Measures Bordering MODS Rating (o LOW PES AND EIS OF NATE WATERCOURSE
1 Construction	Upgrade of existing district roads to widenig a trengthen current crossings	Disturbance and cleaning of vegetation within the bed and banks of indige crossing size to increase within sand crossing size to increase within sand required. Plant and associated manchinery will be used to remove! Install additional bridge infrastructure e.g. increases outer size. reclaiged experience of the control o	Loss of riparian and or instream aquatic vegetation through the disturbance, which could result in own and or sedimentation. The will also result in the and or sedimentation. The will also result in the disturbance of aquatic blocks as well as create hability and appropriate the sedimentation of approximation of a sedimentation of any such vegetations (present as the activities will occur within an area with pre-edisting disturbance.	1	,		,	1.25	1	1	3,25	2	3	5	1	11	35,75	LOW	90-100	Rehabilitate areas where active enosion is identified to re- installe natural topography and hydrological conditions. I will be a second to the recovery of the president intervients to stimulate revegetation must be installed which can include the pooking of loss not, peetedlies under a soil awere; and implement alien vegetation corter program & ensure establishment of integrous species within areas where alien vegetation was Identified.	PES = C.& D.ES = Moderate to Low
2 Construction		Localised potential changes to the flow regime, by the impedance created by the culvers if existing or agained to the culvers if existing or agained matural riverbed levels.	Surface water flow may be impeded within the natural channels when a structure is pieced within the bed of the watercourse during the construction phase, i.e. any raised structures laber than the current natural river levels may create impediance while construction takes included the contraction and the contraction are considered to the contraction and the contraction are considered to the contraction and the contraction are considered to the contraction and the contraction and the contraction are considered to the natural inverted levels and do already create a small degree of impendence.	2			1	1,25	1	2	4,26	2	2	5	1	10	42.5	LOW	96-160	The final design should take cognisance of typical baseflows and should not create any impedance of flows Natural river levels upsteem and downstream of the site resolution of the site o	PES = C.B. D ESS = Moderate to Low
3 Construction		Water quality may be affected by various construction activities which include oil and the splits, split of construction chemicals such as concrete or dry cement etc.	During construction various materials, such as sediments, diesel, oils and cementiconcrete, could downstream areas. If by chance it is dispersed via surface run-off, or are allowed to permeate into the groundwater.	1	3		2	1,75	1	1	2,76	1	1	5	1		30	tow	90-100	Chemicals used for construction must be stored safely on sits and surrounded by bunds. Chemical storage containers must be regularly impeded so that any lesses are detected early. Altering and contamination of water sources during. Attenting and contamination of water sources during. Attenting and contamination of water sources during. Aftering any less seems to the safe seems to constitution waters must be beyond the safe seems to constitution waters must be beyond the safe seems to constitution waters must be beyond the safe seems to constitution waters must be beyond the safe seems to constitution waters must be beyond the safe seems to constitution waters must be the safe safe seems to constitution waters must be the safe safe safe safe safe safe safe saf	PSS = C & D ISS = Moderate to Low
4 Construction		Destruction of habitat that may contain listed and for protected aquatic blots (flauna and flora) or fragmentation of critical blod/wessly/ecological support area.	Loss of any species of special concern and habitat continuity / habitat fragmentation as a result works within the bed or banks.	2	2		,	1,75	2	,	4,75	2	2	5	1	10	475	LOW	90-100	*The final design should take cognisance of typical baseflows and should not create any impedance of flows. *Altural river levels upstream and disvesticeam of the site value of the site	PES = C.S. D.ES = Moderate to Low

5	Operations	Operational activities will be limited to vehicles using the bridge crossings, will the only articipated activities within the only articipated activities within the repair and maintenance of the crossing instancturate (u	Limited disturbance of the beds and banks while maintenance and repairs are conducted, but would be limited to the existing crossing footprinted which	1	,	,	1	1	1	1	3	1	1	5	1	8	24	tow	90-100	Rehabilitate areas where active erosion is identified to re-instate natural topography and hydrological conditions; Monitor learns and incidion within affected quantities revegetation must be installed which can incide the packing of loss rock, posteroities such as all laws and implement allers vegetation control program & ensure establishment of indigenous posteriors within areas where allen vegetation was identified	PES = C & D EIS = Moderate to Low
6	Operations	Stormwater runoff in the operations phase	increased velocity of surface water flows generated by hardened surface and through morpore stormwater management increase the potential for erosion and then sedimentation downstream.	1	2	2	1	1,5	1	1	3.5	,	1	5	1	8	28	LOW	99-100	A stormwater management plan must be developed in the preconstruction phase, detailing the stormwater structures and management interventions that must be installed to and management interventions that must be installed to make a stormwater management must include efficient sebilisation (galbons and Reno matteresse) of exposed soil and the re-vegetation of must except of exposed soil and the re-vegetation of except soil and the re-vegetation of t	PES = C & D EIS = Moderate to Low

