

APPENDIX J: IMPACT ASSESSMENT

IMPACT ASSESSMENT, MANAGEMENT, MITIGATION AND MONITORING MEASURES

Please note: While sections are provided for impacts on certain aspects of the environment and certain impacts, the sections should also be copied and completed for all other impacts.

- (a) Impacts that may result from the planning, design and construction phase (briefly describe and compare the potential impacts (as appropriate), significance rating of impacts, proposed mitigation and significance rating of impacts after mitigation that are likely to occur as a result of the planning, design and construction phase.

POTENTIAL IMPACTS ON GEOGRAPHICAL AND PHYSICAL ASPECTS

Nature of impact: Disturbance to subsurface geological layers						
Discussion: Construction and excavation activities will affect the underlying geological layers on site to some extent.						
Cumulative impacts: It is not anticipated that the cumulative impact on subsurface geological layers will be high as the affected substrata is very shallow and the integrity of the underlying ground structures will thus not be sacrificed.						
Mitigation: Due to the nature of the impacts, not much can be done to mitigate the impact, only the severity of it can be managed.						
<ul style="list-style-type: none"> Mitigation and management for affecting geology is to ensure that removal of geological material and hardening are kept to a minimum and only within proposed development areas. Any cumulative impacts due to compaction/hardening of substrata such as damming of storm water elsewhere must be managed and mitigated as per the requirements of the environmental management plan. 						
Criteria	Layout Alternative 1		Layout Alternative 2 & 3		No-Go Alternative	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Extent	2	1	2	1	Not Applicable (No construction activities to take place during the No-Go Alternative)	
Duration	5	5	5	5		
Magnitude	2	2	2	2		
Probability	4	2	4	2		
Significance	36-Medium	16-Low	36-Medium	16-Low		
Status	Medium negative significance if not mitigated	Low negative significance if mitigated	Medium negative significance if not mitigated	Low negative significance if mitigated		
Reversibility	0%		0%			
Irreplaceable loss of resources	2- Partly Replaceable		2-Partly Replaceable			
Can impacts be mitigated?	2-Partly, but impact on subsurface geological layers during excavations is inevitable.		2-Partly, but impact on subsurface geological layers during excavations is inevitable.			

Nature of impact: Soil erosion						
Discussion: During construction site clearance, access roads for construction, workers camps, etc. will cause a disturbance to the soil and the vegetation cover. This disturbance, unless carefully managed, could spread as a result of unnecessary construction of additional access roads or site clearing outside of approved development footprint. Construction camps, if not fenced and restricted in size, could result in unnecessarily large areas being disturbed. Soil erosion could occur due to wind (wind erosion cause dust pollution) or due to overland flow should rains fall during construction.						
Cumulative impacts: Exposed soil surfaces due to clearing of vegetation could lead to soil erosion and if this is not mitigation could lead to the cumulative impact such as erosion of surrounding vegetation areas outside of the development footprint.						
Mitigation:						
<ul style="list-style-type: none"> Demarcate no-go areas before any land clearing occurs under the supervision of an ECO. 						

Demarcation must be clearly visible and effective and no-go area must remain demarcated throughout construction phase.

- Access to roads and other areas must be controlled to avoid disturbance of areas outside the development footprint. Personnel should be restricted to the construction camp site and immediate construction areas only.
- Undertake specific erosion monitoring and maintenance throughout the construction phase as and if required.
- Undertake dust suppression as needed.
- Monitor soil erosion on a regular basis and rehabilitate impacted areas as soon as possible under supervision of appointed ECO.
- Appropriate and effective storm water management measures must be put in place to ensure that erosion and environmental degradations outside of the proposed development footprint area does not occur, but the storm water measures implemented must not impede storm water flow to such an extent that it is completely stopped. Current hydrological processes outside of the proposed development footprint area must continue to function as is.
- Rehabilitate or stabilise eroded areas immediately to prevent increase in erosion.
- Should any signs of erosion or artificial recharge be observed the municipality must implemented rectification and preventions measures immediately and consult with the appointed ECO before implementing these measures.

Criteria	Layout Alternatives 1		Layout Alternative 2 & 3		No-Go Alternative	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Extent	3	1	3	1	Not Applicable (No construction activities to take place during the No-Go Alternative)	
Duration	5	1	5	1		
Magnitude	6	2	6	2		
Probability	4	2	4	2		
Significance	56 - Medium	8 - Low	56 - Medium	8 - Low		
Status	Medium negative significance if not mitigated	Low negative significance if mitigated	Medium negative significance if not mitigated	Low negative significance if mitigated		
Reversibility	100%					
Irreplaceable loss of resources	2 Partly – while topsoil takes very long to redevelop, loss of topsoil can be prevented if correct mitigation measures are implemented					
Can impacts be mitigated?	2 Partly – Disturbance to topsoil during construction is inevitable, but erosion and increased storm water runoff can be mitigated.					

Nature of impact:

Compaction of soil

Discussion:

Heavy construction machinery will compact the soil on the site.

The compaction will lead to a change in soil structure and function. It will furthermore affect the micro-organisms in the soil detrimentally (these species may migrate to other areas where possible while some individuals may die). Soil compaction will lead to a lower growth rate in vegetation.

Cumulative impacts:

Soil compaction of areas outside of the development footprint can lead to lower growth rate in vegetation and erosion.

Mitigation:

- Undertake construction activities only in areas where required. Avoid all other areas outside of approved development footprint area.
- Cross areas with machinery as little as possible (work effectively) and make use of existing access and internal roads as far as possible.
- Rehabilitate impacted areas outside of approved development footprint area immediately upon construction completion.

Criteria	Layout Alternative 1		Layout Alternative 2 & 3		No-Go Alternative	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Extent	2	1	2	1	Not Applicable (No construction activities to take place during the No-Go Alternative)	
Duration	1	1	1	1		
Magnitude	6	4	6	4		
Probability	4	3	4	3		
Significance	36 - Medium	18 - Low	36-Medium	18-Low		

Status	Medium negative significance if not mitigated	Low negative significance if mitigated	Medium negative significance if not mitigated	Low negative significance if mitigated	
Reversibility	80%		80%		
Irreplaceable loss of resources	1-No		1-No		
Can impacts be mitigated?	2-Yes development and construction vehicles to be restricted only to demarcated footprint areas		2-Yes development and construction vehicles to be restricted only to demarcated footprint areas		

Nature of impact: Increase in and accumulation of storm water runoff
Discussion: Removal of vegetated areas and hardening of surfaces may cause an increase in storm water runoff and excavations may lead to accumulation/damming thereof on the site and surrounds.
Cumulative impacts: Increase in storm water runoff could cause erosion and/or damming of water which may lead to additional negative impacts like further habitat degradation and transformation.
Mitigation: <ul style="list-style-type: none"> • Undertake storm water management measures as recommended in the environmental management program. • Monitor for erosion. Should erosion be present, undertake maintenance activities to rectify and prevent further erosion. • Demarcate no-go areas before construction commences and maintain demarcation throughout construction phase. • All roads need to be maintained and monitored. Visible signs of possible erosion must be immediately rehabilitated. • Monitor impacted areas for erosion and accumulation of water on an ongoing basis and implement mitigation measures as and if required. • Stormwater discharge flow must be managed and restricted in such a manner that it does not cause erosion. • Rehabilitate or stabilise eroded areas immediately to prevent increase/spread of erosion. • Appropriate and effective storm water management measures must be put in place to ensure that erosion and environmental degradations outside of the proposed development footprint area does not occur, but the storm water measures implemented must not impede storm water flow to such an extent that it is completely stopped. Current hydrological processes outside of the proposed development footprint area must continue to function as is. • Conduct and complete construction activities as far as possible during the dry summer months. • Only excavate materials from proposed construction sites as according to approved layout plans. • Do not remove any plant or soil materials from outside of the development areas. • Do not create any additional access routes.

Criteria	Layout Alternative 1		Layout Alternative 2 & 3		No-Go Alternative	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Extent	2	2	2	1	Neutral (Site remains as is)	
Duration	5	5	5	2		
Magnitude	10	10	10	6		
Probability	5	5	5	3		
Significance	85 - High	85 - High	85 - High	27 – Low		
Status	High negative significance if not mitigated	High negative significance if mitigated	High negative significance if not mitigated	Low negative significance if mitigated		
Reversibility	100%					
Irreplaceable loss of resources	2 Partly – While increase in storm water runoff is inevitable erosion can still be prevented and mitigated if required.					
Can impacts be mitigated?	2 Partly – While increase in storm water runoff is inevitable erosion can still be prevented and mitigated if required.					

POTENTIAL IMPACTS ON BIOLOGICAL ASPECTS

Impacts on biological aspects:		
	Layout/design Alternative 1	Layout/design Alternative 2
Nature of impact:	Impacts of construction activities on the terrestrial animal and bird life populations and their associated habitats.	
Extent, duration and magnitude of impact:	E – On site or within 100m of the site (2) D – Short term 0-1 year (1) M – Moderate (6)	E – On site or within 100m of the site (2) D – Short term 0-1 year (1) M – Moderate (6)
Probability of occurrence:	P - Definite (5)	P - Definite (5)
Degree to which the impact can be reversed:	Partly reversible (PR)	Partly reversible (PR)
Degree to which the impact may cause irreplaceable loss of resources:	Resource may be partly destroyed (PR)	
Cumulative impact prior to mitigation:	This survey did not identify the study area as a regionally important specific site from an animal species point of view, as it does not lie within priority animal species corridors, habitat or home ranges. None of the species listed in the environmental screen report are expected to be affected by the proposed development.	This survey did not identify the study area as a regionally important specific site from an animal species point of view, as it does not lie within priority animal species corridors, habitat or home ranges. None of the species listed in the environmental screen report are expected to be affected by the proposed development.
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Medium (45)	Medium (45)
Degree to which the impact can be mitigated:	Partly- mitigatable (PM)	Partly- mitigatable (PM)
Proposed mitigation:	<p>Mitigation measures that must be implemented -</p> <ul style="list-style-type: none"> • Development activities must be limited to identified and demarcated development footprint areas and only existing roads may be used to gain access to the site. • Invasive vegetation to be removed during construction activities to be disposed of at landfill site in such a manner that seeds must not be able to spread from the disposal site or during transportation. • No trapping or hunting of any fauna or avifauna species may take place on the property. • Any tortoises or fauna or avifauna species present on the site when construction activities are taking place must be safely moved to the northeastern indigenous vegetation areas not to be impacted upon. This must be done in a manner not to harm the animals/birds and any relocation must be recorded and reported to the Environmental Control Officer. • No disturbance should be allowed outside of the proposed 0.5ha development area. This includes no excavations; no storage of topsoil no new or widened roads, and all forms of temporary disturbance. • Implement erosion and storm water runoff management measures to prevent (or if prevention is not possible limit) any erosion from occurring on the development areas and surrounds. • Should areas outside of the proposed development footprint area be disturbed this must be actively rehabilitated with indigenous vegetation. 	<p>Mitigation measures that must be implemented -</p> <ul style="list-style-type: none"> • Development activities must be limited to identified and demarcated development footprint areas and only existing roads may be used to gain access to the site. • Invasive vegetation to be removed during construction activities to be disposed of at landfill site in such a manner that seeds must not be able to spread from the disposal site or during transportation. • No trapping or hunting of any fauna or avifauna species may take place on the property. • Any tortoises or fauna or avifauna species present on the site when construction activities are taking place must be safely moved to the northeastern indigenous vegetation areas not to be impacted upon. This must be done in a manner not to harm the animals/birds and any relocation must be recorded and reported to the Environmental Control Officer. • No disturbance should be allowed outside of the proposed 0.5ha development area. This includes no excavations; no storage of topsoil no new or widened roads, and all forms of temporary disturbance. • Implement erosion and storm water runoff management measures to prevent (or if prevention is not possible limit) any erosion from occurring on the development areas and surrounds. • Should areas outside of the proposed development footprint area be disturbed this must be actively rehabilitated with indigenous vegetation.
Cumulative impact post mitigation:	Minimal impact on terrestrial animal and birdlife during construction.	Minimal impact on terrestrial animal and birdlife during construction.
Significance rating of impact after mitigation (Low, Medium,	Low negative	Low negative

