Western Cape Government

Appendix J – Impact Assessment

DR 1797 Road Upgrade Project

DEA&DP Reference Number: 16/3/3/1/D1/9/0011/20

Hatch project number: H357403

Table 1-2: Expected Impacts for the No-Go Alternative

No Go Alternative									
Activity	Nature of Impact	Extent (1-3)	Intensity (1-3)	Duration (1-3)	Consequence		Probability	Overall Significance	Status of Impact
					Combined Score	Rating			
Agriculture / Soils									
Should the DR 1797 Road not be upgraded , there will be no loss of agricultural land	Direct	1	1	1	3	Very Low	Definite	Very Low	Positive Impact
Landscape / Visual									
Should the DR 1797 Road not be upgraded, current poor road alignment and visibility may remain.	Direct	1	2	2	5	Low	Definite	Low	Negative Impact
Archaeological and Cultural Heritage									
Not Applicable									
Paleontology									
Not Applicable									
Terrestrial Biodiversity including Plant and Animal Species									
Continuation of infestation of alien invasive vegetation along the DR 1797 Road.	Direct	1	2	1	4	Very Low	Definite	Very Low	Negative Impact
As no agricultural land will be expropriation, no indigenous vegetation will be lost.	Direct	1	2	3	6	Medium	Definite	Medium	Positive Impact
Aquatic Biodiversity									
Continuation of infestation of alien invasive vegetation along the DR 1797 Road and within channels may disperse and migrate into the water courses .	Direct	1	2	2	5	Low	Possible	Very Low	Negative Impact
The drainage throughout the DR 1797 Road has not been maintained, this has compromised the flow of water and may continue to impact on the aquatic biodiversity.	Direct	1	2	2	5	Low	Definite	Low	Negative Impact
Noise									
Not Applicable									
Traffic									
Not Applicable									
Geotechnical									
Not Applicable									
Socio-Economic Environment									
Should the DR 1797 Road not be upgraded the current socio-economic status of the area may remain unchanged.	Direct	2	2	2	6	Medium	Possible	Low	Negative Impact
Should the DR 1797 Road not be upgraded poor road conditions and safety problems may persist.	Direct	1	2	2	5	Low	Possible	Very Low	Negative Impact
Air Quality									
Nuisance dust fallout as result of traffic on the gravel DR 1797 Road will continue should the DR 1797 Road not be upgrade.	Direct	1	2	2	5	Low	Definite	Low	Negative Impact
Topography and Climate									
Not Applicable									
Geology									
Not Applicable									

Table 3: Expected Impacts, Cumulative Impacts and Residual Impacts for the Preferred Alternative – CONSTRUCTION PHASE

Construction Phase												
Activity	Nature of Impact	Impact Type	Extent (1-3)	Intensity (1-3)	Duration (1-3)	Consequence		Probability	Overall Significance	Status of Impact	Mitigation	Confidence of Assessment
						Combined Score	Consequence Rating					
Agriculture / Soils												
Portion of small holding to be expropriated for the upgrade of the DR 1797 Road.	Direct	Expected	1	2	3	6	Medium	Definite	Medium	Negative Impact	• Landowner to be compensated for expropriated land..	High
		Cumulative	1	2	3	6	Medium	Definite	Medium			
		Residual	1	1	3	5	Low	Definite	Low			
Areas with high land capability to be expropriated for the upgrade of the DR 1797 Road.	Direct	Expected	1	2	3	6	Medium	Definite	Medium	Negative Impact	• Areas of high land capability avoided where possible.	High
		Cumulative	1	2	3	6	Medium	Definite	Medium			
		Residual	1	1	3	5	Low	Definite	Low		• Disturbed areas as part of the construction activities (excluding the expropriation areas, , to be rehabilitation back to natural state, where possible.	
Clearance of vegetation due to the DR 1797 Road upgrade and expropriation of land may lead to soil erosion.	Direct	Expected	1	2	1	4	Very Low	Possible	Insignificant	Negative Impact	• Remove all topsoil from construction areas and expropriation areas and stockpile in a demarcated area. • Limit vegetation removal to physical footprint of road reserve and expropriation areas. • During the construction phase, special attention must be given to the maintenance of topsoil, soil and subsoil stockpiles to avoid erosion and alien invasion. • Stockpiles may not be higher than 2 m. • Areas where rehabilitation occurs, removal of any topsoil must be sufficiently restored through sustainable measures and practices. • Erosion control measures (for wind and water erosion) must be implemented and maintained in areas disturbed by construction such as berms to hinder stormwater flow, revegetation of areas with indigenous vegetation. • In the case of dust fallout due to the topsoil stockpiled, water or an appropriate dust suppressant must be sprayed onto topsoil stockpiles until such time as the topsoil stockpiles natural seedbank has been restored.. Water may not be used from any watercourse without a WUL. • To reduce dust fallout due to the road upgrades, water or an appropriate dust suppressant must be sprayed onto the road. • In areas where disturbance have occurred due to construction activities, a concerted effort must be made to actively rehabilitate, repaired or reshaped banks with indigenous local vegetation.	High
		Cumulative	1	2	1	4	Very Low	Improbable	Insignificant			
		Residual	1	1	1	3	Very Low	Possible	Insignificant		• If mitigation measures are put in place to manage the impacts, then little to no residual impacts should remain.	