NEW INTERNAL ACCESS ROADS AND UNDERGROUND CABLES - MINOR WATERCOURSE CROSSINGS ONLY AS SUPPORTING BIFRASTRUCTURE OF THE WIND FARMS (TURBINES, SUBSTATIONS AND LAYDOWN AREAS HAVE AVOIDED WATERCOURSES). ALL PANS AND WITLANDS INCO 16 BUFFER HAVE ALSO BEEN AVOIDED by THE PROPOSED LAYOUTS

Severity

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No.	Phases	Activity	Aspect	Impact	Flow Regime	Physico & Chemical (Water Quality)	Habitat (Geomorph + Vegetation)	Biota	Severity	Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Risk Rating	Confidence level	Control Measures	Borderline LOW MODERATE Rating Classes	PES AND EIS OF WATERCOURSE
	1 Construction	WIND PARMS (URBINES, SUBSTATIONS AND LAYDOWN AREAS HAVE AVOIDED WATERCOURSES). ALL PANS AND WETLANDS INCL OF BUFFER HAVE ALS OBEEN AVOIDED BY THE PROPOSED LAYOUTS I.E. New watercourse crossings within minor watercourses and or associated buffer, but not any wetlands	bridge infrastructure e.g. culvert, shape approach roads, build wing walls and erosion protection and energy	Loss of riparian and or instream equatic vegelation unsable soils that has the potential to create enalon and or sedimentation. This will also result in the disturbance of aquatic blocks as well as create habbat fragmentation if any such vegelation is present.	' '	2	2	2	1,75	1	2	4.75	2	3	s	1	11	\$2,25	LOW	90-100	Rehabilities areas where active enosion is identified to re- instalen natural topography and phytological conditions within affected angulic resources, and where it persists inference to stimulate recognitions, and within a process inference to a single recognition must be installed which can include the packing of loss rock, geodestiles such as old servers and packing of loss rock, geodestiles such as old servers and entirely and the service areas where after vegetation was identified.		PES = C & D EIS = Moderate to Low
	2 Construction		regime, by the impedance created by the culverts when structures are placed	Surface water flow may be impeded within the natural classics when a structure is placed within the bed of the watercome during the construction base, i.e. any raised structures higher than the current natural river levels may create impedance while construction takes place.	2			2	1,5	1	2	u	2	2	5	1	10	45	LOW	90-100	The final design should take cogrisance of typical baseflows and should not create any impedance of flows. Natural river levels upsteam and downstream of the sale riverbed, it, not create any impedance of flows reviewed, it, and create any obstruction fining any faura. From moving up or downstream. Advices movement within the watercourse should be limited with the sale course should be limited and basis of the course o	d	PES = C & D EIS = Moderate to Llow

3 Construction		Water quality may be affected by various construction activities which construction chemicals such as concrete or dry cement etc.	During construction various materials, such as sediments, direct ofts and comenticoncete, could pose a threat to the continued throoting of downstream areas, if by chance it is dispersed via surface run-off, or are allowed to permetale into the groundwater.	,	ı		2	1,5	1		35	,	,			28	LOW	-Chemicals used for construction must be stored sately on site and surrounded by bunds. Chemical storage containers must be regulately inspected on that any lesies are decided early. Allowing and containment of matter sources during a large storage of the storage of containing and surfaces and valetic countee.
4 Construction		Destruction of habital that may contain fisited and / or protected aquatic bloth critical bedwersity / ecological support area.	Loss of any species of special concern and habitat continuity / habitat fragmentation created by the works within the bed or banks	1	,	1	3	1,5	2	,	45	2	2		10	45	LOW	The final design should take cognitance of typical baseflows and should not create any impediance of flavor and the state of the state should be maintained, that allowing for control of the site should be maintained, that allowing for control within the inverbed, i.e. not create any obstruction limiting any fama from moving up or downstream completed, all distributed areas. *About construction has been completed, and instructed areas where construction has been completed only one of the state
5 Operations		Operational activities will be limited to vehicles using the bridge crossings, will the only articipated activities within the only articipated activities within the repair and maintenance of the crossing infrastructure (cottes, guard ratia and erosion protection/stormwater management features).	maintenance and repairs are conducted, but would be limited to the existing crossing footprinted which	1	,	1	1	1	1	1	3	1	1		8	24	LOW	Rehabilitate areas where active erosion is identified to re-instate natural topography and hydrological conditions; Monitor for restora and suctions within affected assatis, and the state of the stat
6 Operations		Stormwater runoff in the operations phase	Isocrazed velocity of surface water flows generated by hardened surfaces and through improper stommwater managements increase the potential for erosion and then sedimentation downstream.	2	2	2		1,75	1	,	3,76	1	,	. ,	8	30	LOW	A stormwater management plan must be developed in the preconstruction phase, detailing the stormwater structures and management interviews the must be inflated to an examplement interview to the must be inflated to the structure of the structur
NEW INTERNAL ACCESS RC PANS AND WETLAN	DADS AND UNDERGROUND CABLES - WIT DOS INCL OF BUFFER HAVE ALSO BEEN AV	THIN SOOM OF A WETLAND BOUNDARY, ALL OIDED BY THE PROPOSED LAYOUTS.			Sev	verity												
No. Phases	Activity	Aspect	Impact	Flow Regime	Physico & Chemical (Water Quality)	Habitat (Geomorph + Vegetation)	Biota	Severity	Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal issues Detection	Likelihood	Significance	Risk Rating	Control Measures Bonderine LOW MODERATE Rating Classes WATERCOURSE

