

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 criteria, 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. 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 2 - 15 years. Impact is reversible but only with on-going mitigation	Short-term / temporary The impact is expected to be temporary or last for a relatively short time with rehabilitation expected to be <2years. The impact is 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	≥-5 to <-7
	Medium Low	-4 to ≤-5
	Low	-3 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
Insignificant	Low	1 to <4

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

CONSTRUCTION PHASE				
No.	Aspect / Impact	Preferred Alternative – Harmony Instream Dam and Associated Agricultural Development	Alternative Dam Layouts (Options 1 and 2) and Associated Agricultural Layout	No-Go Alternative
1	Visual / Construction	Temporary visual disturbance associated with the construction of the Harmony Instream Dam and the establishment of approximately 25 ha of associated agricultural development within an established agricultural landscape. Low (Neg)	Alternative dam layouts and agricultural layouts would result in a larger or less optimised disturbance footprint, increasing temporary visual impacts during construction. Medium–Low (Neg)	No impact
2	Noise	Temporary noise associated with site preparation, earthworks, dam construction, establishment of the associated agricultural development and movement of construction vehicles and equipment. Low (Neg)	Increased construction activities and earthworks associated with alternative layouts would result in a slightly longer construction period and increased noise disturbance. Medium–Low (Neg)	No impact
3	Waste	Construction rubble, spoil material, cleared vegetation, packaging waste and general construction waste generated during construction; impacts can be effectively managed through implementation of the EMPr. Low (Neg)	Larger construction footprints would generate greater volumes of spoil, vegetation clearance and construction waste. Medium–Low (Neg)	No impact
4	Heritage	No significant impacts on identified heritage resources are anticipated. The preferred layout avoids the recorded rock art sites (HMY1 and HMY2), incorporates the required 50 m No-Go buffers and implements the Heritage and Fossil Chance Find Procedures. Very Low (Neg)	Larger disturbance footprints marginally increase the likelihood of encountering previously unidentified heritage resources during earthworks. Low (Neg)	No impact
5	Freshwater / Aquatic	Temporary disturbance to the watercourse associated with dam construction and establishment of the associated agricultural development. Potential impacts on water quality, sedimentation and aquatic habitat can be effectively mitigated through erosion, stormwater and sediment control measures. Low (Neg)	Larger disturbance areas increase the potential for sediment mobilisation, erosion and temporary impacts on freshwater resources. Medium–Low (Neg)	No impact
6	Terrestrial Biodiversity	Vegetation clearance associated with the construction of the dam and approximately 25 ha of associated agricultural development will result in the loss of indigenous vegetation; however, the preferred layout has been refined to avoid and minimise impacts on higher sensitivity vegetation wherever practicable. Low (Neg)	Alternative layouts would result in a greater disturbance footprint and increased impacts on indigenous vegetation and ecological functioning. Medium (Neg)	No impact
7	Traffic / Access	Existing farm access roads will be utilised wherever practicable, with limited additional access requirements during construction. Temporary increases in construction traffic are anticipated. Low (Neg)	Larger earthworks and construction footprints would require increased vehicle movements and construction traffic. Low (Neg)	No impact

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8	Dust & Air Quality	Localised dust emissions associated with vegetation clearance, excavation, earthworks, haul roads and construction activities; impacts can be effectively managed through standard dust suppression measures. Low (Neg)	Larger disturbed areas and increased earthworks would result in greater dust generation during construction. Medium–Low (Neg)	No impact
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OPERATIONAL PHASE				
No.	Aspect / Impact	Preferred Alternative – Harmony Instream Dam and Associated Agricultural Development	Alternative Dam Layouts (Options 1 and 2) and Associated Agricultural Layout	No-Go Alternative
1	Visual / Landscape Character	The Harmony Instream Dam and associated agricultural development become integrated into the existing agricultural landscape over time. Residual visual impacts are low due to the rural setting and existing farming activities. Low (Neg)	Larger or less optimised dam and agricultural layouts would result in greater permanent landscape modification and visual intrusion. Medium–Low (Neg)	No impact
2	Noise	Operational noise is limited to normal farming activities, irrigation infrastructure and routine maintenance. No significant long-term noise impacts are anticipated. Very Low (Neg)	Slightly larger infrastructure and operational requirements may result in marginally increased operational noise. Low (Neg)	No impact
3	Waste	Limited operational waste associated with agricultural activities and routine maintenance will be generated and managed in accordance with the EMPr and applicable waste legislation. Very Low (Neg)	Larger agricultural and operational footprints would generate slightly greater volumes of operational waste. Low (Neg)	No impact
4	Heritage	No impacts on identified heritage resources are anticipated, provided that the 50 m No-Go buffers around HMY1 and HMY2 are maintained, the Section 42 Heritage Agreement is implemented, and the heritage management measures remain in place. Very Low (Neg)	Larger operational footprints may increase the risk of indirect disturbance to protected heritage resources if not appropriately managed. Low (Neg)	No impact
5	Freshwater / Aquatic	Long-term impacts on freshwater resources are minimised through compliance with Water Use Licence No. 01/E21D/AB/9699 , implementation of Environmental Water Requirements (EWRs), erosion control measures and ongoing monitoring. Low (Neg)	Larger disturbance footprints and less favourable layouts increase the potential for long-term impacts on aquatic habitat, water quality and sedimentation. Medium (Neg)	No impact

