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.

SIGNIFICANCE CRITIERIA	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
Insignificant	Low	-2 to <-4
	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
Insignificant	Low	1 to <4

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

**PLEASE SEE RATING SCORING MATRIX*

Nature of Impact		Impact Assessment Ranking and Proposed Mitigation		
No.	**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	**Botanical:** Loss of vegetation within the critically endangered Swartland Shale Renosterveld (CR) vegetation type.	-6	• Before construction commence the two larger *Olea europaea* trees (located where the dam wall will be constructed) should be carefully removed and transplanted to just outside of the new dam footprint. In order to do so, the roots of these trees should be trimmed (*in-situ*). The trees should then be left for at least a couple of months to recover. Just before being transplanted the trees should be trimmed back (at least a third of the canopy), after which the tree can be transplanted, being careful to keep the tree in its same orientation (the north facing part of the tree, should again face north). • The smaller trees on the disturbed riverbanks should also be considered for transplantation, but these could probably be done in one go. • A suitably qualified Environmental Control Officer must be appointed to monitor the construction phase. • The development footprint should be clearly demarcated and all construction activities should remain within this footprint (including lay-down areas). • Indiscriminate clearing of areas must be avoided. • All areas impacted from construction activities must be rehabilitated on completion of the project.	-2
2	**Botanical:** Loss of ESAs	-6		-3
3	**Botanical:** Soil Contamination	-4		-2
4	**Freshwater:** Loss of Riparian Habitat	-5	• The potential sedimentation of the drainage line can be mitigated for by (i) preventing fill from leaving the construction site, (ii) keeping the construction footprint as small as possible, and (iii) constructing the proposed dam during the dry season (i.e., summer). • Mitigation measures to be implemented for potential seepage and increased flow return include (i) not over-irrigating, (ii) measuring return flow, and (iii) pump the return flow back into the dam. • Mitigation measures to ensure the maintenance of the drainage lines includes (i) retaining as many reeds as possible (these include *Phragmites* spp. and *Typha* spp. reeds as photographed in Figure 18), (ii) conserving remaining ecological functioning of these drainage lines (this involves retaining as much	-3
5	**Freshwater:** Alternation of Hydrology of the drainage line	-5		-2
6	**Freshwater:** Surface water & ground water contamination	-5		-2
7	**Freshwater:** Erosion & Sedimentation	-6		-3

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			biodiversity associated with these drainage lines as possible), and (iii) maintaining the drainage lines according to a schedule. As per the Freshwater Report, the mitigation measures are readily implementable where sediment and agri-chemicals can be prevented from entering the drainage line and subsequently, the Berg Rivier; • Measures recommended to mitigate erosion includes (i) keeping the construction footprint as small as possible, (ii) constructing the proposed dam during the dry season (i.e., summer), and (iii) landscaping and rehabilitating the construction site. The erosion mitigation measures recommended are not regarded as the further destruction of the drainage line due to the current transformed / disturbed condition of these drainage lines. The cumulative impact of implementing these erosion mitigation measures would be positive due to the prevention of the large-scale movement of the sediment. • A suitably qualified ECO must be appointed; • Environmental Awareness training to be conducted with all workers • Ensure construction activities are restricted to the demarcated footprint, strictly prohibit any vehicles or construction-related activities outside of the demarcated footprint area • Access roads to the proposed dam should be limited to a single circular route in and out. Ensure construction vehicles stay on existing roads and erect signs to remind workers not to deviate from the roads. • No material is to be stockpiled within 32m of any watercourse. The stockpiles may not exceed 2m in height. • Mitigation measures applicable to the spillway: ○ Energy dissipating structures should be installed at the spillway outlet to prevent erosion and scouring of the drainage line where the overflow will be discharged; ○ At the outlet, rocks must be placed, and vegetation established (if applicable considering the highly episodic nature of the system) to stabilize the soil of the bed, and to prevent erosion. This will also	

