

APPENDIX D, ANNEXURE A – IMPACT ASSESSMENT

Requirement of Appendix 3, Regulation 3. (1) (h) (v):

“the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts-

(aa) can be reversed;

(bb) may cause irreplaceable loss of resources; and

(cc) can be avoided, managed or mitigated”

Table 1: Document control

| COMPILED / REVISED BY | STATUS | REVISION | REVIEWED / APPROVED BY | DISTRIBUTED ON |
|------------------------------|---------------|-----------------|-------------------------------|-----------------------|
| Philip Radford | Draft | 00 | Justin Bowers | September 2020 |
| Philip Radford | Draft | 01 | Justin Bowers | October 2020 |
| | | | | |

The general objective of integrated environmental management is, *inter alia*, to “*identify, predict and evaluate the potential and actual impact on the environment, socio-economic conditions and cultural heritage, the risks and consequences and alternatives and options for mitigation of activities, with a view to minimising negative impacts, maximising benefits, and promoting compliance with the principles of environmental management*”. – (Section 23(2)(b) of NEMA 107 of 1998)

Ecoleges sets out to identify impacts and suggest mitigations by following the logical sequence of steps illustrated in **Figure 1**. A clearly defined scope is critical for creating the mould within which the EMPr shall be cast. Environmental impacts are defined as any change to the environment, whether adverse or beneficial, wholly, or partially resulting from those elements of the proposed activities that can interact with the environment. Consequently, the activities need to be identified (step 2) before their impacts (step 3) can be predicted. Step 4 is incorporated as a safety net to capture those elements that are not identified in the previous two steps. Finally, mitigations are sought and tailored to counteract the project-specific impacts and achieve goals and objectives in line with environmental best practice.

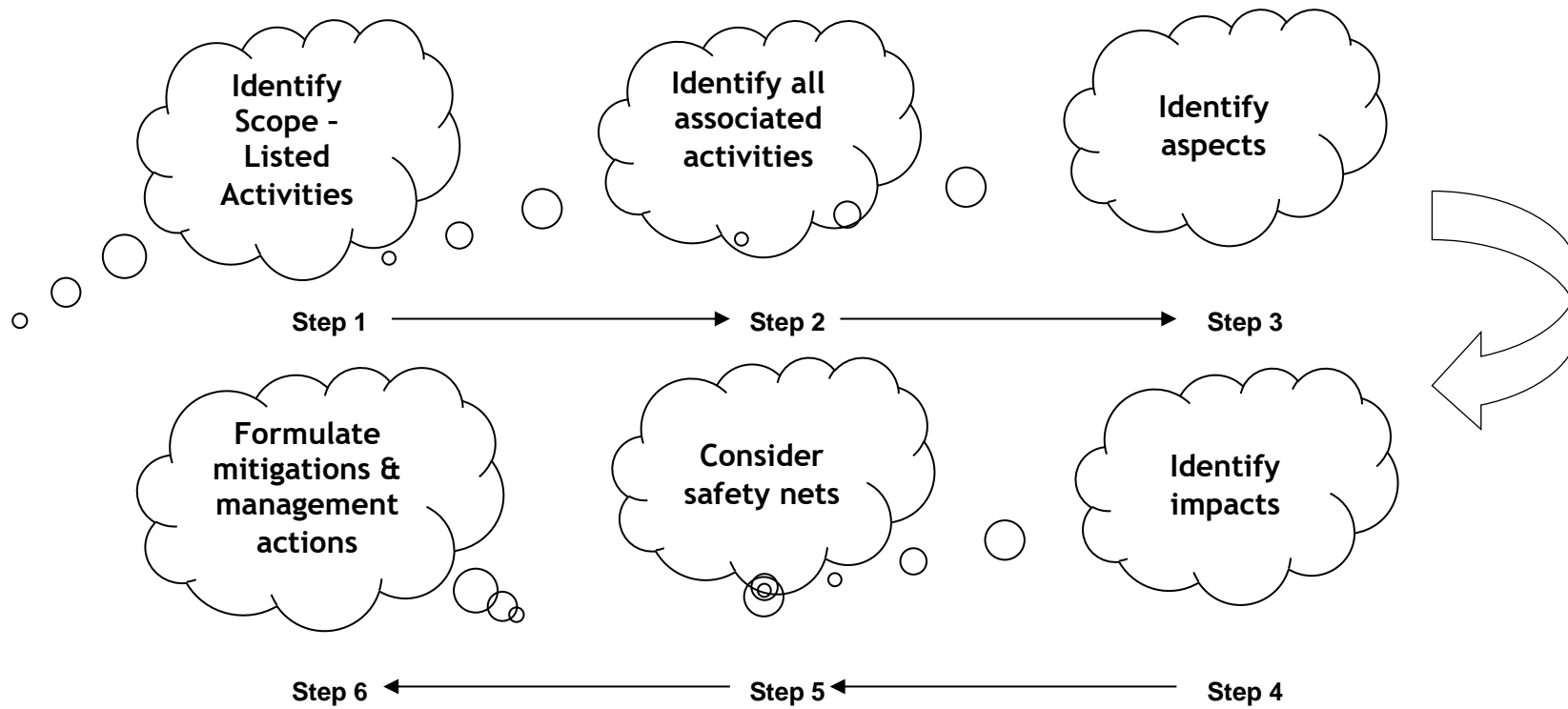


Figure 1. Procedure for identifying the project-specific mitigation of activities.

IDENTIFICATION OF ACTIVITIES, SUB-ACTIVITIES, ASPECTS AND ENVIRONMENTAL DESCRIPTORS

Tables 2 & 3 (in this Impact Assessment report) describes all the activities (Listed Activities identified in terms of GN No. 983, 984 & 985 as amended) that will be undertaken during the lifespan of this project including the identified listed activities and associated activities that do not require environmental authorization, but are needed to achieve the desired objective, of the remediation and operation of the Ngodwana Dam.