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6	Terrestrial Biodiversity	Permanent loss of vegetation is limited to the approved development footprint. The preferred layout avoids and minimises impacts on higher sensitivity vegetation, while rehabilitation and ongoing environmental management maintain ecological functioning where practicable. Low (Neg)	Alternative layouts would result in greater permanent habitat loss, fragmentation and impacts on indigenous vegetation. Medium (Neg)	No impact
7	Traffic / Access	Operational traffic is limited to routine agricultural activities, maintenance vehicles and farm operations, with no significant increase over existing farming activities. Very Low (Neg)	Slightly higher operational traffic associated with larger infrastructure and agricultural operations. Low (Neg)	No impact
8	Air Quality / Dust	Dust generation during operation is limited to normal farm vehicle movement on existing access roads and routine maintenance activities. Impacts are localised and negligible with good management practices. Very Low (Neg)	Larger operational areas may result in slightly increased dust generation associated with farm traffic and maintenance activities. Low (Neg)	No impact
9	Agricultural Productivity	The proposed dam provides lawful storage of authorised surplus winter high flows for subsequent irrigation of approximately 25 ha of deciduous fruit orchards, improving irrigation reliability, water security and long-term agricultural productivity. High (Pos)	Alternative layouts would support agricultural production but with reduced environmental optimisation and engineering efficiency. Medium–High (Pos)	Loss of the opportunity to improve irrigation reliability, agricultural productivity and long-term farming sustainability. Medium (Neg)
10	Socio-economic	Long-term employment, support for local suppliers and contractors, improved agricultural sustainability and continued growth of a 100% black-owned B-BBEE farming enterprise contribute positively to the local economy. High (Pos)	Similar socio-economic benefits would occur, although the alternative layouts are less environmentally and technically favourable. Medium–High (Pos)	No socio-economic benefits would be realised and opportunities for agricultural expansion and employment would be lost. Medium (Neg)

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DECOMMISSIONING PHASE				
No.	Aspect / Impact	Preferred Alternative – Harmony Instream Dam and Associated Agricultural Development	Alternative Dam Layouts (Options 1 and 2) and Associated Agricultural Layout	No-Go Alternative
1	Visual / Landscape Character	Temporary visual disturbance associated with the removal of infrastructure and rehabilitation of disturbed areas. Following rehabilitation, the landscape is expected to recover over time. Low (Neg)	Larger infrastructure footprints would require more extensive demolition and rehabilitation, resulting in greater temporary visual impacts. Medium–Low (Neg)	No impact
2	Noise	Temporary noise associated with demolition activities, earthmoving equipment and removal of infrastructure. Low (Neg)	Increased demolition activities associated with larger infrastructure would result in a longer duration of noise impacts. Medium–Low (Neg)	No impact
3	Waste	Demolition waste, redundant infrastructure, scrap material and general waste generated during decommissioning would require appropriate recycling and disposal at authorised facilities. Low (Neg)	Larger infrastructure footprints would generate greater volumes of demolition waste. Medium (Neg)	No impact
4	Heritage	No significant impacts on identified heritage resources are anticipated, provided that the protected rock art sites (HMY1 and HMY2) and their 50 m No-Go buffers remain undisturbed throughout decommissioning activities. Very Low (Neg)	Larger disturbance footprints may marginally increase the risk of accidental disturbance to previously unidentified heritage resources. Low (Neg)	No impact
5	Freshwater / Aquatic	Temporary disturbance to the watercourse and surrounding freshwater environment may occur during the removal of infrastructure. Appropriate erosion, sediment and stormwater controls would minimise impacts. Low (Neg)	Larger disturbance areas increase the potential for erosion, sediment mobilisation and temporary impacts on freshwater resources. Medium (Neg)	No impact
6	Terrestrial Biodiversity	Temporary disturbance associated with the removal of infrastructure and rehabilitation activities. Rehabilitation of disturbed areas would facilitate the recovery of ecological functioning where practicable. Low (Neg)	Larger disturbance footprints would require more extensive rehabilitation and could result in greater temporary impacts on vegetation and habitat. Medium (Neg)	No impact
7	Traffic / Access	Temporary increase in heavy vehicle traffic associated with demolition, removal of infrastructure and transportation of waste materials. Low (Neg)	Greater demolition activities would increase construction traffic and transport requirements. Medium–Low (Neg)	No impact

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8	Dust & Air Quality	Localised dust generated during demolition, earthworks and removal of infrastructure. Dust suppression measures would minimise impacts. Low (Neg)	Larger demolition footprints would result in increased dust generation and longer disturbance periods. Medium–Low (Neg)	No impact
9	Socio-economic	Temporary employment opportunities may be created during decommissioning; however, permanent agricultural production, employment and associated economic benefits would cease following decommissioning. Medium (Neg)	Similar socio-economic impacts would occur, with potentially greater costs associated with removing larger infrastructure. Medium (Neg)	No impact

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Nature of Impact			Without Mitigation (Baseline)					With Mitigation						
Number	Aspect	Impact	Probability (Likelihood)	Extent	Duration (Frequency)	Magnitude (Intensity/Severity)	Receiving Environment (Significance/Consequence)	Without Mitigation Score (Baseline)	Probability (Likelihood)	Extent	Duration (Frequency)	Magnitude (Intensity/Severity)	Receiving Environment (Significance/Consequence)	With Mitigation Score (Impact Assessment)
CONSTRUCTION PHASE: Preferred Alternative – Harmony Instream Dam and Associated Agricultural Development														
GEOGRAPHICAL / TOPOGRAPHICAL IMPACT														
1	Geographical / Topographical	Earthworks associated with construction of the dam wall, excavation within the dam basin, establishment of access and construction areas, and preparation of the associated agricultural development will modify the existing landform, disturb soils and create a risk of localised erosion and instability.	4 (Highly Probable)	2 (Local)	2 (Short-term)	3 (Moderate)	2 (Semi-disturbed)	3.0 – Medium-Low	2 (Improbable)	1 (Site only)	1 (Temporary)	1 (Negligible)	2 (Semi-disturbed)	1.5 – Very Low
AQUATIC / FRESHWATER IMPACT														
2	Aquatic Freshwater	Construction of the instream dam may result in temporary disturbance of the unnamed tributary of the Houtenbek River, including sediment mobilisation, erosion, altered local runoff and potential deterioration of downstream water quality.	4 (Highly Probable)	2 (Local)	2 (Short-term)	3 (Moderate)	3 (Sensitive)	3.2 – Medium	2 (Improbable)	1 (Site only)	1 (Temporary)	1 (Negligible)	3 (Sensitive)	1.7 – Low
TERRESTRIAL (BOTANICAL & FAUNAL)														
3	Terrestrial Biodiversity – Botanical and Faunal	Vegetation clearance and earthworks associated with the dam and approximately 25	4 (Highly Probable)	2 (Local)	4 (Long-term / Permanent)	4 (High)	4 (Sensitive)	3.8 – Medium-High	3 (Probable)	2 (Local)	4 (Long-term / Permanent)	2 (Low)	4 (Sensitive)	3.0 – Medium-Low