Construction Phase											
Activity	Nature of Impact	Impact Type	Extent (1-3)	Intensity (1-3)	Duration (1-3)	Consequence		Probability	Overall Significance	Status of Impact	Mitigation	Confidence of Assessment
						Combined Score	Consequence Rating					
	Indirect – Eroded soil could possibly end up in surrounding surface water features	Expected	1	2	1	4	Very Low	Probable	Very Low	Negative Impact	• Erosion control measures (for wind and water erosion) must be implemented and maintained in areas disturbed by construction such as berms to hinder stormwater flow, revegetation of areas with indigenous vegetation. • Soil stockpiles must not be deposited / stored within riparian areas (watercourses and their banks). • Stormwater management on site must be in line with the DEA&DP Maintenance Management Plan (MMP) Guidelines (DEA&DP, 2017) to prevent soil erosion.	
		Cumulative	1	1	1	3	Very Low	Improbable	Insignificant			
		Residual	1	1	1	3	Very Low	Improbable	Insignificant		• If mitigation measures are put into place to manage the impacts, then little to no residual impacts should remain.	
Soil compaction due to heavy machinery and equipment during construction.	Direct	Expected	1	2	1	4	Very Low	Probable	Very Low	Negative Impact	• Construction vehicles must be restricted to the physical footprint of road reserve and expropriation areas • Construction activities are to remain within the physical footprint of road reserve and expropriation areas • Physical footprint of road reserve and expropriation areas are to be demarcated. • Where soil compaction has occurred in areas to be rehabilitated, these areas are to be ripped and seeded with indigenous vegetation mix.	High
		Cumulative	1	1	1	3	Very Low	Possible	Insignificant			
		Residual	1	1	1	3	Very Low	Improbable	Insignificant		• If mitigation measures are put into place to manage the impacts, then little to no residual impacts should remain.	
	Indirect – Soil compaction resulting poor infiltration and increased runoff to surrounding system	Expected	1	2	1	4	Very Low	Probable	Very Low	Negative Impact	• Construction vehicles must be restricted to the physical footprint of road reserve and expropriation areas • Construction activities are to remain within the physical footprint of road reserve and expropriation areas • Physical footprint of road reserve and expropriation areas are to be demarcated. • Where soil compaction has occurred in areas to be rehabilitated, these areas are to be ripped and seeded with indigenous vegetation mix. • Where runoff occurs, stormwater berms must be used and silt traps must be installed and maintained. •	
		Cumulative	1	2	1	4	Very Low	Possible	Insignificant			
		Residual	1	1	1	3	Very Low	Improbable	Insignificant		• If mitigation measures are put into place to manage the impacts, then little to no residual impacts should remain.	

Construction Phase											
Activity	Nature of Impact	Impact Type	Extent (1-3)	Intensity (1-3)	Duration (1-3)	Consequence		Probability	Overall Significance	Status of Impact	Mitigation	Confidence of Assessment
						Combined Score	Consequence Rating					
Soil pollution due to hazardous substances spills.	Direct	Expected	2	3	1	6	Medium	Probable	Medium	Negative Impact	• Environmental conditions must be included in any construction contracts, thereby making contractors accountable for preventing accidental spillages and well as allowing contractors to cost for environmental conditions. • All earth moving vehicles and equipment must be regularly maintained. No repairs may be undertaken on site unless it is an emergency repair and the vehicles cannot be moved. All repairs must be conduct on a impervious surfaces to prevent soil contamination. • All earth moving vehicles and equipment must have the relevant drip trays (geyser drip trays are not acceptable) strategically placed underneath to prevent any soil contamination. In particular, drip trays are to be closely monitored during rain events to ensure that they do not overflow • All hazardous substances must be stored on an impervious surface in a designated bunded area, able to contain 110% of the total volume of materials stored at any given time. Storage areas must have a roof and be well ventilated and marked with appropriate signage (volume of bunded areas, volume of hazardous substances within in bund).Material Safety Data Sheet (MSDS) must be available on site for all hazardous substances. • If a spillage of a hazardous substance occurs, the spill must be stopped, minimized and the resultant hazardous waste must be cleaned up using absorbent material provided in spill kits on site and disposed of in a designated hazardous waste bin. • Any incidents must be reported as soon as possible. Measures must be put in place to prevent similar incidences from occurring. If necessary, remediation of any contamination must be carried out. • All hazardous waste must be stored in designated, lined and bunded areas (for no longer than 90 days • All hazardous waste must be disposed of at a registered hazardous waste disposal facility .	High
		Cumulative	2	2	1	5	Low	Possible	Very Low			
		Residual	1	1	1	3	Very Low	Improbable	Insignificant		• If mitigation measures are put into place to manage the impacts, then little to no residual impacts should remain.	