Impacts on biological aspects:

Medium-High, High, or Very-High)		
Layout/design Alternative 3		
Extent, duration and magnitude of impact:	E – On site or within 100m of the site (2) D – Short term 0-1 year (1) M – Moderate (6)	
Probability of occurrence:	P - Definite (5)	
Degree to which the impact can be reversed:	Partly reversible (PR)	
Degree to which the impact may cause irreplaceable loss of resources:	Resource may be partly destroyed (PR)	
Cumulative impact prior to mitigation:	This survey did not identify the study area as a regionally important specific site from an animal species point of view, as it does not lie within priority animal species corridors, habitat or home ranges. None of the species listed in the environmental screen report are expected to be affected by the proposed development.	
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Medium (45)	
Degree to which the impact can be mitigated:	Partly- mitigatable (PM)	
Proposed mitigation:	<p>Mitigation measures that must be implemented -</p> <ul style="list-style-type: none"> • Development activities must be limited to identified and demarcated development footprint areas and only existing roads may be used to gain access to the site. • Invasive vegetation to be removed during construction activities to be disposed of at landfill site in such a manner that seeds must not be able to spread from the disposal site or during transportation. • No trapping or hunting of any fauna or avifauna species may take place on the property. • Any tortoises or fauna or avifauna species present on the site when construction activities are taking place must be safely moved to the northeastern indigenous vegetation areas not to be impacted upon. This must be done in a manner not to harm the animals/birds and any relocation must be recorded and reported to the Environmental Control Officer. • No disturbance should be allowed outside of the proposed 0.5ha development area. This includes no excavations; no storage of topsoil no new or widened roads, and all forms of temporary disturbance. • Implement erosion and storm water runoff management measures to prevent (or if prevention is not possible limit) any erosion from occurring on the development areas and surrounds. • Should areas outside of the proposed development footprint area be disturbed this must be actively rehabilitated with indigenous vegetation. 	
Cumulative impact post mitigation:	Minimal impact on terrestrial animal and birdlife during construction.	
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Low negative	

	Layout/design Alternative 1	Layout/design Alternative 2
Nature of impact:	Impacts of construction activities on terrestrial indigenous vegetation as part of Endangered Eastern Ruens Shale Renosterveld	
Extent, duration and magnitude of impact:	E – On site or within 100m of the site (2) D – Permanent. Will not cease (5) M – Low (4)	E – On site or within 100m of the site (2) D – Permanent. Will not cease (5) M – Low (4)
Probability of occurrence:	P - Definite (5)	P - Definite (5)
Degree to which the impact can be reversed:	Partly reversible (PR)	Partly reversible (PR)
Degree to which the impact may cause irreplaceable loss of resources:	Resource may be partly destroyed (PR)	
Cumulative impact prior to mitigation:	338.21m ² was incorrectly mapped as CBA. This mapped area is located on the existing road and pipeline route that will be used. Approximately 1200m ² degraded endangered vegetation with a medium ecological sensitivity will be permanently cleared.	338.21m ² was incorrectly mapped as CBA. This mapped area is located on the existing road and pipeline route that will be used. Approximately 1200m ² degraded endangered vegetation with a medium ecological sensitivity will be permanently cleared.
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Medium (55)	Medium (55)
Degree to which the impact can be mitigated:	Partly- mitigatable (PM)	Partly- mitigatable (PM)
Proposed mitigation:	<p>Mitigation measures that must be implemented -</p> <ul style="list-style-type: none"> • Clearance of indigenous vegetation must be kept to a minimum clearly demarcating the proposed development area before construction commencement, maintaining the demarcation throughout the construction phase and only clearing the area required for placement of the underground powercable. Undertake construction activities only in identified and specifically demarcated areas. • All unused construction materials must be removed from site immediately after construction completion. • No waste pollution may occur due to the construction activities and all waste must be contained and disposed of at the municipal landfill site. • Construction activities must be controlled to ensure that the adjacent vegetated areas are not negatively impacted. • Invasive vegetation to be removed during construction to be disposed of at landfill site in such a manner that seeds must not be able to spread from the disposal site or during transportation. 	<p>Mitigation measures that must be implemented</p> <ul style="list-style-type: none"> • Clearance of indigenous vegetation must be kept to a minimum clearly demarcating the proposed development area before construction commencement, maintaining the demarcation throughout the construction phase and only clearing the area required for construction. • All unused construction materials must be removed from site immediately after construction completion. • No waste pollution may occur due to the construction activities and all waste must be contained and disposed of at the municipal landfill site. • Construction activities must be controlled to ensure that the adjacent vegetated areas are not negatively impacted. • Invasive vegetation to be removed during construction to be disposed of at landfill site in such a manner that seeds must not be able to spread from the disposal site or during transportation.
Cumulative impact post mitigation:	Minimal impact on indigenous terrestrial vegetation during construction.	Minimal impact on indigenous terrestrial I vegetation during rehabilitation.
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Low negative	Low negative
Layout/design Alternative 3		
Extent, duration and magnitude of impact:	E – Footprint (1) D – Short to Medium term (2) M – Low (4)	
Probability of occurrence:	P - Definite (5)	
Degree to which the	Partly reversible (PR)	

impact can be reversed:	
Degree to which the impact may cause irreplaceable loss of resources:	Resource may be partly destroyed (PR)
Cumulative impact prior to mitigation:	338.21m ² was incorrectly mapped as CBA. This mapped area is located on the existing road and pipeline route that will be used. Approximately 1200m ² degraded endangered vegetation with a low ecological sensitivity will be permanently cleared.
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Medium (35)
Degree to which the impact can be mitigated:	Partly- mitigatable (PM)
Proposed mitigation:	<p>Mitigation measures that must be implemented</p> <ul style="list-style-type: none"> • Clearance of indigenous vegetation must be kept to a minimum clearly demarcating the proposed development area before construction commencement, maintaining the demarcation throughout the construction phase and only clearing the area required for construction. • All unused construction materials must be removed from site immediately after construction completion. • No waste pollution may occur due to the construction activities and all waste must be contained and disposed of at the municipal landfill site. • Construction activities must be controlled to ensure that the adjacent vegetated areas are not negatively impacted. • Invasive vegetation to be removed during construction to be disposed of at landfill site in such a manner that seeds must not be able to spread from the disposal site or during transportation.
Cumulative impact post mitigation:	Minimal impact on indigenous vegetation.
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Low negative

Impacts on biological aspects:		
	Layout/design Alternative 1	Layout/design Alternative 2
Nature of impact:	Impacts of construction activities on terrestrial biodiversity and ecological functioning also partially mapped as terrestrial CBA1	
Extent, duration and magnitude of impact:	E – On site or within 100m of the site (2) D – Short to Medium term (2) M – Low (4)	E – On site or within 100m of the site (2) D – Short to Medium term (2) M – Low (4)
Probability of occurrence:	P - Definite (5)	P - Definite (5)
Degree to which the impact can be reversed:	Partly reversible (PR)	Partly reversible (PR)
Degree to which the impact may cause irreplaceable loss of resources:	Resource may be partly destroyed (PR)	
Cumulative impact prior to mitigation:	338.21m ² was incorrectly mapped as CBA. This mapped area is located on the existing road and pipeline route that will be used. Approximately 1200m ² degraded endangered vegetation with a low ecological sensitivity will be permanently cleared.	338.21m ² was incorrectly mapped as CBA. This mapped area is located on the existing road and pipeline route that will be used. Approximately 1200m ² degraded endangered vegetation with a low ecological sensitivity will be permanently cleared.
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Medium (40)	Medium (40)
Degree to which the impact can be mitigated:	Partly- mitigatable (PM)	Partly- mitigatable (PM)
Proposed mitigation:	<p>Mitigation measures that must be implemented -</p> <ul style="list-style-type: none"> • Clearance of indigenous vegetation must be kept to a minimum clearly demarcating the proposed development area before construction commencement, maintaining the demarcation 	<p>Mitigation measures that must be implemented</p> <ul style="list-style-type: none"> • Clearance of indigenous vegetation must be kept to a