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		ha agricultural development will result in disturbance and loss of indigenous vegetation, including areas of Winterhoek Sandstone Fynbos and Kouebokkeveld Alluvium Fynbos, as well as temporary displacement of fauna.												
VISUAL IMPACT														
4	Visual Landscape	Temporary visual intrusion associated with construction machinery, exposed earthworks, stockpiles, construction camps and dam wall construction within the rural agricultural landscape.	3 (Probable)	2 (Local)	2 (Short-term)	2 (Low)	3 (Semi-disturbed)	2.6 – Medium-Low	2 (Improbable)	1 (Site only)	1 (Temporary)	1 (Negligible)	3 (Semi-disturbed)	1.6 – Low
SOCIO-ECONOMIC IMPACTS														
5.1	Socio-economic – Temporary Disturbance	Temporary disturbance to surrounding farming activities and road users as a result of construction traffic, machinery, noise, dust and general construction activities.	3 (Probable)	2 (Local)	2 (Short-term)	2 (Low)	3 (Semi-disturbed)	2.6 – Medium-Low	2 (Improbable)	1 (Site only)	1 (Temporary)	1 (Negligible)	3 (Semi-disturbed)	1.6 – Low
5.2	Socio-economic – Employment and Local Economic Benefits	Temporary employment opportunities, use of local contractors and suppliers, skills development and local economic stimulation during the construction phase.	4 (Highly Probable)	2 (Local)	2 (Short-term)	3 (Moderate Positive)	5 (Positive)	High Positive	4 (Highly Probable)	2 (Local)	2 (Short-term)	3 (Moderate Positive)	5 (Positive)	High Positive
HERITAGE														
6	Heritage and Palaeontology	Construction activities could result in the accidental disturbance of previously unidentified	2 (Improbable)	1 (Site only)	2 (Short-term)	2 (Low)	4 (Sensitive)	2.2 – Low	1 (Very Unlikely)	1 (Site only)	1 (Temporary)	1 (Negligible)	4 (Sensitive)	1.6 – Very Low

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		archaeological or palaeontological resources. The known rock art sites HMY1 and HMY2 occur outside the development footprint and will be protected by 50 m No-Go buffers.												
NOISE & DUST														
7.1	Noise	Temporary increase in ambient noise levels associated with earthmoving machinery, construction vehicles, excavation, compaction and general construction activities.	4 (Highly Probable)	2 (Local)	2 (Short-term)	2 (Low)	3 (Semi-disturbed)	2.8 – Medium-Low	2 (Improbable)	1 (Site only)	1 (Temporary)	1 (Negligible)	3 (Semi-disturbed)	1.6 – Low
7.2	Dust and Air Quality	Localised dust emissions associated with vegetation clearance, excavation, earthworks, exposed soils, haul roads and movement of construction vehicles.	4 (Highly Probable)	2 (Local)	2 (Short-term)	2 (Low)	3 (Semi-disturbed)	2.8 – Medium-Low	2 (Improbable)	1 (Site only)	1 (Temporary)	1 (Negligible)	3 (Semi-disturbed)	1.6 – Low
WASTE MANAGEMENT														
8	Waste Management	Generation of construction rubble, surplus spoil, cleared vegetation, packaging, general waste and potentially hazardous waste during construction. Poor management could result in pollution, nuisance conditions and visual impacts.	3 (Probable)	2 (Local)	2 (Short-term)	2 (Low)	3 (Semi-disturbed)	2.6 – Medium-Low	1 (Very Unlikely)	1 (Site only)	1 (Temporary)	1 (Negligible)	3 (Semi-disturbed)	1.4 – Very Low
CUMULATIVE IMPACTS														
9	Cumulative Impacts	Incremental loss and disturbance of natural vegetation, freshwater habitat and rural landscape character within a catchment	3 (Probable)	3 (Regional)	4 (Long-term / Permanent)	3 (Moderate)	4 (Sensitive)	3.4 – Medium	2 (Improbable)	2 (Local)	4 (Long-term / Permanent)	2 (Low)	4 (Sensitive)	2.8 – Medium-Low