Construction Phase											
Activity	Nature of Impact	Impact Type	Extent (1-3)	Intensity (1-3)	Duration (1-3)	Consequence		Probability	Overall Significance	Status of Impact	Mitigation	Confidence of Assessment
						Combined Score	Consequence Rating					
Loss of topsoil due to incorrect stockpiling and poor rehabilitation	Direct	Expected	1	3	1	5	Low	Improbable	Very Low	Negative Impact	• Remove all topsoil from construction areas and expropriation areas and stockpile in a demarcated area. • Limit vegetation removal to physical footprint of road reserve and expropriation areas. • During the construction phase, special attention must be given to the maintenance of topsoil, soil and subsoil stockpiles to avoid erosion and alien invasion. • Topsoil stockpiles must be maintained to ensure no alien invasive vegetation growth or erosion occurs. • Stockpiles may not be higher than 2 m. • In the case of dust fallout due to the topsoil stockpiled, water or an appropriate dust suppressant must be sprayed onto topsoil stockpiles until such time as the topsoil stockpiles natural seedbank has been restored.. Water may not be used from any watercourse without a WUL. • Topsoil stockpiles to be monitored and inspected weekly for vegetation establishment, alien removal, and extent of erosion.	High
		Cumulative	1	3	1	5	Low	Improbable	Very Low			
		Residual	1	3	1	5	Low	Improbable	Very Low		• If mitigation measures are put into place to manage the impacts, then little to no residual impacts should remain.	
Incorrect disposal of waste aggregate.	Indirect Impact – Waste material not stockpiled and stored correctly	Expected	1	2	1	4	Very Low	Possible	Insignificant	Negative Impact	• All waste aggregate to be removed from site immediately and disposed of at a license waste management facility, unless material is reused during construction activities. • Separate waste disposal skips to be obtained for various waste streams, where possible. • If waste aggregate is stockpiled on site, this must be within the allocated demarcated area.	High
		Cumulative	1	2	1	4	Very Low	Possible	Insignificant			
		Residual	1	1	1	3	Very Low	Improbable	Insignificant		• If mitigation measures are put into place to manage the impacts, then little to no residual impacts should remain.	
Loss of agricultural land due to poorly demarcate expropriation areas.	Direct	Expected	1	3	3	7	High	Possible	Medium	Negative Impact	• During the engineering phase of the project, areas of environmental and socio-economic importance were avoided, where possible. • All construction and expropriation areas to be demarcated prior to clearing activities. • Limit vegetation removal to physical footprint of road reserve and expropriation areas.	High
		Cumulative	1	2	3	6	Medium	Improbable	Low			
		Residual	1	1	3	5	Low	Improbable	Very Low		• If mitigation measures are put into place to manage the impacts, then little to no residual impacts should remain.	
Landscape / Visual												
	Direct	Expected	1	1	1	3	Very Low	Definite	Very Low			High

Construction Phase											
Activity	Nature of Impact	Impact Type	Extent (1-3)	Intensity (1-3)	Duration (1-3)	Consequence		Probability	Overall Significance	Status of Impact	Mitigation	Confidence of Assessment
						Combined Score	Consequence Rating					
Litter and bad housekeeping from construction staff.		Cumulative	1	1	1	3	Very Low	Possible	Insignificant	Negative Impact	• All construction staff will be made aware of the waste management conditions in line the EMPr. • Waste bins must to be made available by the contractor for the disposal of general and hazardous waste. Proof of disposal must be obtained and kept on site. • Daily site walk throughs must be undertaken by the contractors before the shift ends to clean the site.	
		Residual	1	1	1	3	Very Low	Improbable	Insignificant		• If mitigation measures are put into place to manage the impacts, then little to no residual impacts should remain.	
Clearing of vegetation in expropriation areas.	Direct	Expected	1	2	3	6	Medium	Definite	Medium	Negative Impact	• During the engineering phase of the project, areas of environmental and socio-economic importance were avoided, where possible. • Limit vegetation removal to physical footprint of road reserve and expropriation areas. • Remove all topsoil from construction areas and expropriation areas and stockpile in a demarcated area. • Ensure that all existing indigenous vegetation is retained wherever possible. Where possible, indigenous vegetation is to be stored in a nursery and used as part of rehabilitation. and • Rehabilitate areas all disturbed areas caused by the construction activities (excluding the expropriation areas, where possible.	High
		Cumulative	1	1	3	5	Low	Possible	Very Low		• If mitigation measures for the expected impacts are adhered to, the cumulative impacts will be minimal.	
		Residual	1	1	3	5	Low	Improbable	Very Low		• If mitigation measures are put into place to manage the impacts, then little to no residual impacts should remain.	
Inadequate rehabilitation of the construction footprint.	Direct	Expected	1	3	2	6	Medium	Probable	Medium	Negative Impact	• Disturbed areas caused due to the construction activities are to be rehabilitated as soon as construction activities within those areas have ceased. • The ECO to conduct a close out inspection of rehabilitation areas before the contractor leaves site to ensure that effective rehabilitation has been carried out. A close-out audit must be compiled in this regard. • Rehabilitation conditions must be incorporated into the construction contractors' requirements.	High
		Cumulative	1	2	1	4	Very Low	Possible	Insignificant			
		Residual	1	1	1	3	Very Low	Improbable	Insignificant		• If mitigation measures are put into place to manage the impacts, then little to no residual impacts should remain.	
Archaeological and Cultural Heritage												