	<p>throughout the construction phase and only clearing the area required for placement of the underground powercable. Undertake construction activities only in identified and specifically demarcated areas.</p> <ul style="list-style-type: none"> All unused construction materials must be removed from site immediately after construction completion. No waste pollution may occur due to the construction activities and all waste must be contained and disposed of at the municipal landfill site. Construction activities must be controlled to ensure that the adjacent vegetated areas are not negatively impacted. Invasive vegetation to be removed during construction to be disposed of at landfill site in such a manner that seeds must not be able to spread from the disposal site or during transportation. 	<p>minimum clearly demarcating the proposed development area before construction commencement, maintaining the demarcation throughout the construction phase and only clearing the area required for construction.</p> <ul style="list-style-type: none"> All unused construction materials must be removed from site immediately after construction completion. No waste pollution may occur due to the construction activities and all waste must be contained and disposed of at the municipal landfill site. Construction activities must be controlled to ensure that the adjacent vegetated areas are not negatively impacted. Invasive vegetation to be removed during construction to be disposed of at landfill site in such a manner that seeds must not be able to spread from the disposal site or during transportation.
Cumulative impact post mitigation:	Minimal impact on terrestrial ecosystem during construction.	Minimal impact on terrestrial ecosystem vegetation during construction
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Low negative	Low negative
Layout/design Alternative 3		
Extent, duration and magnitude of impact:	E – Footprint (1) D – Short to Medium term (2) M – Low (4)	
Probability of occurrence:	P - Definite (5)	
Degree to which the impact can be reversed:	Partly reversible (PR)	
Degree to which the impact may cause irreplaceable loss of resources:	Resource may be partly destroyed (PR)	
Cumulative impact prior to mitigation:	338.21m ² was incorrectly mapped as CBA. This mapped area is located on the existing road and pipeline route that will be used. Approximately 1200m ² degraded endangered vegetation with a low ecological sensitivity will be permanently cleared.	
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Medium (35)	
Degree to which the impact can be mitigated:	Partly- mitigatable (PM)	
Proposed mitigation:	<p>Mitigation measures that must be implemented</p> <ul style="list-style-type: none"> Clearance of indigenous vegetation must be kept to a minimum clearly demarcating the proposed development area before construction commencement, maintaining the demarcation throughout the construction phase and only clearing the area required for construction. All unused construction materials must be removed from site immediately after construction completion. No waste pollution may occur due to the construction activities and all waste must be contained and disposed of at the municipal landfill site. Construction activities must be controlled to ensure that the adjacent vegetated areas are not negatively impacted. Invasive vegetation to be removed during construction to be disposed of at landfill site in such a manner that seeds must not be able to spread from the disposal site or during transportation. 	
Cumulative impact post mitigation:	Minimal impact on indigenous terrestrial ecosystem during rehabilitation.	
Significance rating of	Low negative	

impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	
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Nature of potential impact:

Impacts of construction activities on the aquatic functioning of freshwater features of the site and surrounds such as the western non-perennial drainage line and its associated wetland.

Discussion:

Construction activities may temporarily impact hydrological processes i.e. stormwater runoff or may lead to pollution of aquatic features of the site and surrounds.

Cumulative impacts:

The main Water Treatment Works are located outside NFEPA mapped wetlands. The aquatic plant species that were recorded in the western non-perennial river were *Phragmites australis*, *Juncus kraussii*, *Typha capensis* and *Pennisetum alopecuroides*. The non-perennial river is located approximately 16m west of the main Water Treatment Works and flows underneath the railway line through a culvert. The damming of the non-perennial river at the railway line resulted in the development of a pond with associated wetland vegetation. The development will not have a significant impact on the non-perennial river and its associate wetland. The only potential negative impacts on the aquatic functioning of the non-perennial river are the discharge of stormwater into the non-perennial drainage line and the potential overflow of backwash water from the WTW into the non-perennial drainage line. The proposal to treat overflow in the settling dams and incorporate an artificial reed bed from where the overflow will be pumped back into the Bloekombos dam as per **Layout/design Alternative 3 is preferred** from an aquatic perspective. This aspect of the proposed WTW is intended to eliminate risks to the non-perennial river/unchanneled valley bottom wetland which otherwise would have received the overflows thereby altering the flow regime and potentially causing water quality impairment in these downstream receiving freshwater ecosystems.

The non-perennial river with its associated wetlands west of the WTW has a PES of E: The loss of natural habitat, biota and basic ecosystem functions is extensive, and the EIS is moderate. Department of Water and Sanitation (DWS) 2015 publication: Section 21 (c) and (i) water use Risk Assessment Protocol (excel spreadsheet) is used to assess the sensitivity of the proposed WTW on the mapped and delineated freshwater ecological features and is also used by the DWS to determine if the proposed development requires authorization and what type of authorisation either General Authorisation or Water Use License. The DWS Risk Assessment confirmed the aquatic impact risks to be Low.

Mitigation:

- Undertake development activities only in identified and specifically demarcated areas. The impact area is the WTW infrastructure and a 2m wide buffer allowing for safe construction activities which will then allow for a no-go area outside this demarcated area and a buffer between the construction area and any freshwater ecological features of at least 14m to protect the identified features. The delineated feature and its buffer is considered as No-Go areas and if any construction activities are required within the No-Go areas then this should only be permissible via an ECO-approved method statement.
- Storm water and erosion control measures must be implemented during the construction phase and monitored to prevent siltation, flooding or erosion.
- All roads need to be maintained and monitored. Visible signs of possible erosion must be immediately rehabilitated.'
- Construction and operational activities of the development must not lead to environmental pollution and waste management measures must be implemented in accordance with an Environmental Management Programme.
- Stormwater discharge into the non-perennial drainage line must not cause erosion and this should be monitored on a regular basis and especially after heavy rains. The stormwater outlet should be constructed from energy dissipating structures (such as gabions and /or reno mattresses) to slow down the velocity of water inflow and allow to seep through the buffer area and not be discharged directly into the non-perennial stream.
- The Water Treatment Works and its associated stormwater discharge point within the non-perennial drainage line must be monitored and aquatic state of the non perennial drainage line and its associated wetland ecosystem recorded on a 6 monthly basis by an Environmental Control Officer during the operational phase. Should any leakage, erosion or environmental degradation be noticed during monitoring this must be addressed by the ECO by providing the municipality with the appropriate rectification and prevention measures to be implemented.

Criteria	Layout Alternative 1	Layout Alternative 2	No-Go Alternative
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	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Extent	2	2	2	2	Not Applicable (No construction activities to take place during the No-Go Alternative)	
Duration	5	5	5	5		
Magnitude	2	2	2	2		
Probability	4	4	4	4		
Significance	36 - Medium	36 – Medium	36 - Medium	36 - Medium		
Status	Medium Negative Significance without Mitigation	Medium Negative Significance with Mitigation	Medium Negative Significance without Mitigation	Medium Negative Significance without Mitigation		
Reversibility	100% Reversible		100% Reversible			
Irreplaceable loss of resources	2 – Partly, some disturbance will occur but will be limited.		2 – Partly, some disturbance will occur but will be limited.			
Can impacts be mitigated?	2 – Partly, some disturbance will occur but will be limited.		2 – Partly, some disturbance will occur but will be limited.			
Criteria	Layout Alternative 3					
	Without Mitigation	With Mitigation				
Extent	2	1				
Duration	5	1				
Magnitude	2	2				
Probability	4	4				
Significance	36 - Medium	16 – Low				
Status	Medium Negative Significance without Mitigation	Low Negative Significance with Mitigation				
Reversibility	100% Reversible					
Irreplaceable loss of resources	2 – Partly, some disturbance will occur but will be limited.					
Can impacts be mitigated?	2 – Partly, some disturbance will occur but will be limited.					

Nature of impact: Introduction of alien and weed plant species
Discussion: Declared weeds or alien trees may be transported onto the site and spread to surrounding areas during construction. This may have management and cost impacts on such properties. Introduction of alien plant species via vehicular traffic is an important aspect that needs to be considered. Alien grass seeds for example may become attached to vehicles and be transported to site or be brought on to site in building materials such as sand. Without monitoring and control this could become problematic.
Cumulative impacts: Loss of potential biodiversity, ecosystems and natural habitat due to the spread of invader plants.
Mitigation: The mitigation measures mentioned below will help reduce the risk of introductions and will ensure that should introductions occur they are controlled timeously: <ul style="list-style-type: none"> • Undertake construction activities only in identified and specifically demarcated areas. • Do not import and use infill material on site containing alien or weed vegetation seeds/plants. • An important aspect of on-going maintenance is the monitoring of the rehabilitated sites and access road verges for alien plant species. • Implement an ongoing alien eradication program for the areas to be rehabilitated.

Criteria	Layout Alternatives 1		Layout Alternative 2 & 3		No-Go Alternative	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Extent	3	2	3	2	Not Applicable (No construction activities to take place during the No-Go Alternative)	
Duration	5	1	5	1		
Magnitude	6	4	6	4		
Probability	4	3	4	3		
Significance	56- Medium	21 - Low	56- Medium	21 - Low		
Status	Medium negative significance if not mitigated	Low negative significance if mitigated	Medium negative significance if not mitigated	Low negative significance if mitigated		
Reversibility	100%		100%			
Irreplaceable loss of resources	1-Will not be lost		1-Will not be lost			
Can impacts be mitigated?	1-Yes, by implementing an alien eradication plan and continuing monitoring of alien regrowth		1-Yes, by implementing an alien eradication plan and continuing monitoring of alien regrowth			

POTENTIAL IMPACTS ON SOCIO-ECONOMIC ASPECTS

Nature of impact: Increased temporary construction jobs
Discussion: Temporary construction jobs will be created.
Cumulative impacts: -
Mitigation: <ul style="list-style-type: none"> Local contractors, employing or seeking to employ local (historically disadvantaged individuals (HDIs) from the region who are suitably qualified, should get preference.

Criteria	Layout Alternatives 1, 2 and 3		No-Go Alternative	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Status	-	Due to the job creation only being of a temporary nature this impact is rated as a low positive significance	Low Negative Impact, no construction to take place so no temporary jobs to be created.	

Nature of impact: Agricultural impact in terms of change to the future agricultural production potential of the development area.
Discussion: The entire development footprint is considered to be below the threshold for needing to be conserved as agricultural production land because of the limitations that make it unsuitable as viable cropland. Furthermore, the development occupies only a small area of land. The proposed development on this land will therefore result in minimal loss of future agricultural production potential.
Cumulative impacts: The site has no current agricultural production and limited capacity for future agricultural production. Therefore, it is a site which can be used for non-agricultural purposes without a high loss of agricultural production potential. The cumulative agricultural impact of the proposed development is therefore assessed as being of low significance and therefore as acceptable. The development will not have an unacceptable negative impact on the agricultural production capability of the area, and it is therefore recommended, from a cumulative agricultural impact perspective, that the development be approved.
Mitigation: No mitigation measures are required for the protection of agricultural production potential on the site or surrounds because they are not and will not be utilised as agricultural production land.

