

PROJECT IMPACT ASSESSMENT, SIGNIFICANCE AND MITIGATION MEASURES SUMMARY

The following impact rating approach used by EnviroAfrica CC is a basic exponential rating system to assess actual and potential negative and positive environmental impacts.

Environmental activities or aspects are identified, based on:

- the phases of the project,
- the nature (or description) of the actual and potential impacts of the activities.

For every project activity or aspect, various environmental impacts are listed. Every negative impact is allocated a -value as per each of the following criteria:

- Probability (Likelihood)
- Extent
- Duration (Frequency)
- Consequence (Receiving Environment)
- Magnitude (Intensity/severity)

Every positive impact is allocated a +value as per each of the following criteria:

- Probability (Likelihood)
- Extent
- Duration (Frequency)
- Magnitude (Intensity/severity)

Once a value is allocated for each of the criterion, the scores are averaged to determine the final impact rating see Table 1 below.

EnviroAfrica then further assesses environmental significance, based on the nature of the impact, as per the score and colour key which forms part of Table 1 below. This results in impacts having either a low (indicated in green), medium (indicated in yellow) or high (indicated in orange and red) negative significance, and a low (light blue), medium (blue) or a high (dark blue) positive significance

Note: i. As a baseline, impact rating values/scores are allocated taking the **worst case** scenario into account i.e. with no mitigation. The baseline rating is compared with those after mitigation has been taken into account i.e. the post-mitigation rating. Post mitigation rating is used for the actual impact assessment.

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SIGNIFICANCE CRITERIA	Very High	High	Medium	Low	Negligible (very-low)
Value	16	8	4	2	1
Probability (likelihood) (P)	Definite. Impact will definitely occur (impact will occur regardless of any prevention measures)	Highly probable. Very likely for impact to occur.	Probable. Impact may likely occur.	Improbable. Impact may occur. Distinct Possibility	Improbable. Low likelihood/unlikely for impact to occur.
Extent (E)	Impact potentially reaches beyond national boundaries	Impact has definite provincial/potential national consequences	Impact confined to regional area/ town	Impact confined to local region and impact on neighbouring properties	Impact confined to project property / site
Duration (D)	Permanent The impact is expected to have a permanent impact, with very little to no rehabilitation possible	Long-Term The impact is expected to last for a long time after construction with rehabilitation expected to be 15-50 years. Impact is reversible but only with long-term mitigation	Medium-term The impact is expected to last for some time after construction with rehabilitation expected to be 5 - 15 years. Impact is reversible but only with on-going mitigation	Short-term The impact is expected to last for a relatively short time with rehabilitation expected to be 2-5 years. The impact is reversible through natural process and/or some mitigation.	Very short/ temporary The impact is expected to be temporary and last for a very short time with rehabilitation expected to be less than 2 years. The impact is easily reversible through natural process and/or some mitigation.
Magnitude (Intensity/ Severity) (M)	It is expected that the activity will have a very severe to permanent impact on the surrounding environment. Functioning irreversibly impaired. Rehabilitation often impossible or unfeasible	It is expected that the activity will have a severe impact on the surrounding environment. Functioning may be severely impaired and may be temporarily cease. Rehabilitation will be needed to restore system integrity	It is expected that the activity will have an impact on the surrounding environment, but it will maintain its function, even if moderately modified (overall integrity not compromised). Rehabilitation easily achieved	It is expected that the activity will have a perceptible impact on the surrounding environment, but it will maintain its function, even if slightly modified (overall integrity not compromised). Rehabilitation easily achieved	It is expected that the impact will have little or no effect on the integrity of the surrounding environment
Receiving environment (Consequence): (RE)	Very sensitive, pristine area – protected site or species permanently or seasonally present	Unused area containing only indigenous fauna / flora species	Unused area containing indigenous and alien fauna / flora species	Semi-disturbed area already rehabilitated / recovered from prior impact, or with moderate alien vegetation	Disturbed area/ transformed/ heavy alien vegetation

ENVIRONMENTAL RATING SIGNIFICANCE KEY:

Negative Impacts

SIGNIFICANCE	RATING	Final rating score / value range
Very Significant	Very High	-11 to -16
Significant	High	-7 to <-11
Increasing Significance	Medium	-4 to <-7
	Low	-2 to <-4
Insignificant	Very Low	-1 to <-2