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		already influenced by agricultural development, dams, irrigation infrastructure and cultivated land.												
OPERATIONAL PHASE: Preferred Alternative – Harmony Instream Dam and Associated Agricultural Development														
GEOGRAPHICAL / TOPOGRAPHICAL IMPACT														
1	Geographical / Topographical	Permanent modification of the existing landform and topography associated with the dam wall, inundation area and establishment of approximately 25 ha of associated agricultural development.	5 (Definite)	2 (Local)	5 (Permanent)	3 (Moderate)	3 (Semi-disturbed)	3.6 – Medium	5 (Definite)	2 (Local)	5 (Permanent)	2 (Low)	3 (Semi-disturbed)	3.4 – Medium-Low
AQUATIC / FRESHWATER IMPACT														
2	Aquatic / Freshwater	Permanent inundation and alteration of the affected watercourse reach, together with potential changes to downstream flow patterns, aquatic habitat, sediment movement and water quality if the dam is not operated in accordance with Water Use Licence No. 01/E21D/AB/9699 and the applicable Environmental Water Requirements.	5 (Definite)	3 (Regional)	5 (Permanent)	4 (High)	4 (Sensitive)	4.2 – High	3 (Probable)	2 (Local)	5 (Permanent)	2 (Low)	4 (Sensitive)	3.2 – Medium
TERRESTRIAL BIODIVERSITY IMPACT – BOTANICAL AND FAUNAL														

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3	Terrestrial Biodiversity – Botanical and Faunal	Permanent loss and fragmentation of indigenous vegetation and associated faunal habitat within the approved dam inundation and agricultural development footprints, including impacts on Winterhoek Sandstone Fynbos and Kouebokkeveld Alluvium Fynbos.	5 (Definite)	2 (Local)	5 (Permanent)	4 (High)	4 (Sensitive)	4.0 Medium-High –	4 (Highly Probable)	2 (Local)	5 (Permanent)	2 (Low)	4 (Sensitive)	3.4 Medium –
VISUAL IMPACT														
4	Visual	Permanent presence of the dam wall, waterbody and associated agricultural development within the existing rural agricultural landscape, resulting in a localised alteration of landscape character.	5 (Definite)	2 (Local)	5 (Permanent)	2 (Low)	3 (Semi-disturbed)	3.4 Medium-Low –	5 (Definite)	2 (Local)	5 (Permanent)	1 (Negligible)	3 (Semi-disturbed)	3.2 – Low
SOCIO-ECONOMIC IMPACTS														
5.1	Socio-economic – Agricultural Water Security	Long-term improvement in agricultural water security, drought resilience and the reliable storage and use of authorised surplus winter high flows for the irrigation of approximately 25 ha of deciduous fruit orchards.	5 (Definite)	3 (Regional)	5 (Permanent)	4 (High Positive)	5 (Positive)	High Positive	5 (Definite)	3 (Regional)	5 (Permanent)	4 (High Positive)	5 (Positive)	High Positive

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5.2	Socio-economic – Employment and Agricultural Development	Long-term employment creation, agricultural expansion, local procurement and economic support associated with the operation of the Harmony Trust B-BBEE farming enterprise.	5 (Definite)	3 (Regional)	5 (Permanent)	4 (High Positive)	5 (Positive)	High Positive	5 (Definite)	3 (Regional)	5 (Permanent)	4 (High Positive)	5 (Positive)	High Positive
HERITAGE IMPACT														
6	Heritage	No direct operational impact on the identified rock art sites HMY1 and HMY2 is anticipated. Indirect disturbance could occur if the required 50 m No-Go buffers, Section 42 Heritage Agreement and heritage management requirements are not maintained.	2 (Improbable)	1 (Site only)	5 (Permanent)	2 (Low)	4 (Sensitive)	2.8 – Low	1 (Very Unlikely)	1 (Site only)	5 (Permanent)	1 (Negligible)	4 (Sensitive)	2.4 – Very Low
NOISE AND DUST IMPACTS														
7.1	Noise	Limited and intermittent operational noise associated with routine dam inspections, maintenance activities, irrigation infrastructure and normal agricultural operations.	2 (Improbable)	1 (Site only)	5 (Permanent)	1 (Negligible)	3 (Semi-disturbed)	2.4 – Very Low	1 (Very Unlikely)	1 (Site only)	5 (Permanent)	1 (Negligible)	3 (Semi-disturbed)	2.2 – Very Low
7.2	Dust	Localised and intermittent dust generation associated with normal agricultural	2 (Improbable)	1 (Site only)	5 (Permanent)	1 (Negligible)	3 (Semi-disturbed)	2.4 – Very Low	1 (Very Unlikely)	1 (Site only)	5 (Permanent)	1 (Negligible)	3 (Semi-disturbed)	2.2 – Very Low

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		operations, vehicle movement on unpaved farm roads and routine maintenance activities.												
WASTE MANAGEMENT IMPACT														
8	Waste Management	Limited general and potentially hazardous waste generated during routine maintenance of the dam, irrigation infrastructure and agricultural operations. Inadequate waste handling could result in soil or water contamination.	2 (Improbable)	1 (Site only)	5 (Permanent)	2 (Low)	4 (Sensitive)	2.8 – Low	1 (Very Unlikely)	1 (Site only)	5 (Permanent)	1 (Negligible)	4 (Sensitive)	2.4 – Very Low
CUMULATIVE IMPACTS														
9	Cumulative	Long-term cumulative influence of dams, water abstraction, agricultural expansion, indigenous vegetation loss and associated infrastructure within the Houdenbek River catchment.	4 (Highly Probable)	3 (Regional)	5 (Permanent)	4 (High)	4 (Sensitive)	4.0 – Medium-High	3 (Probable)	3 (Regional)	5 (Permanent)	2 (Low)	4 (Sensitive)	3.4 – Medium