Construction Phase											
Activity	Nature of Impact	Impact Type	Extent (1-3)	Intensity (1-3)	Duration (1-3)	Consequence		Probability	Overall Significance	Status of Impact	Mitigation	Confidence of Assessment
						Combined Score	Consequence Rating					
Archaeological and cultural heritage chance finds during the excavation within the expropriation areas.	Direct	Expected	1	3	1	5	Low	Possible	Very Low	Negative Impact	• All contractors to implement "Chance Find Procedure" as per the EMPr. • Should any archaeological artefacts be exposed during construction, the activities near the findings must be stopped immediately. Under no circumstances shall any artefact be destroyed. Such an archaeological site must be marked and fenced off, and the South African Heritage Agency must be contacted immediately. If these appear to be human remains. the South African Police Service must also be contacted.	High
		Cumulative	1	1	1	3	Very Low	Improbable	Insignificant		• If mitigation measures for the expected impacts are adhered to, the cumulative impacts will be minimal.	
		Residual	1	1	1	3	Very Low	Improbable	Insignificant		• If mitigation measures are put into place to manage the impacts, then little to no residual impacts should remain.	
Paleontology												
Paleontological chance finds during the excavation within the expropriation areas.	Direct	Expected	1	3	1	5	Low	Possible	Very Low	Negative Impact	• All contractors to implement "Chance Find Procedure" as per the EMPr. • Should any paleontological artefacts be exposed during construction, the activities near the findings must be stopped immediately. Under no circumstances shall any artefact be destroyed. Such a paleontological site must be marked and fenced off, and the South African Heritage Agency must be contacted immediately.	High
		Cumulative	1	1	1	3	Very Low	Improbable	Insignificant		• If mitigation measures for the expected impacts are adhered to, the cumulative impacts will be minimal.	
		Residual	1	1	1	3	Very Low	Improbable	Insignificant		• If mitigation measures are put into place to manage the impacts, then little to no residual impacts should remain.	
Terrestrial Biodiversity including Plant and Animal Species												
Loss of Tsitsikamma Sandstone Fynbos.	Direct	Expected	1	1	3	5	Low	Probable	Low	Negative Impact	• Limit vegetation removal to physical footprint of road reserve and expropriation areas.. • Prior to the commencement of vegetation clearing, search and rescue for fynbos bulb populations by a trained specialist. • Where possible, Where possible, the fynbos bulbs should be stored in a nursery and used as part of rehabilitation t.	High

Construction Phase											
Activity	Nature of Impact	Impact Type	Extent (1-3)	Intensity (1-3)	Duration (1-3)	Consequence		Probability	Overall Significance	Status of Impact	Mitigation	Confidence of Assessment
						Combined Score	Consequence Rating					
		Cumulative	1	1	2	4	Very Low	Probable	Very Low		• Where possible, aloes planted within the road reserve, should be removed and stored in a nursery and used as part of rehabilitation • Where *Dovyalis caffra* (Kei Apple) has been planted on private property to form security hedges, the plants should be removed and, where possible, kept in a nursery for later replanting. This must be negotiated with the respective landowners.	
		Residual	1	1	2	4	Very Low	Probable	Very Low		• If mitigation measures are put into place to manage the impacts, then little to no residual impacts should remain.	
Potential loss of species of concern (namely *Afrocarpus falcatus* (Outeniqua Yellowwood) and *Pittosporum viridiflorum* (Cheesewood).	Direct	Expected	1	2	3	6	Medium	Definite	Medium	Negative Impact	• If avoidance is not possible, impacted protected tree species are to be replaced (like-for-like where possible), in a suitable nearby location. • Protected species permits are required from the DEFF for disturbance (cutting or removal) of the Protected trees.	High
		Cumulative	1	2	3	6	Medium	Definite	Medium			
		Residual	1	1	3	5	Low	Definite	Low			
Potential sedimentation and erosion due to construction activities.	Direct	Expected	1	2	1	4	Very Low	Definite	Very Low	Negative Impact	• Erosion control measures (for wind and water erosion) must be implemented and maintained in areas disturbed by construction such as berms to hinder stormwater flow, revegetation of areas with indigenous vegetation. • Topsoil, soil and subsoil must be stockpiled separately, for rehabilitation purposes. • Stockpiles must not be deposited / stored within riparian areas (watercourses and their banks). • Stockpiles may not be higher than 2 m. • During rehabilitation, prompt and progressive reinstatement of bare areas is required. The topsoil layer is to be replaced on top during reinstatement. • Erosion control measures (for wind and water erosion) must be implemented and maintained in areas disturbed by construction such as berms to hinder stormwater flow, revegetation of areas with indigenous vegetation. • Any disturbed areas caused as a result of the construction activities which may lay bare for an extended periods, should be temporarily grassed. • Checks must be carried out at regular intervals to identify areas where erosion is occurring. • Where paths may cause erosion, these paths should be relocated and rehabilitated to reduce further erosion. • Increased sediment loads must be prevented from entering watercourses.	High
		Cumulative	1	2	1	4	Very Low	Probable	Very Low			
		Residual	1	1	1	3	Very Low	Possible	Insignificant			