Criteria	Layout Alternative 1		Layout Alternative 2 & 3		No-Go Alternative	
	Without	With	Without	With	Without	With

	Mitigation	Mitigation	Mitigation	Mitigation	Mitigation	Mitigation
Extent	1	1	1	1		
Duration	5	5	5	5		
Magnitude	2	2	2	2		
Probability	2	2	2	2		
Significance	16 - Low	16 - Low	16 - Low	16 - Low		
Status	Low negative significance if not mitigated	Low negative significance if not mitigated	Low negative significance if not mitigated	Low negative significance if not mitigated	Not Applicable (No construction activities to take place during the No-Go Alternative)	
Reversibility	NA		NA			
Irreplaceable loss of resources	NA		NA			
Can impacts be mitigated?	Not required		Not required			

Nature of impact: Increased traffic due to the construction activities requiring various vehicles to come onto and leave the site.						
Discussion: The construction machinery will only have a traffic impact on delivery to, and collection from the site and are therefore regarded as negligible						
Cumulative impacts: The minor increase in traffic volumes at certain times of day will add to the existing traffic volumes. As the existing traffic volumes are relatively low, this cumulative impact is not expected to be significant.						
Mitigation:						
<ul style="list-style-type: none"> Adhere to speed limit and road rules. Work during normal working hours and only use demarcated access and internal roads Only allow drivers with valid driver's licenses to drive and/or operate construction vehicles 						
Criteria	Layout Alternative 1		Layout Alternative 2 & 3		No-Go Alternative	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Extent	2	1	2	1		
Duration	2	1	2	1		
Magnitude	4	4	4	4		
Probability	4	3	4	3		
Significance	32 - Medium	18 - Low	32 - Medium	18 - Low		
Status	Medium negative significance if not mitigated	Low negative significance if not mitigated	Medium negative significance if not mitigated	Low negative significance if mitigated	Not Applicable (No construction activities to take place during the No-Go Alternative)	
Reversibility	100%		100%			
Irreplaceable loss of resources	1 - No loss		1 - No loss			
Can impacts be mitigated?	2 - Partly		2 - Partly			

Nature of impact: Impact of construction workers on local community safety and security						
Discussion: Construction workers on site may pose a safety and security risk to neighbouring communities if not managed						
Cumulative impacts: Theft of property of neighbouring communities.						
Mitigation:						
<ul style="list-style-type: none"> As a proclaimed work site the workers should be restricted to remain within the work site during working hours. A penalty system should be implemented on site to penalise workers who is guilty of trespassing, theft etc. 						
Criteria	Layout Alternative 1		Layout Alternative 2 & 3		No-Go Alternative	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Extent	3	1	3	1	Not Applicable (No construction activities to take place during	
Duration	5	1	5	1		
Magnitude	6	0	6	0		

Probability	4	2	4	2	the No-Go Alternative)
Significance	56- Medium	4-Low	56- Medium	4-Low	
Status	Medium negative significance if not mitigated	Low negative significance if mitigated	Medium negative significance if not mitigated	Low negative significance if mitigated	
Reversibility	100%		100%		
Irreplaceable loss of resources	1-Will not be lost		1-Will not be lost		
Can impacts be mitigated?	1-Yes, by implementing a penalty system and restricting workers movements to remain onsite during working hours.		1-Yes, by implementing a penalty system and restricting workers movements to remain onsite during working hours.		

Nature of impact: Impact of litter or waste from the construction site on the surrounding communities.						
Discussion: Construction workers and activities on site may cause polluting of surrounding areas with litter and waste from the construction site.						
Cumulative impacts: Litter and waste polluting the surrounding areas.						
Mitigation:						
<ul style="list-style-type: none"> • Appropriate refuse disposable facilities shall be provided at the proposed construction site • Daily clearance of construction litter on the site and surrounds shall be undertaken. • Waste to be disposed of via closed containers/vehicles at the municipal landfill site. 						
Criteria	Layout Alternative 1		Layout Alternative 2 & 3		No-Go Alternative	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Extent	3	1	3	1	Not Applicable (No construction activities to take place during the No-Go Alternative)	
Duration	5	1	5	1		
Magnitude	6	0	6	0		
Probability	4	2	4	2		
Significance	56- Medium	4-Low	56- Medium	4-Low		
Status	Medium negative significance if not mitigated	Low negative significance if mitigated	Medium negative significance if not mitigated	Low negative significance if mitigated		
Reversibility	100%		100%			
Irreplaceable loss of resources	1-Will not be lost		1-Will not be lost			
Can impacts be mitigated?	1-Yes, by implementing a penalty system and restricting workers movements to remain onsite during working hours.		1-Yes, by implementing a penalty system and restricting workers movements to remain onsite during working hours.			

Nature of impact: Dust and emissions pollution arising from ground clearing and other construction activities	
Discussion: It is anticipated that construction will occur during the dry season in order to prevent construction delays due to the rains. As such, dust will be present on the site and the access roads. Should the construction machinery not be properly maintained, emissions pollution may occur. Either one or a combination of the above may affect the surrounding land users/ owners if not managed.	
Cumulative impacts: Dust and emissions impacts on surrounding environment and community.	

- Mitigation:**
- Undertake dust suppression if necessary. If dust suppression and/or surface hardening is undertaken by using water only non-potable water resources must be used.
 - Only clear the areas to be developed upon, no additional areas outside of the proposed development footprint area may be cleared.
 - Plant additional vegetation where needed after construction during site rehabilitation if required.
 - Service and maintain construction vehicles on a frequent basis.

Criteria	Layout Alternative 1		Layout Alternative 2 & 3		No-Go Alternative	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Extent	2	1	2	1	Not Applicable (No construction activities to take place during the No-Go Alternative)	
Duration	2	1	2	1		
Magnitude	4	4	4	4		
Probability	4	3	4	3		
Significance	32 - Medium	18 - Low	32 - Medium	18 - Low		
Status	Medium negative significance if not mitigated	Low negative significance if not mitigated	Medium negative significance if not mitigated	Low negative significance if not mitigated		
Reversibility	100%		100%			
Irreplaceable loss of resources	1 - No loss		1 - No loss			
Can impacts be mitigated?	2 - Partly		2 - Partly			

POTENTIAL IMPACTS ON CULTURAL-HISTORICAL ASPECTS

Nature of impact:
The potential impact of the proposed development on archaeological, paleontological and heritage remains

Discussion:
Notice of Intent to Develop submitted to Heritage Western Cape and confirmation was received that HWC agrees there are no significant heritage resources on site that will be impacted upon by the proposed development and no further heritage impacts assessments are required.

Cumulative impacts:
Destruction of cultural- historical features at the site will contribute to the loss of such features in the general area due to other non-related activities. This can at all times be mitigated to prevent/ minimise the loss of such features.

Mitigation:
The Chance Fossil Finds Procedure should be implemented as/if required. Should any burials, fossils or other historical material be encountered during construction, work must cease immediately and HWC must be notified.

Criteria	Layout Alternative 1		Layout Alternative 2 & 3		No-Go Alternative	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Extent	2	1	2	1	Not Applicable (No construction activities to take place during the No-Go Alternative)	
Duration	5	1	5	1		
Magnitude	6	0	6	0		
Probability	5	1	5	1		
Significance	65 - High	2-Low	65 - High	2-Low		
Status	High negative significance if not mitigated	Low negative significance if mitigated	High negative significance if not mitigated	Low negative significance if mitigated		
Reversibility	0% reversibility – once the historical features are destroyed, it cannot be recovered.		0% reversibility – once the historical features are destroyed, it cannot be recovered.			
Irreplaceable loss of resources	3- Yes, completely irreplaceable		3- Yes, completely irreplaceable			
Can impacts be mitigated?	1-Yes		1-Yes			

POTENTIAL IMPACTS OF NOISE

Nature of impact:

Noise due to construction machinery						
Discussion: Construction machinery may cause noise disturbance to the directly adjacent land users/ owners. It is not anticipated that the noise will be considerable and will only be temporary.						
Cumulative impacts: Noise due to construction activities may cause a nuisance to adjacent residential areas.						
Mitigation: <ul style="list-style-type: none"> • Construction activities should be restricted to weekday working hours. • Machinery and vehicles should be regularly maintained to prevent excessive noise. • All machinery and work activities must adhere to the requirements of the noise regulations. • Construction not to take place during peak holiday season middle Dec – middle January. 						
Criteria	Layout Alternative 1		Layout Alternative 2 & 3		No-Go Alternative	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Extent	3	2	3	2	Not Applicable (No construction activities to take place during the No-Go Alternative)	
Duration	1	1	1	1		
Magnitude	4	2	4	2		
Probability	3	2	3	2		
Significance	24- Low	10-Low	24-Low	10-Low		
Status	Low negative significance if not mitigated	Low negative significance if mitigated	Low negative significance if not mitigated	Low negative significance if mitigated		
Reversibility	This will not be a long term impact nor will it have an impact on the natural processes. It is thus 100% reversible.		This will not be a long term impact nor will it have an impact on the natural processes. It is thus 100% reversible.			
Irreplaceable loss of resources	1- No resources will be lost.		1- No resources will be lost.			
Can impacts be mitigated?	2 Partly – Construction noise will occur but it is not expected to be significant		2 Partly – Construction noise will occur but it is not expected to be significant			

POTENTIAL VISUAL IMPACTS

Nature of impact: Visual impact of construction of proposed development.						
Discussion: The surrounding land users/ owners will be exposed to the presence of the construction machinery. It is not anticipated that the visual impact of the construction activities will be very significant as it will only be temporary until development is complete.						
Cumulative impacts: Unightly construction camp/s and activities on construction site						
Mitigation: <ul style="list-style-type: none"> • Proposed construction activities must be limited to development footprint site. • Construction camp must be neatly fenced and construction site must be neat and tidy. • Stockpile construction materials in one specific area. • To retain the current visual screening in-between the Heidelberg residential areas and the proposed WTWs the Eucalyptus trees along the boundary fence of the property must be retained as far as possible. 						
Criteria	Layout Alternative 1		Layout Alternative 2 & 3		No-Go Alternative	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Extent	3	1	3	1	Not Applicable (No construction activities to take place during the No-Go Alternative)	
Duration	1	1	1	1		
Magnitude	6	2	6	2		
Probability	4	3	4	3		
Significance	40-Medium	12-Low	40-Medium	12-Low		
Status	Medium negative significance if not mitigated	Low negative significance if mitigated	Medium negative significance if not mitigated	Low negative significance if mitigated		
Reversibility	100%		100%			
Irreplaceable loss	2- Partial loss due to		2- Partial loss due to			

of resources	unavoidable visual impact	unavoidable visual impact	
Can impacts be mitigated?	2 Partly – Construction camp and activities will have a visual impact but significance can be mitigated	2 Partly – Construction camp and activities will have a visual impact but significance can be mitigated	

(b) Impacts that may result from the operational/maintenance phase (briefly describe and compare the potential impacts (as appropriate), significance rating of impacts, proposed mitigation and significance rating of impacts after mitigation that are likely to occur as a result of the operational phase.