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Nature of Impact					Without Mitigation (Baseline)					With Mitigation				
Number	Aspect	Impact	Probability (Likelihood)	Extent	Duration (Frequency)	Magnitude (Intensity/Severity)	Receiving Environment (Significance/Consequence)	Without Mitigation Score (Baseline)	Probability (Likelihood)	Extent	Duration (Frequency)	Magnitude (Intensity/Severity)	Receiving Environment (Significance/Consequence)	With Mitigation Score (Impact Assessment)
CONSTRUCTION PHASE – Alternative Dam Layouts (Options 1 and 2) and Associated Agricultural Layout														
GEOGRAPHICAL / TOPOGRAPHICAL IMPACT														
1	Geographical / Topographical	Increased earthworks associated with the alternative dam wall layouts, larger construction footprint and establishment of the associated agricultural development, resulting in greater modification of the landform, soil disturbance and erosion risk.	4 (Highly Probable)	2 (Local)	2 (Short-term)	4 (High)	2 (Semi-disturbed)	Medium	2 (Improbable)	1 (Site only)	1 (Temporary)	2 (Low)	2 (Semi-disturbed)	Low
AQUATIC / FRESHWATER IMPACT														
2	Aquatic Freshwater	Increased disturbance of the affected watercourse and drainage features, with a greater potential for erosion, sediment mobilisation, altered runoff and deterioration of downstream water quality due to the larger construction footprint.	4 (Highly Probable)	2 (Local)	2 (Short-term)	4 (High)	4 (Sensitive)	Medium – High	2 (Improbable)	1 (Site only)	1 (Temporary)	2 (Low)	4 (Sensitive)	Low

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TERRESTRIAL BIODIVERSITY IMPACT – BOTANICAL AND FAUNAL														
3	Terrestrial Biodiversity – Botanical and Faunal	Greater clearance, fragmentation and permanent loss of indigenous vegetation and associated faunal habitat due to the larger dam inundation area and associated agricultural development footprint, including increased impacts on Winterhoek Sandstone Fynbos and Critically Endangered Kouebokkeveld Alluvium Fynbos.	4 (Highly Probable)	2 (Local)	4 (Long-term / Permanent)	4 (High)	4 (Sensitive)	Medium –High	3 (Probable)	2 (Local)	4 (Long-term / Permanent)	3 (Moderate)	4 (Sensitive)	Medium
VISUAL IMPACT														
4	Visual	The larger construction footprint, increased earthworks, stockpiles, machinery and construction areas would result in greater temporary visual intrusion within the rural agricultural landscape.	4 (Highly Probable)	2 (Local)	2 (Short-term)	3 (Moderate)	3 (Semi-disturbed)	Medium	2 (Improbable)	1 (Site only)	1 (Temporary)	1 (Negligible)	3 (Semi-disturbed)	Low
SOCIO-ECONOMIC IMPACTS														
5.1	Socio-economic – Temporary Disturbance	Temporary disturbance to surrounding farming activities and road users associated with increased construction activity, vehicle movements, noise, dust and a potentially longer construction period.	3 (Probable)	2 (Local)	2 (Short-term)	3 (Moderate)	3 (Semi-disturbed)	Medium –Low	2 (Improbable)	1 (Site only)	1 (Temporary)	1 (Negligible)	3 (Semi-disturbed)	Low

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5.2	Socio-economic – Employment and Local Economic Benefits	Temporary employment opportunities, local procurement, use of local contractors and economic stimulation during construction.	4 (Highly Probable)	2 (Local)	2 (Short-term)	3 (Moderate Positive)	5 (Positive)	High Positive	4 (Highly Probable)	2 (Local)	2 (Short-term)	3 (Moderate Positive)	5 (Positive)	High Positive
HERITAGE IMPACT														
6	Heritage and Palaeontology	The larger disturbance footprint would slightly increase the likelihood of encountering or disturbing previously unidentified archaeological or palaeontological resources during excavation and earthworks. The known rock art sites HMY1 and HMY2 must remain protected by the required 50 m No-Go buffers.	2 (Improbable)	1 (Site only)	2 (Short-term)	2 (Low)	4 (Sensitive)	Low	1 (Very Unlikely)	1 (Site only)	1 (Temporary)	1 (Negligible)	4 (Sensitive)	Very Low
NOISE AND DUST IMPACTS														
7.1	Noise	Increased construction duration, earthworks and larger work areas would result in greater temporary noise from heavy machinery, vehicles, excavation and compaction activities.	4 (Highly Probable)	2 (Local)	2 (Short-term)	3 (Moderate)	3 (Semi-disturbed)	Medium	2 (Improbable)	1 (Site only)	1 (Temporary)	1 (Negligible)	3 (Semi-disturbed)	Low
7.2	Dust and Air Quality	Increased excavation, vegetation clearance, earthworks, exposed soils and vehicle movements would result in higher	4 (Highly Probable)	2 (Local)	2 (Short-term)	3 (Moderate)	3 (Semi-disturbed)	Medium	2 (Improbable)	1 (Site only)	1 (Temporary)	1 (Negligible)	3 (Semi-disturbed)	Low

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		temporary dust emissions.												
WASTE MANAGEMENT IMPACT														
8	Waste Management	Greater volumes of spoil material, cleared vegetation, packaging, construction rubble and potentially hazardous waste would be generated as a result of the larger construction footprint.	4 (Highly Probable)	2 (Local)	2 (Short-term)	3 (Moderate)	3 (Semi-disturbed)	Medium	1 (Very Unlikely)	1 (Site only)	1 (Temporary)	1 (Negligible)	3 (Semi-disturbed)	Very Low
CUMULATIVE IMPACTS														
9	Cumulative	Increased cumulative disturbance to freshwater resources, indigenous vegetation, ecological functioning and rural landscape character as a result of the larger development footprint within an agricultural catchment already influenced by farming and water infrastructure.	4 (Highly Probable)	3 (Regional)	4 (Long-term / Permanent)	4 (High)	4 (Sensitive)	Medium –High	3 (Probable)	2 (Local)	4 (Long-term / Permanent)	3 (Moderate)	4 (Sensitive)	Medium
OPERATIONAL PHASE – Alternative Dam Layouts (Options 1 and 2) and Associated Agricultural Layout														
GEOGRAPHICAL / TOPOGRAPHICAL IMPACT														
1	Geographical / Topographical	Permanent modification of the existing landform and topography associated with the alternative dam wall, larger inundation area and associated agricultural development footprint.	5 (Definite)	2 (Local)	5 (Permanent)	3 (Moderate)	3 (Semi-disturbed)	Medium	5 (Definite)	2 (Local)	5 (Permanent)	2 (Low)	3 (Semi-disturbed)	Medium–Low