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			diffuse flow and lower the velocity of water into the lower reach of the drainage line; ○ Upon completion of the construction activities, all footprint areas should be revegetated with indigenous vegetation. ○ The 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 by the reinstatement of the embankments through compaction of soil and revegetation thereof. If erosion is pronounced, erosion control devices such as reno mattresses should be considered, in consultation with a freshwater ecological specialist. • No concrete/ cement will be mixed on-site and surplus must be disposed of in the correct manner. • Inspect all vehicles daily for the early detection of deterioration or leaks. Drip trays are required and must be used for stationary heavy vehicles. • The dam and the spillway should not be higher than the dam's full capacity, which will ensure that if the dam is at its design capacity, it would overflow during exceptional very high rainfall events. • The construction footprint must be kept as small as possible; • All building rubble should be removed following the completion of the dam. Any building rubble must not be stockpiled within 32m of the watercourse; • No building rubble should be allowed to wash into the stream; • The building should take place during the dry summer months • Areas below the dam wall (at the spillway) must be monitored after heavy rainfall events for erosion and sedimentation. • Should erosion and incision be noted, immediate corrective measures must be undertaken. • Erosion at the spillway can be prevented by using rip-rap mattresses or spreaders. Other erosion mitigation / control measures must be implemented if applicable;	

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			• Nuisance vegetation and sedimentation to be removed to ensure overflow; • Rehabilitation measures may include the filling of erosion gullies and rills, gabions, and the stabilization of gullies with silt fences. Rehabilitation will also include the vegetation of bare areas of soil, susceptible to erosion, within the construction footprint. Impact on areas outside of the designated construction area must be minimized and where applicable, rehabilitated with plant species characteristic of the Swartland Shale Renosterveld Vegetation Type. See Appendix H (EMPr) for more information on rehabilitation.	
8	**Heritage Resources:** Loss of Heritage Resources	-2	• A suitably qualified ECO must be appointed; • Environmental Awareness training to be conducted with all workers • Ensure construction activities are restricted to the demarcated footprint, strictly prohibit any vehicles or construction-related activities outside of the demarcated footprint area • Access roads to the dam should be limited to a single circular route in and out. Ensure construction vehicles stay on existing roads and erect signs to remind workers not to deviate from the roads. • Should any heritage resources, including evidence of graves and human burials, archaeological material and paleontological material be discovered during the execution of the activities above, all works must be stopped immediately, and Heritage Western Cape must be notified without delay. These should be safeguarded - preferably *in situ* - and reported by the ECO as soon as possible to Heritage Western Cape (Ms. Stephanie Barnardt - 021 483 9543). This area must be marked using visible means, such as barrier tape, and all personnel should be informed that it is a no-go area. • No measures should be taken to cover up the suspected heritage resource with soil or to collect any remains such as bone, ceramics, or stone.	-2

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			• All parties concerned should respect the potentially sensitive and confidential nature of the heritage resources, particularly human remains, and refrain from making public statements until a mutually agreed time.	
9	**Agricultural Land:** Loss of approximately 10.4ha of agricultural land.	-6	Although there is an area of agricultural land which will be lost should the proposed development be approved, the total area of the dam relative to the farms size is less than 3%. If the proposed dam is not developed, a lack of water security (exacerbated by water shortages and droughts, amid global climate change) will result in crop losses which will directly impact employment security. Although the larger size layout (Alternative 2 – preferred layout) will result in a larger footprint, the cost/storage ratio is considered viable under the circumstances relative to the (i) irrigational requirements of the Bonathaba Farm and (ii) site conditions. - Implementation of the EMPr - A suitably qualified ECO must be appointed; - Environmental Awareness training to be conducted with all workers; - Ensure construction activities are restricted to the demarcated footprint, strictly prohibit any vehicles or construction related activities outside of the demarcated footprint area - Access roads to the dam should be limited to a single circular route in and out. Ensure construction vehicles stay on existing roads and erect signs to remind workers not to deviate from the roads. - Please refer to Section 6.6 of the Environmental Impact Report (EIR)	-3
10	**Dust:** Dust from site topsoil removal; construction, rehabilitation.	-3	• Dust will be monitored. If dust becomes a problem, dust will be controlled by means of water spray vehicles. • No over watering of the site area or roads surfaces should occur. • Speed limits must be enforced in all areas to limit the levels of dust pollution. • Max speed of 40km/h must be maintained. • Protect stockpiled topsoil using tarp or erosion blankets. • Stockpile topsoil within an area where no stormwater runoff is expected	-2