POTENTIAL IMPACTS ON GEOGRAPHICAL AND PHYSICAL ASPECTS

Nature of impact: Increase in storm water runoff which may lead to erosion of surrounding areas						
Discussion: Due to the proposed stormwater and sludge dams overflow outlet to be placed along the bank of the western non-perennial drainage line and stormwater to be discharged during heavy rains the stormwater discharge may lead to erosion of surrounding environments if not mitigated.						
Cumulative impacts: Erosion may lead to loss in topsoil and impact on wetland features of the drainage line.						
Mitigation:						
<ul style="list-style-type: none"> Stormwater discharge flow must be managed and restricted in such a manner that it does not cause erosion. Rehabilitate or stabilise eroded areas immediately to prevent increase/spread of erosion. Stormwater infrastructure must not cause erosion of the surrounding remaining undeveloped areas, but still allow current hydrological processes to continue as is. The municipality must maintain all stormwater infrastructure on a regular basis to ensure that it is working effectively and is not blocked with waste and is not causing erosion. Undertake development activities only in identified and specifically demarcated areas. Storm water and erosion control measures must be implemented during the construction phase and monitored to prevent siltation, flooding or erosion. All roads need to be maintained and monitored. Visible signs of possible erosion must be immediately rehabilitated.' Construction and operational activities of the development must not lead to environmental pollution and waste management measures must be implemented in accordance with an Environmental Management Programme. Overflow discharge from sludge dams into the non-perennial drainage lines must be conducted in a controlled manner not leading to erosion and or pollution and degradation of the non-perennial drainage line and is associated wetland ecosystems. Stormwater discharge into the non-perennial drainage line must not cause erosion and this should be monitored on a regular basis and especially after heavy rains. The Water Treatment Works and its associated stormwater and overflow discharge point within the non-perennial drainage line must be monitored and aquatic state of the non-perennial drainage line and its associated wetland ecosystem recorded on a 6 monthly basis by an Environmental Control Officer during the operational phase. Should any leakage, erosion or environmental degradation be noticed during monitoring this must be addressed by the ECO by providing the municipality with the appropriate rectification and prevention measures to be implemented. No developments may occur within 100m from any drainage line or 500m from any wetland without determining requirement for water use authorisation from Department of Water and Sanitation or the Breede Gouritz Catchment Management Agency. 						
Criteria	Layout Alternatives 1		Layout Alternative 2 & 3		No-Go Alternative	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Extent	2	2	3	1	Neutral (Site remains as is)	
Duration	5	5	5	1		
Magnitude	10	10	6	2		
Probability	5	5	4	2		
Significance	85 - High	85 - High	56 - Medium	8 - Low		
Status	High negative significance if not mitigated	High negative significance if not mitigated	Medium negative significance if not mitigated	Low negative significance if mitigated		
Reversibility	100%					

Irreplaceable loss of resources	2 Partly – While increase in storm water runoff is inevitable erosion can still be prevented and mitigated if required.	
Can impacts be mitigated?	2 Partly – While increase in storm water runoff is inevitable erosion can still be prevented and mitigated if required.	

POTENTIAL IMPACTS ON BIOLOGICAL ASPECTS

Impacts on biological aspects:		
	Layout/design Alternative 1	Layout/design Alternative 2
Nature of impact:	Impacts of Water Treatment Works operational activities on the terrestrial animal and bird life populations and their associated habitats.	
Extent, duration and magnitude of impact:	E – On site or within 100m of the site (2) D – Will not cease (5) M – Low (4)	E – On site or within 100m of the site (2) D – Will not cease (5) M – Low (4)
Probability of occurrence:	P - Definite (5)	P - Definite (5)
Degree to which the impact can be reversed:	Partly reversible (PR)	Partly reversible (PR)
Degree to which the impact may cause irreplaceable loss of resources:	Resource may be partly destroyed (PR)	
Cumulative impact prior to mitigation:	Cumulative impacts of the operational activities on animal and bird life will be disturbances to local animal and bird life due to human activities causing disturbances within the area,	Cumulative impacts of the operational activities on animal and bird life will be disturbances to local animal and bird life due to human activities causing disturbances within the area,
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Medium (55)	Medium (55)
Degree to which the impact can be mitigated:	Partly- mitigatable (PM)	Partly- mitigatable (PM)
Proposed mitigation:	<p>Mitigation measures that must be implemented -</p> <ul style="list-style-type: none"> No trapping, hunting or any injury to animal or birdlife may occur during operational activities. Should any local animal or birdlife be found within the area during maintenance activities they must carefully be moved to the adjacent natural areas not to be impacted upon. The stormwater outlets must be fitted with a grid to prevent animals and birds from nesting inside of these pipes. The discharge of stormwater must not lead to waste pollution, flooding or erosion. Waste traps must be installed at the inlet to the stormwater pipes which must be cleared of waste on a monthly basis by the municipality. Any waste at the stormwater discharge areas must also be removed by the municipality and disposed of at the municipal landfill site on a monthly basis. Ongoing monitoring of erosion at the outlet structures must be done by the municipality, should any signs of erosion be detected immediate rectification and further prevention measures must be put in place under the guidance of a qualified ecological specialist so as to prevent any additional cumulative impacts on the environment. Discharge of stormwater must be controlled and must be done in such a manner that it does not cause erosion at the discharge point. The impacted site must be monitored for alien vegetation encroachment and should alien vegetation encroach on the impacted site it must be removed and monitored in accordance with CapeNature approved alien vegetation management practices. Replacement of topsoil and revegetation of the impacted indigenous vegetation areas must be completed within one month of construction completion and under guidance of a qualified ecological specialist. Revegetation must only be done with locally sourced indigenous vegetation. Monitoring of rehabilitated areas must be done by an ECO for at least one year after construction completion on a three-monthly basis to determine success of 	<p>Mitigation measures that must be implemented -</p> <ul style="list-style-type: none"> No trapping, hunting or any injury to animal or birdlife may occur during operational activities. Should any local animal or birdlife be found within the area during maintenance activities they must carefully be moved to the adjacent natural areas not to be impacted upon. The stormwater outlets must be fitted with a grid to prevent animals and birds from nesting inside of these pipes. The discharge of stormwater must not lead to waste pollution, flooding or erosion. Waste traps must be installed at the inlet to the stormwater pipes which must be cleared of waste on a monthly basis by the municipality. Any waste at the stormwater discharge areas must also be removed by the municipality and disposed of at the municipal landfill site on a monthly basis. Ongoing monitoring of erosion at the outlet structures must be done by the municipality, should any signs of erosion be detected immediate rectification and further prevention measures must be put in place under the guidance of a qualified ecological specialist so as to prevent any additional cumulative impacts on the environment. Discharge of stormwater must be controlled and must be done in such a manner that it does not cause erosion at the discharge point. The impacted site must be monitored for alien vegetation encroachment and should alien vegetation encroach on the impacted site it must be removed and monitored in accordance with CapeNature approved alien vegetation management practices. Replacement of topsoil and revegetation of the impacted indigenous vegetation areas must be completed within one month of construction completion and under guidance of a qualified ecological specialist. Revegetation must only be done with locally sourced indigenous vegetation. Monitoring of rehabilitated areas must be done by an ECO for at least one year after construction completion on a three-monthly basis to determine success of

	<p>rehabilitation and to monitor other potential impacts such as erosion. Should the ECO find that rehabilitation is not satisfactory he/she must recommend additional measures to be implemented.</p> <ul style="list-style-type: none"> All services infrastructure must be maintained in a good condition by the municipality not leading to any environmental degradation or pollution. 	<p>rehabilitation and to monitor other potential impacts such as erosion. Should the ECO find that rehabilitation is not satisfactory he/she must recommend additional measures to be implemented.</p> <ul style="list-style-type: none"> All services infrastructure must be maintained in a good condition by the municipality not leading to any environmental degradation or pollution.
Cumulative impact post mitigation:	Minimal impact on coastal animal and birdlife during operation.	Minimal impact on coastal animal and bird life during operation.
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Low negative	Low negative
Layout/design Alternative 3		
Extent, duration and magnitude of impact:	E – On site or within 100m of the site (2) D – Will not cease (5) M – Low (4)	
Probability of occurrence:	P - Definite (5)	
Degree to which the impact can be reversed:	Partly reversible (PR)	
Degree to which the impact may cause irreplaceable loss of resources:	Resource may be partly destroyed (PR)	
Cumulative impact prior to mitigation:	Cumulative impacts of the operational activities on animal and bird life will be disturbances to local animal and bird life due to human activities causing disturbances within the area,	
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Medium (55)	
Degree to which the impact can be mitigated:	Partly- mitigatable (PM)	
Proposed mitigation:	<p>Mitigation measures that must be implemented -</p> <ul style="list-style-type: none"> No trapping, hunting or any injury to animal or birdlife may occur during operational activities. Should any local animal or birdlife be found within the area during maintenance activities they must carefully be moved to the adjacent natural areas not to be impacted upon. The stormwater outlets must be fitted with a grid to prevent animals and birds from nesting inside of these pipes. The discharge of stormwater must not lead to waste pollution, flooding or erosion. Waste traps must be installed at the inlet to the stormwater pipes which must be cleared of waste on a monthly basis by the municipality. Any waste at the stormwater discharge areas must also be removed by the municipality and disposed of at the municipal landfill site on a monthly basis. Ongoing monitoring of erosion at the outlet structures must be done by the municipality, should any signs of erosion be detected immediate rectification and further prevention measures must be put in place under the guidance of a qualified ecological specialist so as to prevent any additional cumulative impacts on the environment. Discharge of stormwater must be controlled and must be done in such a manner that it does not cause erosion at the discharge point. The impacted site must be monitored for alien vegetation encroachment and should alien vegetation encroach on the impacted site it must be removed and monitored in accordance with CapeNature approved alien vegetation management practices. Replacement of topsoil and revegetation of the impacted indigenous vegetation areas must be completed within one month of construction completion and under guidance of a qualified ecological specialist. Revegetation must only be done with locally sourced indigenous vegetation. Monitoring of rehabilitated areas must be done by an 	