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AQUATIC / FRESHWATER IMPACT														
2	Aquatic Freshwater	Greater permanent inundation and alteration of the affected watercourse, with increased potential for changes to downstream flow patterns, aquatic habitat, sediment movement and water quality due to the larger development footprint.	5 (Definite)	3 (Regional)	5 (Permanent)	4 (High)	4 (Sensitive)	High	3 (Probable)	2 (Local)	5 (Permanent)	3 (Moderate)	4 (Sensitive)	Medium
TERRESTRIAL BIODIVERSITY IMPACT – BOTANICAL AND FAUNAL														
3	Terrestrial Biodiversity – Botanical and Faunal	Greater permanent loss and fragmentation of indigenous vegetation and associated faunal habitat within the larger dam inundation and agricultural development footprints, including increased impacts on Winterhoek Sandstone Fynbos and Kouebokkeveld Alluvium Fynbos.	5 (Definite)	2 (Local)	5 (Permanent)	4 (High)	4 (Sensitive)	Medium-High	4 (Highly Probable)	2 (Local)	5 (Permanent)	3 (Moderate)	4 (Sensitive)	Medium
VISUAL IMPACT														
4	Visual	The larger dam wall, inundation area and associated agricultural infrastructure would result in a greater permanent visual presence and alteration of	5 (Definite)	2 (Local)	5 (Permanent)	3 (Moderate)	3 (Semi-disturbed)	Medium	5 (Definite)	2 (Local)	5 (Permanent)	2 (Low)	3 (Semi-disturbed)	Medium-Low

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		landscape character within the rural agricultural setting.												
SOCIO-ECONOMIC IMPACTS														
5.1	Socio-economic – Agricultural Water Security	Long-term improvement in agricultural water security, drought resilience and agricultural productivity through the storage and use of authorised surplus winter high flows, although achieved through a larger and less environmentally efficient development footprint.	5 (Definite)	3 (Regional)	5 (Permanent)	3 (Moderate Positive)	5 (Positive)	Medium–High Positive	5 (Definite)	3 (Regional)	5 (Permanent)	3 (Moderate Positive)	5 (Positive)	Medium–High Positive
5.2	Socio-economic – Employment and Agricultural Development	Long-term employment creation, agricultural expansion, local procurement and economic support for the Harmony Trust B-BBEE farming enterprise.	5 (Definite)	3 (Regional)	5 (Permanent)	3 (Moderate Positive)	5 (Positive)	Medium–High Positive	5 (Definite)	3 (Regional)	5 (Permanent)	3 (Moderate Positive)	5 (Positive)	Medium–High Positive
HERITAGE IMPACT														
6	Heritage	No direct operational impact on the identified rock art sites HMY1 and HMY2 is anticipated. Indirect disturbance could occur if the required 50 m No-Go buffers and heritage management requirements are not maintained.	2 (Improbable)	1 (Site only)	5 (Permanent)	2 (Low)	4 (Sensitive)	Low	1 (Very Unlikely)	1 (Site only)	5 (Permanent)	1 (Negligible)	4 (Sensitive)	Very Low

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NOISE AND DUST IMPACTS														
7.1	Noise	Limited and intermittent operational noise associated with routine dam inspections, maintenance, irrigation infrastructure and agricultural activities.	2 (Improbable)	1 (Site only)	5 (Permanent)	1 (Negligible)	3 (Semi-disturbed)	Very Low	1 (Very Unlikely)	1 (Site only)	5 (Permanent)	1 (Negligible)	3 (Semi-disturbed)	Very Low
7.2	Dust and Air Quality	Localised and intermittent dust generation associated with agricultural operations, vehicle movement on unpaved roads and routine maintenance of the larger infrastructure footprint.	2 (Improbable)	1 (Site only)	5 (Permanent)	1 (Negligible)	3 (Semi-disturbed)	Very Low	1 (Very Unlikely)	1 (Site only)	5 (Permanent)	1 (Negligible)	3 (Semi-disturbed)	Very Low
WASTE MANAGEMENT IMPACT														
8	Waste Management	Slightly greater volumes of general and potentially hazardous waste would be generated during routine maintenance of the larger dam, irrigation infrastructure and agricultural development footprint.	2 (Improbable)	1 (Site only)	5 (Permanent)	2 (Low)	4 (Sensitive)	Low	1 (Very Unlikely)	1 (Site only)	5 (Permanent)	1 (Negligible)	4 (Sensitive)	Very Low
CUMULATIVE IMPACTS														
9	Cumulative	Greater long-term cumulative influence of dams, water abstraction, agricultural	5 (Definite)	3 (Regional)	5 (Permanent)	4 (High)	4 (Sensitive)	High	3 (Probable)	3 (Regional)	5 (Permanent)	3 (Moderate)	4 (Sensitive)	Medium