Construction Phase											
Activity	Nature of Impact	Impact Type	Extent (1-3)	Intensity (1-3)	Duration (1-3)	Consequence		Probability	Overall Significance	Status of Impact	Mitigation	Confidence of Assessment
						Combined Score	Consequence Rating					
Infestation of alien invasive species within areas where construction activities have occurred.	Direct	Expected	1	2	3	6	Medium	Possible	Low	Negative Impact	• Limit vegetation removal to physical footprint of road reserve and expropriation areas.. • Upon commencement of construction, a photographic record of invasive alien plants present in the physical footprint of road reserve and expropriation areas must be made. • After revegetation has been completed, the Contractor must remove weeds and alien invasive plants at the construction sites and adjacent areas on a monthly basis, until the end of the defects liability period of the contract. • Special care must be taken when removing alien invasive plants from site, so as to not to leave any part of the plant behind. When removing alien invasive plants, soil disturbance must be minimised to prevent as little germination as possible as alien invasive plants can spread their seeds when disturbed. • All felled or cut alien invasive plants must be removed from site and appropriately disposed of. • Care must be taken to avoid the introduction of alien invasive plant species to the site. Particular attention must be paid to imported material such as building material, fill material or dirty earth - moving equipment. Stockpiles should be checked regularly and any weeds emerging from material stockpiles must be removed. • A monitoring program should be put in place to remove alien vegetation and maintain areas free from alien invasions during construction. • Within, and in proximity to the wetland, successful re-vegetation, if required, is crucial to stabilise soils and limit infestation by invasive alien plant species. Rehabilitation should be undertaken on a progressive basis in these areas.	High
		Cumulative	1	1	1	3	Very Low	Possible	Insignificant			
		Residual	1	1	1	3	Very Low	Possible	Insignificant			
Aquatic Biodiversity												

Construction Phase											
Activity	Nature of Impact	Impact Type	Extent (1-3)	Intensity (1-3)	Duration (1-3)	Consequence		Probability	Overall Significance	Status of Impact	Mitigation	Confidence of Assessment
						Combined Score	Consequence Rating					
Potential impact on the aquatic habitats adjacent to the proposed work areas.	Direct	Expected	1	3	2	6	Medium	Definite	Medium	Negative Impact	• Work within the watercourses and wetland areas must be limited as far as possible to remain within the physical footprint of road reserve and expropriation areas. • The disturbed areas should be rehabilitated on a progressive basis in these areas to reduce soil erosion and alien invasive vegetation growth. • Where possible, the construction within watercourses should take place during the drier months of the year. • Limit vegetation removal to physical footprint of road reserve and expropriation areas • Care must be taken to avoid the introduction of alien invasive plant species to the undisturbed areas. • The upgraded culvert structures should be adequately sized and installed in the watercourses in such a manner so as to not increase the rate of deposition or erosion at the structure.	High
		Cumulative	1	2	2	5	Low	Probable	Low		• Only existing disturbed areas should be utilised as laydown and stockpile areas if required. • Waste material should be removed to authorized waste facilities. • Where there are steeper gradients along the road, erosion control measures (for wind and water erosion) must be implemented and maintained such as berms to hinder stormwater flow, revegetation of areas with indigenous vegetation.	
		Residual	1	1	1	3	Very Low	Possible	Insignificant		• If mitigation measures are put into place to manage the impacts, then little to no residual impacts should remain.	