	<p>ECO for at least one year after construction completion on a three-monthly basis to determine success of rehabilitation and to monitor other potential impacts such as erosion. Should the ECO find that rehabilitation is not satisfactory he/she must recommend additional measures to be implemented.</p> <ul style="list-style-type: none"> All services infrastructure must be maintained in a good condition by the municipality not leading to any environmental degradation or pollution.
Cumulative impact post mitigation:	Minimal impact on terrestrial animal and birdlife during operation.
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Low negative

Impacts on biological aspects:		
	Layout/design Alternative 1	Layout/design Alternative 2
Nature of impact:	Impacts of Water Treatment Works operational activities on terrestrial indigenous vegetation as part of Endangered Eastern Ruens Shale Renosterveld	
Extent, duration and magnitude of impact:	E – On site or within 100m of the site (2) D – Will not cease (5) M – Low (4)	E – On site or within 100m of the site (2) D – Will not cease (5) M – Low (4)
Probability of occurrence:	P - Definite (5)	P - Definite (5)
Degree to which the impact can be reversed:	Partly reversible (PR)	Partly reversible (PR)
Degree to which the impact may cause irreplaceable loss of resources:	Resource may be partly destroyed (PR)	
Cumulative impact prior to mitigation:	<p>Cumulative impacts of the operational activities on indigenous vegetation is related to stormwater and overflow discharge which may cause erosion and further loss of indigenous vegetation species if not done in a controlled manner, as well as potential human activities impacts on remaining adjacent indigenous vegetation areas during maintenance.</p> <p>Layout/alternative 1 does not accommodate proper sludge handling capacity nor stormwater management, hence is not preferred.</p>	<p>Cumulative impacts of the operational activities on indigenous vegetation is related to stormwater and overflow discharge which may cause erosion and further loss of indigenous vegetation species if not done in a controlled manner, as well as potential human activities impacts on remaining adjacent indigenous vegetation areas during maintenance.</p> <p>Layout/alternative 2 does accommodate proper sludge handling capacity and stormwater management; however sludge overflow is recommended within the adjacent drainage line which is not preferred.</p>
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Medium (55)	Medium (55)
Degree to which the impact can be mitigated:	Completely mitigatable (CM)	Completely mitigatable (CM)
Proposed mitigation:	<p>Mitigation measures that must be implemented -</p> <ul style="list-style-type: none"> The discharge of stormwater and overflow must not lead to waste pollution or erosion at discharge points. Waste traps must be installed at the inlet to the stormwater pipes which must be cleared of waste on a monthly basis by the municipality. Any waste at the stormwater discharge areas must also be removed by the municipality and disposed of at the municipal landfill site on a monthly basis. Ongoing monitoring of erosion at the outlet structures must be done by the municipality, should any signs of erosion be detected immediate rectification and further prevention measures must be put in place under the guidance of a qualified ecological specialist so as to prevent any additional cumulative impacts on the environment. The impacted site must be monitored for alien vegetation encroachment and should alien vegetation encroach on the impacted site it must be removed and monitored in accordance with CapeNature approved alien vegetation management practices. Replacement of topsoil and revegetation of the impacted indigenous vegetation areas must be completed within one month of construction completion and under guidance of a qualified ecological specialist. 	<p>Mitigation measures that must be implemented -</p> <ul style="list-style-type: none"> The discharge of stormwater and overflow must not lead to waste pollution or erosion at discharge points. Waste traps must be installed at the inlet to the stormwater pipes which must be cleared of waste on a monthly basis by the municipality. Any waste at the stormwater discharge areas must also be removed by the municipality and disposed of at the municipal landfill site on a monthly basis. Ongoing monitoring of erosion at the outlet structures must be done by the municipality, should any signs of erosion be detected immediate rectification and further prevention measures must be put in place under the guidance of a qualified ecological specialist so as to prevent any additional cumulative impacts on the environment. The impacted site must be monitored for alien vegetation encroachment and should alien vegetation encroach on the impacted site it must be removed and monitored in accordance with CapeNature approved alien vegetation management practices. Replacement of topsoil and revegetation of the impacted indigenous vegetation areas must be completed within one month of construction completion and under guidance of a qualified ecological specialist.

	<p>Revegetation must only be done with locally sourced indigenous vegetation.</p> <ul style="list-style-type: none"> Monitoring of rehabilitated areas must be done by an ECO for at least one year after construction completion on a three-monthly basis to determine success of rehabilitation and to monitor other potential impacts such as erosion. Should the ECO find that rehabilitation is not satisfactory he/she must recommend additional measures to be implemented. All services infrastructure must be maintained in a good condition by the municipality not leading to any environmental degradation or pollution. 	<p>Revegetation must only be done with locally sourced indigenous vegetation.</p> <ul style="list-style-type: none"> Monitoring of rehabilitated areas must be done by an ECO for at least one year after construction completion on a three-monthly basis to determine success of rehabilitation and to monitor other potential impacts such as erosion. Should the ECO find that rehabilitation is not satisfactory he/she must recommend additional measures to be implemented. All services infrastructure must be maintained in a good condition by the municipality not leading to any environmental degradation or pollution.
Cumulative impact post mitigation:	Minimal impact on surrounding indigenous vegetation during operation.	Minimal impact on surrounding indigenous vegetation during operation.
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Low negative	Low negative
Layout/design Alternative 3		
Extent, duration and magnitude of impact:	E – Footprint (1) D – Short to Medium term (2) M – Low (4)	
Probability of occurrence:	P - Definite (5)	
Degree to which the impact can be reversed:	Partly reversible (PR)	
Degree to which the impact may cause irreplaceable loss of resources:	Resource may be partly destroyed (PR)	
Cumulative impact prior to mitigation:	<p>Cumulative impacts of the operational activities on indigenous vegetation is related to stormwater and overflow discharge which may cause erosion and further loss of indigenous vegetation species if not done in a controlled manner, as well as potential human activities impacts on remaining adjacent indigenous vegetation areas during maintenance.</p> <p>Layout/alternative 3 does accommodate proper sludge handling capacity and stormwater management; and also proposes to discharge all sludge overflow back into the Bloekombos Dam hence, it is the preferred option.</p>	
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Medium (35)	
Degree to which the impact can be mitigated:	Partly- mitigatable (PM)	
Proposed mitigation:	<p>Mitigation measures that must be implemented</p> <ul style="list-style-type: none"> The discharge of stormwater and overflow must not lead to waste pollution or erosion at discharge points. Waste traps must be installed at the inlet to the stormwater pipes which must be cleared of waste on a monthly basis by the municipality. Any waste at the stormwater discharge areas must also be removed by the municipality and disposed of at the municipal landfill site on a monthly basis. Ongoing monitoring of erosion at the outlet structures must be done by the municipality, should any signs of erosion be detected immediate rectification and further prevention measures must be put in place under the guidance of a qualified ecological specialist so as to prevent any additional cumulative impacts on the environment. The impacted site must be monitored for alien vegetation encroachment and should alien vegetation encroach on the impacted site it must be removed and monitored in accordance with CapeNature approved alien vegetation management practices. Replacement of topsoil and revegetation of the impacted indigenous vegetation areas must be completed within one month of construction completion and under guidance of a qualified ecological specialist. Revegetation must only be done with locally sourced indigenous vegetation. Monitoring of rehabilitated areas must be done by an ECO for at least one year after construction completion on a three-monthly basis to determine success of rehabilitation and to monitor other potential impacts such as erosion. Should the ECO find that rehabilitation is not satisfactory he/she must recommend additional measures to be implemented. All services infrastructure must be maintained in a good condition by the municipality not leading to any environmental degradation or pollution. 	

Cumulative impact post mitigation:	Minimal impact on indigenous vegetation during operation.
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Low negative

Impacts on biological aspects:		
	Layout/design Alternative 1	Layout/design Alternative 2
Nature of impact:	Impacts of operational activities on terrestrial biodiversity and ecological functioning also partially mapped as terrestrial CBA1	
Extent, duration and magnitude of impact:	E – On site or within 100m of the site (2) D – Short to Medium term (2) M – Low (4)	E – On site or within 100m of the site (2) D – Short to Medium term (2) M – Low (4)
Probability of occurrence:	P - Definite (5)	P - Definite (5)
Degree to which the impact can be reversed:	Partly reversible (PR)	Partly reversible (PR)
Degree to which the impact may cause irreplaceable loss of resources:	Resource may be partly destroyed (PR)	
Cumulative impact prior to mitigation:	Cumulative impacts of the operational activities on the terrestrial ecosystem is related to stormwater and overflow discharge which may cause erosion, pollution and further loss of indigenous vegetation species if not done in a controlled manner, as well as potential human activities impacts on remaining adjacent indigenous vegetation areas during maintenance. Layout/alternative 1 does not accommodate proper sludge handling capacity nor stormwater management, hence is not preferred.	Cumulative impacts of the operational activities on the terrestrial ecosystem is related to stormwater and overflow discharge which may cause erosion, pollution and further loss of indigenous vegetation species if not done in a controlled manner, as well as potential human activities impacts on remaining adjacent indigenous vegetation areas during maintenance. Layout/alternative 2 does accommodate proper sludge handling capacity and stormwater management; however sludge overflow is recommended within the adjacent drainage line which is not preferred.
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Medium (40)	Medium (40)
Degree to which the impact can be mitigated:	Partly- mitigatable (PM)	Partly- mitigatable (PM)
Proposed mitigation:	<p>Mitigation measures that must be implemented -</p> <ul style="list-style-type: none"> The discharge of stormwater and overflow must not lead to waste pollution or erosion at discharge points. Waste traps must be installed at the inlet to the stormwater pipes which must be cleared of waste on a monthly basis by the municipality. Any waste at the stormwater discharge areas must also be removed by the municipality and disposed of at the municipal landfill site on a monthly basis. Ongoing monitoring of erosion at the outlet structures must be done by the municipality, should any signs of erosion be detected immediate rectification and further prevention measures must be put in place under the guidance of a qualified ecological specialist so as to prevent any additional cumulative impacts on the environment. The impacted site must be monitored for alien vegetation encroachment and should alien vegetation encroach on the impacted site it must be removed and monitored in accordance with CapeNature approved alien vegetation management practices. Replacement of topsoil and revegetation of the impacted indigenous vegetation areas must be completed within one month of construction completion and under guidance of a qualified ecological specialist. Revegetation must only be done with locally sourced indigenous vegetation. Monitoring of rehabilitated areas must be done by an ECO for at least one year after construction completion on a three-monthly basis to determine success of rehabilitation and to monitor other potential impacts such as erosion. Should the ECO find that rehabilitation is not satisfactory he/she must recommend additional measures to be implemented. All services infrastructure must be maintained in 	<p>Mitigation measures that must be implemented</p> <ul style="list-style-type: none"> The discharge of stormwater and overflow must not lead to waste pollution or erosion at discharge points. Waste traps must be installed at the inlet to the stormwater pipes which must be cleared of waste on a monthly basis by the municipality. Any waste at the stormwater discharge areas must also be removed by the municipality and disposed of at the municipal landfill site on a monthly basis. Ongoing monitoring of erosion at the outlet structures must be done by the municipality, should any signs of erosion be detected immediate rectification and further prevention measures must be put in place under the guidance of a qualified ecological specialist so as to prevent any additional cumulative impacts on the environment. The impacted site must be monitored for alien vegetation encroachment and should alien vegetation encroach on the impacted site it must be removed and monitored in accordance with CapeNature approved alien vegetation management practices. Replacement of topsoil and revegetation of the impacted indigenous vegetation areas must be completed within one month of construction completion and under guidance of a qualified ecological specialist. Revegetation must only be done with locally sourced indigenous vegetation. Monitoring of rehabilitated areas must be done by an ECO for at least one year after construction completion on a three-monthly basis to determine success of rehabilitation and to monitor other potential impacts such as erosion. Should the ECO find that rehabilitation is not satisfactory he/she must recommend additional measures to be