1 Construction	NEW INTERNAL ACCESS ROADS AND UNDERGROUND WITH LAND EXCUNDARY, ALL PANS AND WETLANDS SINCL OF BUFFER INVAL ALS DIEED AVOIDED BY THE PROPOSED Lithrance and clearing of vegetation AVOIDED BY THE PROPOSED Lithrance and clearing of vegetation within the explaint of the proposed of the prop	Loss of riparian and or instream aquatic vegetation brough the disturbance, which could result in unstable soits that has the potential to create erosion disturbance of aquatic bolds as well a create habitat fragmentation if any such vegetation is present.	,	2	2	2	1,75	1	2	4.78	2	3	5	1	11	\$2.25	LOW	90-100	Rehabilitate areas where active erosion is identified to re- instate natural topography and hydrological conditions; Montror for erosion and incision within affected aquatic resources, and where it presists interventions to stimulate resources, and where it presists interventions to stimulate activity of the properties of the properties of the properties of the properties of the properties of the properties of the properties of the properties of the properties of the transfer of the properties of the properties of the transfer of the properties of the properties of the properties of properties of properties properties properties of properties	PES = C & D EIS = Moderate to Low
2 Construction	Localised potential changes to the flow regime, by the singled and created by the singled and created by higher than the natural riverbed levels.	Surface water flow may be impeded within the natural channels when a structure is placed within the bed of surface within the standard place of the surface	2	,		2	1.5	1	2	45	2	2	5	1	10	45	LOW	99-100	*The final design should take cognision of hybical basellows and should not create any impedance of flows *Natural river levels upstream and downstream of the site should be maintained, thus allowing for confunity within the riverbed, i.e. not create any destruction limiting any floars which the site of t	PES = C & D EIS = Moderate to Low
3 Construction	Water quality may be affected by vertices construction activities which include oil and full epiths, spit of construction chemicals such as concret or dry cement etc.	During construction various materials, such as sediments, dissel, oils and cementiconcrete, could pose a threat to the continued functioning of continued functioning of continued functioning of continued function of cont	,	2		2	1,5	1	,	2.5	1		5	,		28	LOW	90-100	Chemicals used for construction must be stored safely on site and surrounded by bunds. Chemical storage containers resignatively inspected so that any leaks are detected valy. Litering and containmitiation of water sources during construction must be prevented by effective construction carry minargement and the in place in ceed or place onto road surfaces and water course. As a stocyling should take place within a valer course. All stocylines must be prevented from ension, stored on flat by bunds. Stocylines must be protected from ension, stored on flat storage of the storage of the storage of the surrounded by bunds. Stocylines must be located away from river channels. Erication and sedimentation into channels must be minimized through the effective stabilisation (gabiners and when the surrounded or the surrounded or any disturbed riverbanks. The construction camp and necessary abultion facilities meant for construction workers must be beyond the surrounded buffers shown in Figure 6 as shown in the Aquatic Assessment Attached	PES = C & D EIS = Moderate to Low
4 Construction	Destruction of habital that may contain islated and for protected aqualic bolds (fama and flora) or figurestation of critical blodiversity / ecologicia support ana	Loss of any species of special concern and habitat continuely / habitat fragmentation created by the works within the bod or banks.	,	,		3	15	2	,	45	2	2	5	,	10	45	LOW	90-100	*The final design should take cognitance of typical baseflows and should not create any impediance of flows a shatural river levels upstream and downstream of the site should be maintained, thus allowing for continuity within the reviewoid. I. or, not create any obstruction intelling any fauna from reviewoid. I. and create any obstruction intelling any fauna from "Once construction has been completed, all disturbed areas should be monitored with regard revergeation which should occur naturally, thus preventing unstable soils. Seeding should occur naturally, on any state of the soil of the contraction of the contraction of the soil of the contraction of the contraction of the soils are should be included in the designs to prevent tude any congression of soils "ded and bank revision protection should be included in the designs to prevent tude any congression of soils."	PES = C. B. D. ESS = Moderate to Leav
5 Operations	Operational activities will be limited to vehicles using the bridge crossings, with the control of the control	maintenance and repairs are conducted, but would be limited to the existing crossing footprinted which includes the extermunity and crossing postprinted which	1				,	1	1	3	1	,	5	1	8	24	LOW	90-100	Behabilitate areas where active erosion is identified to re-instate natural topography and hydrological conditions. Monitor for hydrological conditions. Monitor for where it persists interventients to stimulate erosures, and where it persists interventients to stimulate erosures are to be installed which can enclude the packing of loss rock, good sections which are also also areas and implement allen vegetation control program & ensure exhibition of hodgemous persists within areas where allen vegetation was identified.	PES = C & D ES = Moderate to Low