Construction Phase											
Activity	Nature of Impact	Impact Type	Extent (1-3)	Intensity (1-3)	Duration (1-3)	Consequence		Probability	Overall Significance	Status of Impact	Mitigation	Confidence of Assessment
						Combined Score	Consequence Rating					
Impairment of the surface water quality could potentially occur during the construction phase.	Direct	Expected	1	2	1	4	Very Low	Probable	Very Low	Negative Impact	• Where possible, the construction should take place during the drier months of the year to minimise the risk of contaminated runoff and sediment washing into the adjacent aquatic habitats. • Contaminated runoff from the construction site(s) should be prevented from entering the watercourses and wetland areas. • The laydown area and main construction site for the road upgrade should be located away at least 30 m from the indicated freshwater constraints • The laydown area and main construction site must be bunded (i.e. natural soil berms) to prevent any run-off from these areas. • Where construction site(s) need to be located close to the rivers / streams, all materials on the construction site(s) must be properly stored and contained in bunded and impermeable areas. • Construction workers must be provided with ablution facilities at the construction works that are located away from the river systems (at least 30 m) in a bunded and impermeable areas and regularly serviced. Proof of service must be maintained on site for inspection. • Increased sedimentation or turbidity at each of the construction works should be mitigated as far as possible by making use of sandbags, settling ponds or screens to minimize the load of sediment being washed downstream of the sites. • Waste bins must to be made available by the contractor for the disposal of general and hazardous waste. Proof of disposal must be obtained and kept on site. • Daily site walk throughs must be undertaken by the contractors before the shift ends to clean the site.	High
		Cumulative	1	2	1	4	Very Low	Possible	Insignificant			
		Residual	1	1	1	3	Very Low	Possible	Insignificant		• If mitigation measures are put into place to manage the impacts, then little to no residual impacts should remain.	
Potential of longer-term modification of the flow	Direct	Expected	1	2	1	4	Very Low	Possible	Insignificant	Negative Impact	• The watercourse channels should remain open and not be constricted as a result of the works	High

Construction Phase											
Activity	Nature of Impact	Impact Type	Extent (1-3)	Intensity (1-3)	Duration (1-3)	Consequence		Probability	Overall Significance	Status of Impact	Mitigation	Confidence of Assessment
						Combined Score	Consequence Rating					
characteristics to downstream watercourse habitats as a result of the proposed activities due to the modification of the stormwater drains and the culvert structures.		Cumulative	1	1	1	3	Very Low	Possible	Insignificant		(i.e. the conveyance capacity of the channels should not be reduced). The base level of the watercourses should also not be raised or deepened at the culvert as a result of any of the works. • Once the works is complete, the area should be rehabilitated to resemble that of the surrounding landscape to ensure that the flow in the watercourses and to the more natural wetland areas is not modified by the activities.	
		Residual	1	1	1	3	Very Low	Possible	Insignificant		• If mitigation measures are put into place to manage the impacts, then little to no residual impacts should remain.	
Noise												
Noise from construction vehicles and excavation activities.	Direct	Expected	1	2	1	4	Very Low	Definite	Very Low	Negative Impact	• Construction to only take place during the daytime (06h00 – 18h00) where ambient noise levels are expected to be elevated and therefore will not be too noticeable by the surrounding land users. • Construction vehicles and machinery shall not be left to idle when not in use. • All construction machinery to be serviced regularly and maintained to ensure that noise levels are kept to a minimum.	High
		Cumulative	1	1	1	3	Very Low	Probable	Very Low		• If mitigation measures for the expected impact are adhered to, this impact will be insignificant.	
		Residual	1	1	1	3	Very Low	Possible	Insignificant		• If mitigation measures are put into place to manage the impacts, then little to no residual impacts should remain.	
Traffic												
Interrupted traffic due to construction activities.	Direct	Expected	1	3	1	5	Low	Definite	Low	Negative Impact	• Temporary traffic control measures to be implemented for the duration of the construction activities. • Traffic will be accommodated to minimize traffic congestions. • Flagmen will be used to raise caution to oncoming motorists from both ends. • Traffic shall be controlled by means of a stop-and-go system during the day and a traffic light signalling system at night. • The culvert is to be constructed in two phases for traffic accommodation purposes.	High
		Cumulative	1	1	1	3	Very Low	Probable	Very Low			
		Residual	1	1	1	3	Very Low	Possible	Insignificant		• If mitigation measures are put into place to manage the impacts, then little to no residual impacts should remain.	
Increase construction vehicles on the road.	Direct	Expected	1	3	1	5	Low	Definite	Low	Negative Impact	• Traffic to be controlled by means of a stop-and-go system during the day and a traffic light signalling system at night.	High