	a good condition by the municipality not leading to any environmental degradation or pollution.	<ul style="list-style-type: none"> implemented. All services infrastructure must be maintained in a good condition by the municipality not leading to any environmental degradation or pollution.
Cumulative impact post mitigation:	Minimal impact on terrestrial ecosystem during construction.	Minimal impact on terrestrial ecosystem vegetation during construction
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Low negative	Low negative
Layout/design Alternative 3		
Extent, duration and magnitude of impact:	E – Footprint (1) D – Short to Medium term (2) M – Low (4)	
Probability of occurrence:	P - Definite (5)	
Degree to which the impact can be reversed:	Partly reversible (PR)	
Degree to which the impact may cause irreplaceable loss of resources:	Resource may be partly destroyed (PR)	
Cumulative impact prior to mitigation:	<p>Cumulative impacts of the operational activities on the terrestrial ecosystem is related to stormwater and overflow discharge which may cause erosion, pollution and further loss of indigenous vegetation species if not done in a controlled manner, as well as potential human activities impacts on remaining adjacent indigenous vegetation areas during maintenance.</p> <p>Layout/alternative 3 does accommodate proper sludge handling capacity and stormwater management; and also proposes to discharge all sludge overflow back into the Bloekombos Dam hence, it is the preferred option.</p>	
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Medium (35)	
Degree to which the impact can be mitigated:	Partly- mitigatable (PM)	
Proposed mitigation:	<p>Mitigation measures that must be implemented</p> <ul style="list-style-type: none"> The discharge of stormwater and overflow must not lead to waste pollution or erosion at discharge points. Waste traps must be installed at the inlet to the stormwater pipes which must be cleared of waste on a monthly basis by the municipality. Any waste at the stormwater discharge areas must also be removed by the municipality and disposed of at the municipal landfill site on a monthly basis. Ongoing monitoring of erosion at the outlet structures must be done by the municipality, should any signs of erosion be detected immediate rectification and further prevention measures must be put in place under the guidance of a qualified ecological specialist so as to prevent any additional cumulative impacts on the environment. The impacted site must be monitored for alien vegetation encroachment and should alien vegetation encroach on the impacted site it must be removed and monitored in accordance with CapeNature approved alien vegetation management practices. Replacement of topsoil and revegetation of the impacted indigenous vegetation areas must be completed within one month of construction completion and under guidance of a qualified ecological specialist. Revegetation must only be done with locally sourced indigenous vegetation. Monitoring of rehabilitated areas must be done by an ECO for at least one year after construction completion on a three-monthly basis to determine success of rehabilitation and to monitor other potential impacts such as erosion. Should the ECO find that rehabilitation is not satisfactory he/she must recommend additional measures to be implemented. All services infrastructure must be maintained in a good condition by the municipality not leading to any environmental degradation or pollution. 	

Cumulative impact post mitigation:	Minimal impact on indigenous terrestrial ecosystem during rehabilitation.
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Low negative

Nature of potential impact:

Impacts of operational activities on the aquatic functioning of freshwater features of the site and surrounds such as the western non-perennial drainage line and its associated wetland.

Discussion:

Operational activities may impact hydrological processes i.e. stormwater runoff or may lead to pollution of aquatic features of the site and surrounds.

Cumulative impacts:

The main Water Treatment Works are located outside NFEPA mapped wetlands. The aquatic plant species that were recorded in the western non-perennial river were *Phragmites australis*, *Juncus kraussii*, *Typha capensis* and *Pennisetum alopecuroides*. The non-perennial river is located approximately 16m west of the main Water Treatment Works and flows underneath the railway line through a culvert. The damming of the non-perennial river at the railway line resulted in the development of a pond with associated wetland vegetation. The development will not have a significant impact on the non-perennial river and its associate wetland. The only potential negative impacts on the aquatic functioning of the non-perennial river are the discharge of stormwater into the non-perennial drainage line and the potential overflow of backwash water from the WTW into the non-perennial drainage line. The proposal to treat overflow in the settling dams and incorporate an artificial reed bed from where the overflow will be pumped back into the Bloekombos dam as per **Layout/design Alternative 3 is preferred** from an aquatic perspective. This aspect of the proposed WTW is intended to eliminate risks to the non-perennial river/unchanneled valley bottom wetland which otherwise would have received the overflows thereby altering the flow regime and potentially causing water quality impairment in these downstream receiving freshwater ecosystems.

The non-perennial river with its associated wetlands west of the WTW has a PES of E: The loss of natural habitat, biota and basic ecosystem functions is extensive, and the EIS is moderate. Department of Water and Sanitation (DWS) 2015 publication: Section 21 (c) and (i) water use Risk Assessment Protocol (excel spreadsheet) is used to assess the sensitivity of the proposed WTW on the mapped and delineated freshwater ecological features and is also used by the DWS to determine if the proposed development requires authorization and what type of authorisation either General Authorisation or Water Use License. The DWS Risk Assessment confirmed the aquatic impact risks to be Low.

Mitigation:

- Undertake development activities only in identified and specifically demarcated areas. The impact area is the WTW infrastructure and a 2m wide buffer allowing for safe construction activities which will then allow for a no-go area outside this demarcated area and a buffer between the construction area and any freshwater ecological features of at least 14m to protect the identified features. The delineated feature and its buffer is considered as No-Go areas and if any construction activities are required within the No-Go areas then this should only be permissible via an ECO-approved method statement.
- Storm water and erosion control measures must be implemented during the construction phase and monitored to prevent siltation, flooding or erosion.
- All roads need to be maintained and monitored. Visible signs of possible erosion must be immediately rehabilitated.'
- Construction and operational activities of the development must not lead to environmental pollution and waste management measures must be implemented in accordance with an Environmental Management Programme.
- Stormwater discharge into the non-perennial drainage line must not cause erosion and this should be monitored on a regular basis and especially after heavy rains. The stormwater outlet should be constructed from energy dissipating structures (such as gabions and /or reno mattresses) to slow down the velocity of water inflow and allow to seep through the buffer area and not be discharged directly into the non-perennial stream.
- The Water Treatment Works and its associated stormwater discharge point within the non-perennial drainage line must be monitored and aquatic state of the non perennial drainage line and its associated wetland ecosystem recorded on a 6 monthly basis by an Environmental Control Officer during the operational phase. Should any leakage, erosion or environmental degradation be noticed during monitoring this must be addressed by the ECO by providing the

municipality with the appropriate rectification and prevention measures to be implemented.						
Criteria	Layout Alternative 1		Layout Alternative 2		No-Go Alternative	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Extent	2	2	2	2	Not Applicable (No construction activities to take place during the No-Go Alternative)	
Duration	5	5	5	5		
Magnitude	2	2	2	2		
Probability	4	4	4	4		
Significance	36 - Medium	36 - Medium	36 - Medium	36 - Medium		
Status	Medium Negative Significance without Mitigation	Medium Negative Significance with Mitigation	Medium Negative Significance without Mitigation	Medium Negative Significance without Mitigation		
Reversibility	100% Reversible		100% Reversible			
Irreplaceable loss of resources	2 – Partly, some disturbance will occur but will be limited.		2 – Partly, some disturbance will occur but will be limited.			
Can impacts be mitigated?	2 – Partly, some disturbance will occur but will be limited.		2 – Partly, some disturbance will occur but will be limited.			
Criteria	Layout Alternative 3					
	Without Mitigation	With Mitigation				
Extent	2	1				
Duration	5	1				
Magnitude	2	2				
Probability	4	4				
Significance	36 - Medium	16 – Low				
Status	Medium Negative Significance without Mitigation	Low Negative Significance with Mitigation				
Reversibility	100% Reversible					
Irreplaceable loss of resources	2 – Partly, some disturbance will occur but will be limited.					
Can impacts be mitigated?	2 – Partly, some disturbance will occur but will be limited.					