6 Operation		Stormwater runoff in the operations phase	Increased valority of surface water flows generated by hardened surfaces and through improper stormwater management increase the potential for erroison and then sedimentation downstream.	2	2	2	1	1,75	1	1	3,75	,	1	5	1		30	LOW	90-100	A stormwater management plan must be developed in the preconstruction phase, detailing the stormwater structures and management interventions that must be installed to be a stormwater structure and management interventions that must be installed to make the preconstruction of the properties of the p		PES = C & D EIS = Moderate	že to
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TURBINES, HARDSTAND AREAS AND BLADE LAYDOWNS WITHIN SOOM OF A WETLAND BOUNDARY - ALTHOUGH ALL PANS AND WETLA HAVE BEEN AVOIDED INCL OF BUFFER THEREFORE NO DIRECT IMPACTS

Severity

No.	Phases	Activity	Aspect	Impact	Flow Regime	Physico & Chemical (Water Quality)	Habitat (Geomorph + Vegetation)	Biota	Severity	Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Risk Rating	Confidence level Control Measures	Borderline LOW MODERATE Rating Classes	PES AND EIS OF WATERCOURSE
	Construction	Turbines, hardstands and laydown areas only within 500m of westland boundary, but not estimate boundary, but not estimate boundary, but not associated buffers areas or the	Disturtance and clearing of vegetation within 500m of a welland boundary	All wellands (pons and valley bottom areas) have been avoided by the proposed layout these no disturbance of any vegetation roution associated with these systems are articipated.		,		,	1	1	1	,	1	1	5	,		24	LOW	Approval of the current tayout is provided in which welland areas will be avoided.		PES = C & D EIS = Moderate to Low
2	Construction		Water quality may be affected by various construction activities which include oil and the sight, spill of control or construction chemicals such as concrete or dry cerement etc.	All welfands (pans and valley bottom areas) have been avcided by the proposed layouts thus no direct disturbance of bress systems are articipated	•			2	1,25	1	1	3,26	1	1	•	•		26	LOW	-Chemicals used for construction must be stored safely on site and surraunded by burds. Chemical storage contains and are unusually contained by the safe storage contained on the day leads are defected safely. -Littering and contamination of water sources during construction must be prevented by effective construction. -Contained the safe safe safe safe safe safe safe saf		PES = C & D EIS = Moderate to Low
3	Construction		Destruction of habital that may contain listed and I or protected aquatic binds (fauna and fora) or fragmentation of clause also bindivensity feedingscal support area.	Joss of any species of special concern and habitat continuity / habitat fragmentation created by the works however, wettanking jours and valley below a result have been avoided by the proposed injusts thus no elirect disturbance of any vegetation or rolls accounted with these systems are anticipated		·			1	1	1	,	1	1	s	,	٥	24	LOW	*The first design should take cognisions of typical baseflows and should not receive any impedience of those **Autor in vivil several several may be a several		PES = C & D EIS = Moderate to Low

4	Construction	Placement of elevate structures	Localised potential changes to the flow regime, by the impedance created when structures are placed higher than the natural levels	1	,	,	,	1	1	,	,	,	1	5	1		24	LOW	-The finel design should take cognisions of typical baseflows and should not create any impedance of flows *Natural river levels upstream and downstream of the ails should be amaintained, thus allowing for continuity within the should be amaintained, thus allowing from the similar any flausa from moving up or downstream. *Sometime of the similar and the similar and the similar between the similar and the similar between the similar and the similar between the similar simi	
5	Operations	Stomwater runoff in the operations phase due to placement of hard surfaces	Iscreased velocity of surface water flows generated by hardened surface and through improper stomwater management increase the potential for evision and then sedimentation downstream.		1	,		1	1	1	3	,	1	5	1	s	24	LOW	A stormwater management plan must be developed in the preconstruction place, dealing the software structures and management intervients that must be installed to an advantagement intervients that must be installed to a structure of the plant of the pla	PES = C & D EIS = Moderate to Low