Construction Phase											
Activity	Nature of Impact	Impact Type	Extent (1-3)	Intensity (1-3)	Duration (1-3)	Consequence		Probability	Overall Significance	Status of Impact	Mitigation	Confidence of Assessment
						Combined Score	Consequence Rating					
		Cumulative	1	1	1	3	Very Low	Probable	Very Low		• The culvert is to be constructed in two phases for traffic accommodation purposes.	
		Residual	1	1	1	3	Very Low	Possible	Insignificant		• If mitigation measures are put into place to manage the impacts, then little to no residual impacts should remain.	
Geotechnical												
No geotechnical impacts have been identified.												
Socio-Economic Environment												
Job opportunities.	Direct	Expected	2	2	1	5	Low	Improbable	Very Low	Positive Impact	• As part of the contractor's contract, contractors will be required to meet a certain target of employing laborers from the local community. • General jobs can be filled by local employees.	High
		Cumulative	2	2	1	5	Low	Improbable	Very Low			
		Residual	1	1	1	3	Very Low	Improbable	Insignificant			
Influx of people to the area seeking employment.	Direct	Expected	1	2	2	5	Low	Probable	Low	Negative Impact	• As part of the contractor's contract, contractors will be required to meet a certain target of employing laborers from the local community.	High
		Cumulative	1	2	2	5	Low	Possible	Very Low		• Should labour be required during the construction phase, this should be sourced from the local communities. This requirement must be specified within the contract signed by the contractor. This will contribute to the local economy of the area.	
		Residual	1	1	1	3	Very Low	Improbable	Insignificant		• If mitigation measures are put into place to manage the impacts, then little to no residual impacts should remain.	
Safety and security problems.	Direct	Expected	1	2	2	5	Low	Improbable	Very Low	Negative Impact	• Where fencing is removed as part of the construction activities, these must be replaced in line with the Western Cape Standards. • Flagmen will be used to raise caution to oncoming motorists from both ends. • Traffic shall be controlled by means of a stop-and-go system during the day and a traffic light signalling system at night. • Placing road signs notifying road users of construction activity ahead. • Reduction in speed limit during construction to 20 km/hr for all vehicles.	High
		Cumulative	1	1	1	3	Very Low	Improbable	Insignificant			
		Residual	1	1	1	3	Very Low	Improbable	Insignificant		• If mitigation measures are put into place to manage the impacts, then little to no residual impacts should remain.	
Air Quality												
Increased nuisance dust fall rates associated with construction activities.	Direct	Expected	1	2	1	4	Very Low	Definite	Very Low	Negative Impact	• Dust suppression to be used such as the use of water or other dust suppressants sprayed onto open areas / topsoil stockpiles. • Water may not be used from any watercourse without a WUL. • Reduction in speed limit during construction to 20 km/hr for all vehicles.	High
		Cumulative	1	1	1	3	Very Low	Possible	Insignificant			
		Residual	1	1	1	3	Very Low	Possible	Insignificant		• If mitigation measures are put into place to manage the impacts, then little to no residual impacts should remain.	

Construction Phase											
Activity	Nature of Impact	Impact Type	Extent (1-3)	Intensity (1-3)	Duration (1-3)	Consequence		Probability	Overall Significance	Status of Impact	Mitigation	Confidence of Assessment
						Combined Score	Consequence Rating					
Topography and Climate												
Alteration to topography due to the infilling and raising of the DR 1797 Road at km 0.705.	Direct	Expected	1	2	3	6	Medium	Definite	Medium	Negative Impact	• Restrict all activities, materials, equipment and persons within the area(s) specified. • Stockpiles created during the construction phase must be removed prior to the operation phase of the project. • Erosion control measures (for wind and water erosion) must be implemented and maintained where necessary in areas disturbed by the construction. • All rubble is to be removed from the site to a certified landfill.	High
		Cumulative	1	1	2	4	Very Low	Definite	Very Low		• There will be no substantive increase to topographic impacts when compared to the existing level of impact on site, and thus the cumulative impact will be the same as the expected impact.	
		Residual	1	2	2	5	Low	Definite	Low		• If mitigation measures are put into place to manage the impacts, then little to no residual impacts should remain.	
Geology												
Not Applicable												

Table 4: Expected Impacts, Cumulative Impacts and Residual Impacts for the Preferred Alternative – OPERATIONAL PHASE