APPENDIX 9C – IMPACT ASSESSMENT AND SCORING MATRIX

		expansion, indigenous vegetation loss and associated infrastructure within the Houtenbek River catchment due to the larger development footprint.												
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Nature of Impact					Without Mitigation (Baseline)					With Mitigation				
Number	Aspect	Impact	Probability (Likelihood)	Extent	Duration (Frequency)	Magnitude (Intensity/ Severity)	Receiving Environment (Significance/ Consequence)	Without Mitigation Score (Baseline)	Probability (Likelihood)	Extent	Duration (Frequency)	Magnitude (Intensity/ Severity)	Receiving Environment (Significance/ Consequence)	With Mitigation Score (Impact Assessment)
CONSTRUCTION PHASE – NO-GO ALTERNATIVE														
GEOGRAPHICAL / TOPOGRAPHICAL IMPACT														
1	Geographical / Topographical	No earthworks, excavation, dam construction or establishment of the associated agricultural development will occur. The existing landform and topography will remain unchanged.	1 (Very Unlikely)	1 (Site only)	1 (Temporary)	1 (Negligible)	2 (Semi-disturbed)	Negligible	1 (Very Unlikely)	1 (Site only)	1 (Temporary)	1 (Negligible)	2 (Semi-disturbed)	Negligible
AQUATIC / FRESHWATER IMPACT														

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2	Aquatic / Freshwater	No construction-related disturbance, erosion, sedimentation or alteration of watercourses, drainage features or the Houdenberg River catchment will occur. Existing freshwater conditions will remain unchanged.	1 (Very Unlikely)	1 (Site only)	1 (Temporary)	1 (Negligible)	4 (Sensitive)	Negligible	1 (Very Unlikely)	1 (Site only)	1 (Temporary)	1 (Negligible)	4 (Sensitive)	Negligible
TERRESTRIAL BIODIVERSITY IMPACT – BOTANICAL AND FAUNAL														
3	Terrestrial Biodiversity – Botanical and Faunal	No vegetation clearance, habitat loss or construction-related faunal displacement will occur. Indigenous vegetation and associated habitat within the proposed development footprint will remain undisturbed.	1 (Very Unlikely)	1 (Site only)	1 (Temporary)	1 (Negligible)	4 (Sensitive)	Negligible	1 (Very Unlikely)	1 (Site only)	1 (Temporary)	1 (Negligible)	4 (Sensitive)	Negligible
VISUAL IMPACT														
4	Visual	No construction machinery, earthworks, stockpiles, construction camps or other construction-related visual disturbance will occur. The existing rural landscape character will remain unchanged.	1 (Very Unlikely)	1 (Site only)	1 (Temporary)	1 (Negligible)	3 (Semi-disturbed)	Negligible	1 (Very Unlikely)	1 (Site only)	1 (Temporary)	1 (Negligible)	3 (Semi-disturbed)	Negligible
SOCIO-ECONOMIC IMPACTS														

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5.1	Socio-economic – Temporary Disturbance	No temporary disturbance associated with construction traffic, noise, dust, machinery or construction activities will occur.	1 (Very Unlikely)	1 (Site only)	1 (Temporary)	1 (Negligible)	3 (Semi-disturbed)	Negligible	1 (Very Unlikely)	1 (Site only)	1 (Temporary)	1 (Negligible)	3 (Semi-disturbed)	Negligible
5.2	Socio-economic – Employment and Local Economic Benefits	Temporary construction employment, local procurement, contracting opportunities and construction-related economic benefits associated with the proposed development will not be realised.	5 (Definite)	2 (Local)	2 (Short-term)	3 (Moderate Negative)	5 (Positive)	Medium Negative	5 (Definite)	2 (Local)	2 (Short-term)	3 (Moderate Negative)	5 (Positive)	Medium Negative
HERITAGE IMPACT														
6	Heritage and Palaeontology	No excavation or earthworks will occur and no construction-related disturbance of known or previously unidentified archaeological, heritage or palaeontological resources is anticipated.	1 (Very Unlikely)	1 (Site only)	1 (Temporary)	1 (Negligible)	4 (Sensitive)	Negligible	1 (Very Unlikely)	1 (Site only)	1 (Temporary)	1 (Negligible)	4 (Sensitive)	Negligible
NOISE AND DUST IMPACTS														
7.1	Noise	No construction machinery, heavy vehicles, excavation or earthmoving activities will occur and no construction-related noise will be generated.	1 (Very Unlikely)	1 (Site only)	1 (Temporary)	1 (Negligible)	3 (Semi-disturbed)	Negligible	1 (Very Unlikely)	1 (Site only)	1 (Temporary)	1 (Negligible)	3 (Semi-disturbed)	Negligible

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7.2	Dust and Air Quality	No vegetation clearance, excavation, earthworks or construction vehicle movements will occur and no construction-related dust emissions will be generated.	1 (Very Unlikely)	1 (Site only)	1 (Temporary)	1 (Negligible)	3 (Semi-disturbed)	Negligible	1 (Very Unlikely)	1 (Site only)	1 (Temporary)	1 (Negligible)	3 (Semi-disturbed)	Negligible
WASTE MANAGEMENT IMPACT														
8	Waste Management	No construction rubble, spoil material, packaging waste, cleared vegetation or potentially hazardous construction waste will be generated.	1 (Very Unlikely)	1 (Site only)	1 (Temporary)	1 (Negligible)	3 (Semi-disturbed)	Negligible	1 (Very Unlikely)	1 (Site only)	1 (Temporary)	1 (Negligible)	3 (Semi-disturbed)	Negligible
CUMULATIVE IMPACTS														
9	Cumulative	No cumulative construction impacts associated with dam construction, agricultural expansion, freshwater disturbance, vegetation loss or associated infrastructure will occur. Existing environmental conditions will remain unchanged.	1 (Very Unlikely)	1 (Site only)	1 (Temporary)	1 (Negligible)	4 (Sensitive)	Negligible	1 (Very Unlikely)	1 (Site only)	1 (Temporary)	1 (Negligible)	4 (Sensitive)	Negligible
OPERATIONAL PHASE – NO-GO ALTERNATIVE														
GEOGRAPHICAL / TOPOGRAPHICAL IMPACT														