Positive Impacts

SIGNIFICANCE	RATING	Final rating score / value range
Significant	High	10 to 16
Increasing Significance	Medium	4 to <10
	Low	1 to <4

Table 1: Environmental Significance Rating Methodology (rating criteria and significance key)

Nature of Impact			Impact Assessment Ranking and Proposed Mitigation		
No.	Aspect	Impact	Environmental Significance (without Mitigation)	Proposed Mitigation (i.e. Proposed mitigation to reverse/ avoid, manage or mitigate identified impacts associated with construction, operation, and decommissioning/ closure phases)	Environmental Significance (After Mitigation)
CONSTRUCTION PHASE					
1	Impact on Cultural, Archaeological, and Heritage Resources	Loss and/or damage to potential archaeological and historical sites within the construction footprint	No Impact	<p>The proposed development is unlikely to impact on significant archaeology, built environment or cultural landscape heritage resources. No mitigation required.</p> <p>However:</p> <ul style="list-style-type: none"> - If any archaeological remains (including but not limited to fossil bones and fossil shells, coins, indigenous and/or colonial ceramics, any articles of value or antiquity, stone artefacts and bone remains, structures and other built features, rock art and rock engravings) are discovered during construction they must immediately be reported to HWC and must not be disturbed further until the necessary approval has been obtained from HWC. - Should any human remains/burial or archaeological material be disturbed, exposed or uncovered during construction, these should immediately be reported to the South African Heritage Resources Agency (021 462 4502) and Heritage Western Cape (021 483 9685). The ECO and ER are also to be informed. An archaeologist will be required to remove the remains at the expense of the developer. 	No Impact
2	Impact on Palaeontological Resources	Loss and/or damage to potential fossils within the construction footprint	No Impact	See above	No Impact
3	Botanical	Loss of fynbos vegetation and / or riparian vegetation	Low (Negative)	The requirement for mitigation would not be great but it is recommended that once the dam wall of any of the alternatives is complete, the wall should be vegetated with local fynbos plants to stabilize it. No exotic species should be used for this purpose. In addition, the building of the dam would present the opportunity to completely remove the >1 ha stand of poplar trees, to ensure that this species is no longer present downstream of the dam spillway, since it is undesirable and water-hungry!.	Very Low Negative

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4	Freshwater Resources: Vehicular movement (transportation of construction materials) and access to the site.	<ul style="list-style-type: none"> Transportation of construction materials can result in disturbances to soils, and increased risk of sedimentation/erosion; and Soil and stormwater contamination from oils and hydrocarbons originating from construction vehicles. 	Medium (Negative)	<ul style="list-style-type: none"> Site preparation prior to construction It is imperative that all construction works be undertaken during the dry, summer months as it is expected that surface runoff collected in the excavated channels will be minimal and no diversion of flow would be necessary and would prevent any indirect effects impacting on the downstream Houdenbek River; Due to the accessibility of the site, no unnecessary crossing of the excavated channels may be permitted (with specific mention of the excavated channel section between the proposed dam wall and the R303 road). This will limit edge effects, erosion and sedimentation of the downstream excavated channel (the portion of channel between the proposed dam wall and the R303 crossing) which connects to the Houdenbek River; 	Low (Negative)
5	Freshwater Resources: Removal of vegetation and associated disturbances to soils	<ul style="list-style-type: none"> Removal of vegetation, including the large stand of poplar trees between the two ridges, leading to the expose of soils; These soils can be transported into the excavated channel underneath the R303 road, causing sedimentation of the downstream Houdenbek River; Any sheet runoff from the dam footprint area cleared of vegetation can cause erosion, resulting in a high sediment load entering the downstream excavated channel; Proliferation of alien vegetation as a result of disturbances. 	Medium (Negative)	<ul style="list-style-type: none"> Contractor laydown areas, vehicle re-fuelling areas and material storage facilities to remain outside of the excavated channels and may be located either south of the proposed dam wall or north east thereof but must be at least 10m away from the excavated channels. These localities and the access to them are considered to have the minimal edge effects on the downstream excavated channel; The removal of the poplar trees may potentially result in an increase of dust and sediments in the downstream excavated channel. Thus, sediment control devices (such as silt traps) should be constructed in the downstream excavated channel (just before the R303 road crossing culvert) prior to any vegetation clearing, if construction occurs during the wet winter season. This will prevent any blockages of the portion of excavated channel before the R303 road crossing; All cleared vegetation must be stockpiled in a designated area, at least 10m from the excavated channels. Vegetation may not be disposed of in the excavated channels as this may cause blockages. During the removal of the poplar trees, a temporary stockpile may be created directly east thereof (in the proposed dam footprint). Once all clearing activities has commenced all material must be disposed of at a registered garden refuse site and may not be burned or mulched on site; Any topsoil removed must be stockpiled separately from all other materials, for use covering the new dam wall. Soil stockpiles may not be contaminated, and it must be ensured that the minimum surface area is taken up, however the stockpiles may not exceed 2m in height; 	Low (Negative)