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11	**Visual:** Negative visual impact of the proposed development.	-2	The nature of the proposed development is in line with surrounding land uses (i.e., farm dams). Thus, construction related activities should remain within the demarcated footprint	-2
12	**Socioeconomic Impacts:** Employment and skill development opportunities.	5	The proposed development will create employment and skills development opportunities. This is a positive impact.	5
OPERATIONAL PHASE				
13	**Erosion:** erosion of areas surrounding the proposed dam.	-6	• Erosion mitigation measures[1] must be implemented where applicable. • Install erosion and sediment controls where applicable; • Inspect and maintain erosion and sediment controls regularly; and • Rehabilitate any areas affected by construction activities. • Erosion mitigation measures, as outlined in the EMPr, must be implemented to reduce the susceptibility of the area to erosion. • Mitigation measures must be monitored, especially after heavy rainfall events.	-2
14	**Water supply:** water supply for irrigation activities and agricultural productivity. The water use rights will be realized.	5	The proposed operation of the proposed dam will ensure water supply for irrigation activities. The water use right will be realized. This is a positive impact.	5
15	**Freshwater:** Alteration of the hydrology of the Berg River.	-5	• Strict monitoring must be put in place with regards to water abstraction; • The local irrigation board as well as the DWA has most likely already defined the schedule according to which water is to be taken from the Berg River. The DWS, according to its legal mandate, is already monitoring the Berg River water quality and water levels in terms of a long-standing national program. All that remains for Bonathaba is to operate within the ambit of their water use license. • Do not over-irrigate agricultural areas; and	-2

[1] Erosion mitigation measures include, but are not limited to, gabions, silt fences, retention basins, detention ponds, interceptor ditches, seeding and sodding, riprap of exposed embankments, erosion mats and/or mulching, etc. Exposed areas, susceptible to erosion, must be rehabilitated. Soils can also be stabilized by planting indigenous vegetation characteristic of the vegetation type.

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			• Please refer to recommendations made by the Freshwater Specialist (Appendix 8.2). • Mitigation measures as outlined in the EMPr must be complied with. • Erosion mitigation measures must be complied with where applicable to reduce sedimentation of watercourse. • No stockpiling is permitted within 32m of any watercourse. • Ensure no material is allowed to wash down stream.	
16	**Erosion:** Erosion and sedimentation of watercourse.	-5	• Erosion mitigation measures, as outlined in the EMPr, must be implemented to reduce the susceptibility of the area to erosion. • Mitigation measures must be monitored, especially after heavy rainfall events.	-2
17	**Visual Impact**: Site may be not aesthetic amid natural background.	-2	The nature of the proposed development is in line with surrounding land uses (i.e., farm dams). Operation-related activities will be limited to the developed area.	-2
18	**Socioeconomic:** retention of existing jobs.	5	Insurance of water supply will improve farm productivity. This will enable existing jobs on the farm to be retained. This is a positive impact.	5
DECOMMISSIONING PHASE				
19	**Waste**: Demolition of infrastructure resulting in waste accumulation on-site and surrounding area.	-6	It is not envisioned that the proposed development will be decommissioned. The following mitigation measures must be implemented should the dam be decommissioned: • All infrastructure which has been demolished must be consolidated, removed, and disposed of at a registered disposal facility. Waste receipts are required as proof of safe disposal; • The burying and/or burning of waste is strictly prohibited; • Mitigation measures as outlined in the EMPr must be complied with. • No stockpiling of material must take place within 32m of any watercourse. • General and hazardous (if applicable) waste must be collected, consolidated, and disposed of accordingly at a registered general or hazardous disposal facility. A waste receipt is required as proof of safe disposal.	-2
20	**Soil**: Exposed soil becoming prone to erosion	-5	It is not envisioned that the proposed development will be decommissioned. The following mitigation measures must be implemented should the dam be decommissioned:	-2

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			• Previously transformed areas must be ripped and subsequently rehabilitated with indigenous vegetation characteristic of the Atlantis Sandstone Fynbos (EN). Previously implemented erosion mitigation measures must remain in place. • Erosion mitigation measures, as outlined in the EMPr, must be complied with.	