Nature of impact: Introduction of alien and weed plant species						
Discussion: Declared weeds or alien trees may be transported onto the site and spread to surrounding areas during construction which may lead to alien plants growing on disturbed area during after construction and during operation. This may have management and cost impacts on such properties						
Cumulative impacts: Loss of potential biodiversity, ecosystems and natural habitat due to the spread of invader plants.						
Mitigation:						
<ul style="list-style-type: none"> An important aspect of on-going maintenance is the monitoring of the rehabilitated sites and access road verges for alien plant species. Implement an ongoing alien eradication program for the disturbed and rehabilitated areas as per EMP requirements. 						
Criteria	Layout Alternatives 1		Layout Alternative 2 & 3		No-Go Alternative	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Extent	3	2	3	2	Not Applicable (No	

Duration	5	1	5	1	construction activities to take place during the No-Go Alternative)
Magnitude	6	4	6	4	
Probability	4	3	4	3	
Significance	56- Medium	21 - Low	56- Medium	21 - Low	
Status	Medium negative significance if not mitigated	Low negative significance if mitigated	Medium negative significance if not mitigated	Low negative significance if mitigated	
Reversibility	100%		100%		
Irreplaceable loss of resources	1-Will not be lost		1-Will not be lost		
Can impacts be mitigated?	1-Yes, by implementing an alien eradication plan and continuing monitoring of alien regrowth		1-Yes, by implementing an alien eradication plan and continuing monitoring of alien regrowth		

POTENTIAL IMPACTS ON SOCIO-ECONOMIC ASPECTS

Nature of impact: Additional water supply infrastructure to the towns of Heidelberg and Slangrivier.						
Discussion: The only water supply source for Heidelberg and Slangrivier, is from the Overberg Water Supply System (WSS). The required assurance of supply has been compromised for several years. The projected increase in summer seasonal water demand in these towns, is predicted to exceed supply from the current source within the next 2 years. Several water augmentation schemes have been investigated by Hessequa Municipality as possible solutions to the predicted supply shortage. Options investigated to date included Boreholes, Desalination and the proposed Heidelberg Water Scheme Project. The Overberg WSS is fully developed and there are no further infrastructure options available to improve the system yield unless expanded. The proposed Heidelberg water scheme comprises the utilisation of the existing Bloekombos dam, a new Water Treatment Works and a potable water pipeline from the WTW to Muir Street where it connects the Ultkyk Reservoir via a 200mm dia uPVC pipeline. The proposed plant aims to provide an efficient solution for treating water from the Duivenhoks Dam in addition to the present supply from the Overberg WSS, ensuring a consistent supply of high-quality water for residential and industrial use..						
Cumulative impacts: The overall socio-economic impacts of the proposed WTWs will be positive as it aims to provide additional supply of high-quality water for residential and industrial use for the town of Heidelberg and surrounds.						
Mitigation: <ul style="list-style-type: none"> Ongoing effective operations, maintenance and management of infrastructure. 						
Criteria	Layout Alternative 1		Layout Alternative 2 & 3		No-Go Alternative	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Status	-	High positive significance	-	High positive significance	High Negative Impact, no provision of additional potable water supply for Heidelberg and surrounds.	

Nature of impact: Agricultural impact in terms of change to the future agricultural production potential of the development area.						
Discussion: The entire development footprint is considered to be below the threshold for needing to be conserved as agricultural production land because of the limitations that make it unsuitable as viable cropland. Furthermore, the development occupies only a small area of land. The proposed development on this land will therefore result in minimal loss of future agricultural production potential.						
Cumulative impacts: The site has no current agricultural production and limited capacity for future agricultural production. Therefore, it is a site which can be used for non-agricultural purposes without a high loss of agricultural production potential. The cumulative agricultural impact of the proposed development is therefore assessed as being of low significance and therefore as acceptable. The development will not have an unacceptable negative impact on the agricultural production capability of the area, and it is therefore recommended, from a cumulative agricultural impact perspective, that the development be						

approved.						
Mitigation: No mitigation measures are required for the protection of agricultural production potential on the site or surrounds because they are not and will not be utilised as agricultural production land.						
Criteria	Layout Alternative 1		Layout Alternative 2 & 3		No-Go Alternative	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Extent	1	1	1	1	Not Applicable (No operational activities to take place during the No-Go Alternative)	
Duration	5	5	5	5		
Magnitude	2	2	2	2		
Probability	2	2	2	2		
Significance	16 - Low	16 - Low	16 - Low	16 - Low		
Status	Low negative significance if not mitigated	Low negative significance if not mitigated	Low negative significance if not mitigated	Low negative significance if not mitigated		
Reversibility	NA		NA			
Irreplaceable loss of resources	NA		NA			
Can impacts be mitigated?	Not required		Not required			

POTENTIAL IMPACTS ON CULTURAL-HISTORICAL ASPECTS

It is not anticipated that any further impact on the cultural-historical aspects of the site will occur during this phase, however should any burials, fossils or other historical material be encountered during maintenance activities of the operational phase, work must cease immediately and HWC must be contacted.

POTENTIAL IMPACTS OF NOISE AND ODOURS

Nature of impact: Production of noise or odours due to proposed Water Treatment Works causing noise disturbance or odours affected adjacent residential areas.						
Discussion: <u>Noise</u> Noise levels produced during the operational phases must not exceed the allowable maximum urban noise levels and must be regulated by the requirements of the EMP. <u>Odour</u> As it is not sewage water that will be treated it is also not expected that any significant odours will be produced during the operational phase of the Water Treatment works						
Cumulative impacts: Impacts on local residents and current ambience of the adjacent residential areas.						
Mitigation: • Noise and odour monitoring and management to be implemented and addressed in the Operational Manual to be compiled for the WTWs.						
Criteria	Layout Alternative 1		Layout Alternative 2 & 3		No-Go Alternative	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Extent	3	1	3	1	Not Applicable (No construction activities to take place during the No-Go Alternative)	
Duration	1	1	1	1		
Magnitude	6	2	6	2		
Probability	4	3	4	3		
Significance	40-Medium	12-Low	40-Medium	12-Low		
Status	Medium negative significance if not mitigated	Low negative significance if mitigated	Medium negative significance if not mitigated	Low negative significance if mitigated		
Reversibility	100%					
Irreplaceable loss of resources	2- Partial loss due to unavoidable noise impact					

Can impacts be mitigated?	2 Partly – Additional noise will be experienced but can be mitigated to be controlled to be in line with allowable noise regulations for residential areas.	
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POTENTIAL VISUAL IMPACTS

Nature of impact: Visual impact of proposed Heidelberg Water Treatment works below the Bloekombos Dam.						
Discussion: In terms of potential visual impact during the operational phase visual screening from adjacent residential areas will be maintained as far as possible by maintaining the existing stands of Eucalyptus trees inbetween the residential area and the proposed water treatment works infrastructure, although some visual impacts are expected it is not anticipated that the visual impact of the proposed infrastructure will have a high significant visual impact as there will be visual screening with remaining trees and only 3 residential erven are within the expected visual receptors range.						
Cumulative impacts: No significant visual impacts expected.						
Mitigation: <ul style="list-style-type: none"> All areas disturbed during construction to be rehabilitated and maintained with natural indigenous vegetation. Maintain visual screen from residential areas with existing Eucalyptus trees as far as possible. 						
Criteria	Layout Alternative 1		Layout Alternative 2 & 3		No-Go Alternative	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Extent	3	1	3	1	Not Applicable (No construction activities to take place during the No-Go Alternative)	
Duration	1	1	1	1		
Magnitude	6	2	6	2		
Probability	4	3	4	3		
Significance	40-Medium	12-Low	40-Medium	12-Low		
Status	Medium negative significance if not mitigated	Low negative significance if mitigated	Medium negative significance if not mitigated	Low negative significance if mitigated		
Reversibility	100%					
Irreplaceable loss of resources	2- Partial loss due to unavoidable visual impact					
Can impacts be mitigated?	2 Partly – Top structures to blend in with existing residential areas.					

(c) Impacts that may result from the decommissioning and closure phase (briefly describe and compare the potential impacts (as appropriate), significance rating of impacts, proposed mitigation and significance rating of impacts after mitigation that are likely to occur as a result of the decommissioning and closure phase

POTENTIAL IMPACTS ON GEOGRAPHICAL AND PHYSICAL ASPECTS

It is not anticipated that decommissioning will occur in the near future. Should decommissioning occur, the expected impacts are similar to those listed in the construction phase above with the additional positive impact of rehabilitating the decommissioned area to a near natural/indigenous state and negative impact of destroying water treatment works infrastructure. Impacts must be mitigated and managed according to the best practise techniques/management measures available for that time.

POTENTIAL IMPACTS ON BIOLOGICAL ASPECTS

The decommissioning of proposed developments is not anticipated in the near future. Impacts during this phase will however be similar to that of the construction phase. Mitigation and management measures will be related to the technology of the day and needs to be discussed at such time as decommissioning will occur. All structures must be removed and the area rehabilitated to a near natural state (dependent upon the end land

use agreement). Waste, where possible must be recycled. All concrete introduced must be removed off site to a licensed facility

POTENTIAL IMPACTS ON SOCIO-ECONOMIC ASPECTS

Potential decommissioning of the proposed developments will mean that the Municipality will not be able to provide additional supply of potable water to the town of Heidelberg and surrounds therefore potentially leading to shortages in potable water supplies for the area. Decommissioning is therefore highly unlikely and undesirable.

POTENTIAL IMPACTS ON CULTURAL-HISTORICAL ASPECTS

It is not anticipated that any further impact on the cultural-historical aspects of the site will occur during this phase as no further disturbance outside of the already impacted areas will take place during decommissioning.

POTENTIAL IMPACTS OF NOISE

The impacts and their significance anticipated to occur during this phase will be the same as that of the construction phase. Mitigation measures during this phase will remain the same as for the construction phase.

POTENTIAL VISUAL IMPACTS

The impacts and their significance anticipated to occur during this phase will be the same as that of the construction phase. Mitigation measures during this phase will remain the same as for the construction phase, with the added potential positive impact of the site to be rehabilitated to a more "natural" state.

(d) The No-Development Option-

The No-Development option will result in the current water storage capacity and supply for Heidelberg and Slangrivier remaining as it is. The only water supply source for Heidelberg and Slangrivier, is from the Overberg Water Supply System (WSS). The required assurance of supply has been compromised for several years. The projected increase in summer seasonal water demand in these towns, is predicted to exceed supply from the current source within the next 2 years.

The Overberg WSS is fully developed and there are no further infrastructure options available to improve the system yield unless expanded. The proposed Heidelberg water scheme comprises the utilisation of the existing Bloekombos dam, a new Water Treatment Works and a potable water pipeline from the WTW to Muir Street where it connects the Ultkyk Reservoir via a 200mm dia uPVC pipeline. The proposed plant aims to provide an efficient solution for treating water from the Duivenhoks Dam in addition to the present supply from the Overberg WSS, ensuring a consistent supply of high-quality water for residential and industrial use.

The need for water services infrastructure upgrades required within the Heidelberg area to ensure and increase water supply and capacity especially during the peak dry summer months was identified and approved as part of the Amended 2022-2027 IDP for Hessequa Municipality.

Hence should the municipality not be able to implement the development as proposed there is a high risk that the town of Heidelberg and Slangrivier will exceed available potable water sources supplies within the next 2 years potentially leading to high negative socio-economic and human health impacts and is therefore not preferred.