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6	Freshwater Resources: Excavation of dam basin to source fill material; Stockpiling of material; Infilling and compaction of the proposed dam wall footprint .	Runoff from stockpiled material or sediment laden runoff from the construction footprint area could enter the excavated channel between the proposed dam wall and the R303 road and increase its sediment load; Disturbance to vegetation and soils due to edge effects.	Low (Negative)	<ul style="list-style-type: none"> All exposed soils must be protected for the duration of the construction phase with a suitable geotextile (e.g. Geojute or hessian sheeting) in order to prevent dust generation resulting in vegetation smothering and sedimentation of the downstream excavated channel. This is especially important since the surrounding landscape is utilised for harvestable fruits/crops that may be sensitive to excessive dust. 	Low (Negative)
7	Freshwater Resources: Use of concrete within close proximity to the excavated channel ; Connecting the downstream excavated channel to the spillway outlet	Potential negative impact on the water quality (if present); Potential erosion of excavated channel	Medium (Negative)	<ul style="list-style-type: none"> - Construction On completion of the civil works for the construction of the dam wall, the wall must be covered with topsoil (removed during site preparation activities), specifically the crest and outer side; Should additional topsoil be imported, it must be ensured that the topsoil used are weed-free to limit the establishment of alien and invasive vegetation species; The slope of the dam wall may not exceed the maximum slope ratio of 3:1, and must be stabilised (on the western embankment of the dam wall) during the construction phase with the use of a geotextile product such as hessian or Geojute, which is to be staked to the surface of the dam wall slope while revegetation of the dam wall occurs; The dam wall must be revegetated after the construction activities, to stabilize the soils and prevent erosion of the dam wall. A graminoid seed mixture (such as the MayFord Fynbos Biomosome seed mixture) can be used for this purpose, as it will allow for quick establishment. The proposed spillway placement must connect with the downstream excavated channel that has a culvert below the R303; No mixed concrete may be deposited outside of the designated construction footprint. The following recommendations must be adhered to: <ul style="list-style-type: none"> Fresh concrete and cement mortar should not be mixed near the excavated channel. Preferably in the laydown area/construction camp, may not be mixed on bare soil, and must be within a lined, bound or banded portable mixer. Consideration must be taken to use ready mix concrete; No mixed concrete shall be deposited directly onto the ground within the excavated channel. A batter board or other suitable platform/mixing tray is to be provided onto which any mixed concrete can be deposited whilst it awaits placing; 	Low (Negative)

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				<ul style="list-style-type: none"> - A washout area must be designated outside of the excavated channel and dam footprint area, and wash water must be treated on-site or discharged to a suitable sanitation system. Wash water may not be discharged into the excavated channel without treatment; - Empty cement bags must be disposed of through the hazardous substance waste stream; - Concrete spillage outside of the demarcated area must be promptly removed and taken to a suitably licensed waste disposal site. • As a precautionary principle, it should be ensured that the spillway (when in use) does not cause erosion of the downstream excavated channel when water is flowing. As such, scour protection (either loose rocks or reno mattresses) must be placed at the base of the outlet to decrease the velocity of water and prevent erosion from occurring; • The inlet and outlet of the proposed spillway must be of equal width to allow water to enter the spillway and diffusely flow through the spillway and into the downstream excavated channel, without the flow being concentrated. 	
8	Socioeconomic	Creation of short- term employment opportunities.	Low (Positive)	The development is expected to create jobs during the construction phase, and operational phase	
9	Dust	Dust may be generated during the construction of the proposed development.	Medium-Low (Negative)	<p>The Contractor must take all reasonable measures to minimize the generation of dust as a result of construction activities resulting from along-construction-route activities (but must also take into account possible water constrictions of the area).</p> <ul style="list-style-type: none"> - The onsite construction site agent must take into account prevailing wind strength and wind direction and must have preventative measures on standby to minimize dust pollution that may cause damage to people and property. - The liberation of dust into the surrounding environment shall be effectively controlled by the use of, inter alia, water spraying and/or other dust-allaying agents. The speed of haul trucks and other vehicles must be strictly controlled to avoid dangerous conditions, excessive dust or excessive deterioration of the road being used. - Earth-works to take place after harvest season 	Low (Negative)