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1	Geographical / Topographical	No permanent modification of the existing landform or topography associated with the dam wall, inundation area or associated agricultural development will occur. Existing site conditions will remain unchanged.	1 (Very Unlikely)	1 (Site only)	5 (Permanent)	1 (Negligible)	2 (Semi-disturbed)	Negligible	1 (Very Unlikely)	1 (Site only)	5 (Permanent)	1 (Negligible)	2 (Semi-disturbed)	Negligible
AQUATIC / FRESHWATER IMPACT														
2	Aquatic Freshwater	No permanent inundation, alteration of flow patterns or operational impacts on the affected watercourse or downstream freshwater systems will occur. Existing hydrological and aquatic conditions will remain unchanged.	1 (Very Unlikely)	1 (Site only)	5 (Permanent)	1 (Negligible)	4 (Sensitive)	Negligible	1 (Very Unlikely)	1 (Site only)	5 (Permanent)	1 (Negligible)	4 (Sensitive)	Negligible
TERRESTRIAL BIODIVERSITY IMPACT – BOTANICAL AND FAUNAL														
3	Terrestrial Biodiversity – Botanical and Faunal	No permanent loss or fragmentation of indigenous vegetation or associated	1 (Very Unlikely)	1 (Site only)	5 (Permanent)	1 (Negligible)	4 (Sensitive)	Negligible	1 (Very Unlikely)	1 (Site only)	5 (Permanent)	1 (Negligible)	4 (Sensitive)	Negligible

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		faunal habitat will occur. Existing vegetation communities and ecological functioning will remain unchanged.												
VISUAL IMPACT														
4	Visual	No dam wall, permanent waterbody or associated agricultural infrastructure will be introduced into the landscape. The existing rural agricultural landscape character will remain unchanged.	1 (Very Unlikely)	1 (Site only)	5 (Permanent)	1 (Negligible)	3 (Semi-disturbed)	Negligible	1 (Very Unlikely)	1 (Site only)	5 (Permanent)	1 (Negligible)	3 (Semi-disturbed)	Negligible
SOCIO-ECONOMIC IMPACTS														
5.1	Socio-economic – Agricultural Water Security	The proposed improvement in agricultural water security, drought resilience and reliable storage of authorised surplus winter high flows will not be realised. The approximately 25 ha of	5 (Definite)	3 (Regional)	5 (Permanent)	4 (High Negative)	5 (Positive)	High Negative	5 (Definite)	3 (Regional)	5 (Permanent)	4 (High Negative)	5 (Positive)	High Negative

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		proposed deciduous fruit orchards will not be supported by the proposed dam.												
5.2	Socio-economic – Employment and Agricultural Development	Long-term employment creation, agricultural expansion, local procurement and economic benefits associated with the Harmony Trust B-BBEE farming enterprise will not be realised.	5 (Definite)	3 (Regional)	5 (Permanent)	4 (High Negative)	5 (Positive)	High Negative	5 (Definite)	3 (Regional)	5 (Permanent)	4 (High Negative)	5 (Positive)	High Negative
HERITAGE IMPACT														
6	Heritage	No operational disturbance of known or previously unidentified heritage resources will occur. The identified rock art sites HMY1 and HMY2 will remain unaffected by the proposed development.	1 (Very Unlikely)	1 (Site only)	5 (Permanent)	1 (Negligible)	4 (Sensitive)	Negligible	1 (Very Unlikely)	1 (Site only)	5 (Permanent)	1 (Negligible)	4 (Sensitive)	Negligible
NOISE AND DUST IMPACTS														

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7.1	Noise	No operational noise associated with dam inspections, irrigation infrastructure, maintenance or additional agricultural activities will be generated.	1 (Very Unlikely)	1 (Site only)	5 (Permanent)	1 (Negligible)	3 (Semi-disturbed)	Negligible	1 (Very Unlikely)	1 (Site only)	5 (Permanent)	1 (Negligible)	3 (Semi-disturbed)	Negligible
7.2	Dust and Air Quality	No additional operational dust associated with the proposed agricultural expansion, vehicle movement or maintenance of the dam and related infrastructure will be generated.	1 (Very Unlikely)	1 (Site only)	5 (Permanent)	1 (Negligible)	3 (Semi-disturbed)	Negligible	1 (Very Unlikely)	1 (Site only)	5 (Permanent)	1 (Negligible)	3 (Semi-disturbed)	Negligible
WASTE MANAGEMENT IMPACT														
8	Waste Management	No operational waste associated with maintenance of the proposed dam, irrigation infrastructure or additional agricultural activities will be generated.	1 (Very Unlikely)	1 (Site only)	5 (Permanent)	1 (Negligible)	3 (Semi-disturbed)	Negligible	1 (Very Unlikely)	1 (Site only)	5 (Permanent)	1 (Negligible)	3 (Semi-disturbed)	Negligible

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CUMULATIVE IMPACTS														
9	Cumulative	No additional cumulative environmental impacts associated with dam infrastructure, water storage, agricultural expansion, vegetation loss or freshwater alteration will occur. However, the cumulative socio-economic benefits associated with improved water security and agricultural development will not be realised.	4 (Highly Probable)	3 (Regional)	5 (Permanent)	3 (Moderate Negative)	5 (Positive)	Medium–High Negative	4 (Highly Probable)	3 (Regional)	5 (Permanent)	3 (Moderate Negative)	5 (Positive)	Medium–High Negative