Operational Phase												
Activity	Nature of Impact	Impact Type	Extent (1-3)	Intensity (1-3)	Duration (1-3)	Consequence		Probability	Overall Significance	Status of Impact	Mitigation	Confidence of Assessment
						Combined Score	Consequence Rating					
Agriculture / Soils												
Not Applicable												
Landscape / Visual												
Not Applicable												
Archaeological and Cultural Heritage												
Not Applicable												
Palaeontology												
Not Applicable												
Terrestrial Biodiversity including Plant and Animal Species												
Infestation of alien invasive species.	Direct	Expected	1	2	2	5	Low	Possible	Very Low	Negative Impact	• Any existing or new alien invasive vegetation within the road reserve areas must be eradicated. • Special care must be taken when removing alien invasive plants from site, so as to not to leave any part of the plant behind. When removing alien invasive plants, soil disturbance must be minimised to prevent as little germination as possible as alien invasive plants can spread their seeds when disturbed. • All felled or cut alien invasive plants must be removed from site and appropriately disposed of. • A monitoring program should be put into place to remove alien vegetation and maintain areas free from alien invasive vegetation	High
		Cumulative	1	2	2	5	Low	Possible	Very Low			
		Residual	1	2	2	5	Low	Possible	Very Low			
Aquatic Biodiversity												
Potential impact of the aquatic habitats adjacent to the proposed work areas.	Direct	Expected	1	2	2	5	Low	Definite	Low		• Maintenance works on the structures should be in accordance with the DEA&DP Maintenance Management Plan (MMP) Guidelines (DEA&DP, 2017). • Any invasive alien plants within the road reserve should be monitored and removed on an ongoing basis according to methods as provided by the Working for Water Programme. • Minimise the frequency of, or requirement for, maintenance activities within the aquatic features.	High
		Cumulative	1	2	2	5	Low	Probable	Low			
		Residual	1	2	2	5	Low	Probable	Low	Positive Impact	• If mitigation measures are put into place to manage the impacts, then little to no residual impacts should remain.	
Potential of longer-term modification of the flow characteristics to downstream watercourse habitats as a result of the proposed activities due to the modification of the stormwater drains and the culvert structures.	Direct	Expected	1	2	2	5	Low	Improbable	Very Low		• The watercourse crossings should be kept clear of invasive alien plant growth and debris to ensure that the crossings do not become blocked and result in localised flooding of the area.	High
		Cumulative	1	1	1	3	Very Low	Improbable	Insignificant			
		Residual	1	1	1	3	Very Low	Improbable	Insignificant	Positive Impact	• If mitigation measures are put into place to manage the impacts, then little to no residual impacts should remain	
Noise												

Potential of increased noise levels due to increased use of the road.	Direct	Expected	1	2	2	5	Medium	Definite	Low	Negative Impact	• Placement of road safety signage along the road to ensure the speed limits, as well as advanced warning signage at one sharp horizontal curve.	High
		Cumulative	1	1	3	5	Low	Probable	Low		• If mitigation measures for the expected impacts are adhered to, these impacts will be insignificant.	
		Residual	1	1	1	3	Very Low	Possible	Insignificant		• If mitigation measures are put into place to manage the impacts, then little to no residual impacts should remain.	
Traffic												
Increased vehicles on the road.	Direct	Expected	1	1	3	5	Low	Possible	Very Low	Negative Impact	• Placement of road safety signage along the road to reduce speed limits, as well as advanced warning signage at one sharp horizontal curve.	High
		Cumulative	1	1	3	5	Low	Possible	Very Low			
		Residual	1	1	3	5	Low	Possible	Very Low			
Geotechnical												
Not Applicable												
Socio-Economic Environment												
Potential job opportunities in surrounding businesses due to better access to the area as a result of improved road conditions.	Direct	Expected	2	2	3	7	High	Improbable	Medium	Positive Impact	• Legalise the small business and tourism signage along the road to notify passing residents and job seekers.	High
		Cumulative	2	2	3	7	High	Improbable	Medium			
		Residual	2	2	3	7	High	Improbable	Medium			
Potential increase in tourism of the surrounding areas due to better access to the area as a result of improved road conditions.	Direct	Expected	1	2	3	6	Medium	Probable	Medium	Positive Impact	• The WCG to maintain the road in accordance with the MMP • Legalise the small business and tourism signage along the road to notify passing residents and job seekers.	High
		Cumulative	1	2	3	6	Medium	Possible	Low			
		Residual	1	2	2	5	Low	Possible	Very Low			
Improved road safety due to the road upgrade (e.g. no blind rises).	Direct	Expected	1	3	3	7	High	Probable	High	Positive Impact	• The DR 1797 Road has been engineered in accordance with SANS to improve overall road conditions and safety. • The WCG to maintain the road in accordance with the DEA&DP Maintenance Management Plan (MMP) Guidelines (DEA&DP, 2017).	High
		Cumulative	1	3	3	7	High	Possible	Medium			
		Residual	1	3	3	7	High	Possible	Medium			
Air Quality												
Reduction in dust due to the upgrade of the road from a Class 4 (gravel) to and Special Class 4 (surfaced).	Direct	Expected	1	3	3	7	High	Probable	High	Positive Impact	• The WCG to maintain the road in accordance with the DEA&DP Maintenance Management Plan (MMP) Guidelines (DEA&DP, 2017).	High
		Cumulative	1	3	2	6	Medium	Possible	Low			
		Residual	1	2	2	5	Low	Possible	Very Low			
Topography and Climate												
Improved road alignment and gradient due to the road upgrade (e.g. no blind rises).	Direct	Expected	1	3	3	7	High	Improbable	Medium	Positive Impact	• The DR 1797 Road has been engineered in accordance with SANS to improve overall road conditions and safety. • The WCG to maintain the road in accordance with the DEA&DP Maintenance Management Plan (MMP) Guidelines (DEA&DP, 2017).	High
		Cumulative	1	2	2	5	Low	Improbable	Very Low			
		Residual	1	2	2	5	Low	Improbable	Very Low			
Geology												
Not Applicable												