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Nature of Impact			Impact Assessment Ranking and Proposed Mitigation		
No.	Aspect	Impact	Environmental Significance (without Mitigation)	Proposed Mitigation (i.e. Proposed mitigation to reverse/ avoid, manage or mitigate identified impacts associated with construction, operation, and decommissioning/ closure phases)	Environmental Significance (After Mitigation)
10	Visual	Visual impact of construction activities and plant on site	Low (Negative)	<ul style="list-style-type: none"> - Construction activities limited to within the construction footprint - The contractor may not operate any machinery outside the demarcated area. - Appropriate machinery to be used 	Low (Negative)
11	Traffic	Increase in trucks and construction plant	Very Low (Negative)	Cognisance of traffic and other road users	Very Low (Negative)
12	Noise	Noise will be generated during the construction phase.	Low (Negative)	<p>Any noise generated by construction activities will be a temporary impact however, the following mitigation measures will be implemented:</p> <ul style="list-style-type: none"> - A complaint register to be maintained on-site. Any complaints received must be responded to and rectified accordingly. The ECO must be notified of any complaints; - All construction vehicles must be fitted with standard silencers. All silencers must be maintained. All machinery used on site must have suppressors. - Working hours must be limited to and strictly adhered to standard daylight working hours (08h00-17h00). 	Very Low (Negative)

OPERATION PHASE					
13	<p>Freshwater Resources: Potential foundation seepage of stored water into the downstream excavated channel and eventually into the Houtenbek River;</p> <p>Overflow of water over the spillway when the dam is at full capacity.</p>	<ul style="list-style-type: none"> • Increase in the volume of water that may seep through the dam wall into the excavated channel (positive impact); • Erosion of the excavated channel where water enters the excavated channel from the spillway; • Potential increased sedimentation of the excavated channel due to erosion associated with the spillway. 	Low (Negative)	<ul style="list-style-type: none"> - The dam and spillway should regularly be inspected for erosion, especially after heavy rainfall events when overflow from the dam is expected and the flow velocity is increased. If erosion is noted, this should be rectified, preferably reinstating vegetation in the eroded areas in the excavated channel. If erosion is pronounced, erosion control devices such as reno mattresses should be considered, in consultation with a freshwater ecological specialist; - If erosion is apparent on the dam wall, immediate measures such as strategic placement of hessian sheets or gum poles or stabilisation with sandbags must be taken in order to prevent additional erosion from occurring; - The spillway and excavated channel must be maintained free of any debris and silt/sediment that could block the system. 	Low (Negative)
14	<p>Freshwater Resources: Maintenance of the dam wall, including inspections, desilting and leak detection.</p>	<ul style="list-style-type: none"> • Desilting activities resulting in the: *Removal of vegetation; and *Earthworks and silt stockpiling, the runoff from which has the potential to increase silt loads within the downstream excavated channel . 	Low (Negative)	<ul style="list-style-type: none"> - Control measures applicable to this activity would be as per Construction and Operation above. Additionally, the following is applicable: - During desilting, silt associated with the dam should immediately be removed in order to prevent sedimentation of the downstream excavated channel. Additionally, during desilting a temporary silt trap would be installed at the spillway and in the excavated channel. This would be emptied on a regular basis and not allowed to reduce the capacity of the dam. 	Low (Negative)
15		<ul style="list-style-type: none"> • In the event where a leak has been detected within the dam wall itself, impacts include: • An increase in water quantity could cause extended periods of water saturation of the downstream excavated channel ; • Repair of a leak would entail the impacts as per Construction above. 	Low (Negative)		Low (Negative)

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16	Visual	Visual impact of the dam and agricultural development	Low (Negative)	<ul style="list-style-type: none"> - Appropriate colour shade netting to be used where possible - Maintain and/or increase screening with trees 	Low (Negative)
17	Socio-economic	Creation of long-term employment opportunities.	Low (Positive)	The development is expected to create 12 permanent job opportunities during the operational phase	