Table 2: Activities and aspects including the affected environment for the planning and design phase of the Ngodwana Dam remediation. Aspects highlighted in “green” resulted in positive impacts.

| PLANNING & DESIGN PHASE | | |
|--|--|-------------------------------|
| ACTIVITY | ENVIRONMENTAL ASPECT | ENVIRONMENTAL DESCRIPTOR |
| Legal - Acquiring Authorisations, permits and/or licenses for activities/uses undertaken during construction and operation | POTENTIAL OFFENCES | Physical |
| | | Terrestrial and Avian |
| | | Aquatic |
| | | Public Services |
| | | Heritage |
| | | Legal |
| Sustainable resource requirements (water, energy, etc.) for lifespan of project | INCREASED ABSTRACTION OF WATER | Physical |
| | INCREASED DEMAND ON ELECTRICITY | Public Services |
| | INCREASED DEMAND ON HUMAN RESOURCES | People and Property |
| Layout (or Location) and Design (or Size), including the consideration of ALTERNATIVES & CUMULATIVE impacts | LOSS OF SOIL EROSION | Soil and Rock |
| | LOSS OF FLORA | Terrestrial and Avian |
| | IMPACT OF EROSION ON SURFACE WATER POLLUTION - SEDIMENTATION | Groundwater and Surface Water |
| | LOSS OF HERITAGE RESOURCES | Heritage |
| | VISUALLY UNAESTHETIC | Visual |

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| | POTENTIAL OFFENCES | Legal |
| Rezoning | LOST LAND USE (i.e. arable land) | Land Use |

Table 3: Activities and aspects including the affected environment for the pre-construction phase of the Ngodwana Dam remediation.

| PRE-CONSTRUCTION PHASE | | | |
|--|---|--|--------------------------------|
| ACTIVITY | SUB-ACTIVITY | ENVIRONMENTAL ASPECT | ENVIRONMENTAL DESCRIPTOR |
| Readiness | N/A | POTENTIAL OFFENCES | Public Services |
| | | | Legal |
| | | | Safety Net |
| Site Preparation or Establishment (Layout and Design) incl. surveying and pegging of site footprint. | <ul style="list-style-type: none"> • Construction camp, • Site Offices, • Sanitation / Ablutions, • Kitchen, Eating / Rest Areas, • Storage / Laydown Area - Non-Hazardous, • Storage - Hazardous Substances, • Temporary access roads, • Parking Area, • Batching plant / cement-mixing area. | HYDROLOGICAL IMPACT ON EROSION | Soil and Rock |
| | | LOSS OF FLORA | Aquatic |
| | | HYDROLOGICAL IMPACT ON SURFACE WATER POLLUTION | Surface Water |
| | | CHANGES TO SURFACE WATER HYDROLOGY | Surface Water |
| | | AIR POLLUTION - NOISE THAT IS A NUISANCE | Air |
| | | HYDROLOGICAL IMPACT ON DEGRADATION | Aquatic |
| | | LOSS OF HERITAGE RESOURCES | Heritage |
| | | VISUALLY UNAESTHETIC | Visual |
| | | LIGHT POLLUTION IMPACT ON BATS | Terrestrial and Avian |
| | | DEGRADATION | Aquatic, Terrestrial and Avian |
| | | AIR POLLUTION BAD ODOURS | Air |

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Table 4: Activities and aspects including the affected environment for the construction phase of the Ngodwana Dam remediation. Aspects highlighted in “green” resulted in positive impacts.

| CONSTRUCTION PHASE | | | |
|--|---|--|--------------------------------|
| ACTIVITY | SUB-ACTIVITY | ENVIRONMENTAL ASPECT | ENVIRONMENTAL DESCRIPTOR |
| Employment | Foreign versus local employment | INCREASED LOCAL EMPLOYMENT & WEALTH | People & Property |
| Staff Conduct | Excessive noise | NOISE POLLUTION IMPACT ON WILDLIFE & BIRDS | Aquatic, Terrestrial and Avian |
| | | AIR POLLUTION NOISE | Air |
| | Ablutions | CONTAMINATION OF SOIL | Soil and Rock |
| | | CONTAMINATION OF GROUND & SURFACE WATER | Surface Water and Groundwater |
| | Unauthorised fires | BUSHFIRE IMPACT ON FAUNA | Aquatic, Terrestrial and Avian |
| | | BUSHFIRE IMPACT ON FLORA | Aquatic, Terrestrial and Avian |
| | | AIR POLLUTION BUSHFIRE SMOKE | Air |
| | | BUSHFIRE IMPACT ON HABITAT | Aquatic, Terrestrial and Avian |
| | | BUSHFIRE IMPACT ON PROPERTY | People and Property |
| | Harvesting of medicinal plant or poaching | BUSHFIRE IMPACT ON HUMAN LIFE | Health and Safety |
| | | LOSS OF FAUNA | Aquatic, Terrestrial and Avian |
| | | LOSS OF FLORA | Aquatic, Terrestrial and Avian |
| | Clearing, Grubbing and Grading | N/A | LOSS OF FISH SPECIES |
| LOSS OF SOIL - EROSION | | | Soil and Rock |
| COMPACTION OF SOIL | | | Soil and Rock |
| IMPACT OF ALIEN INVASIVE PLANTS ON SOIL QUALITY | | | Aquatic, Terrestrial and Avian |
| LOSS OF FAUNA | | | Aquatic, Terrestrial and Avian |
| IMPACT OF ALIEN INVASIVE PLANTS ON FAUNA | | | Aquatic, Terrestrial and Avian |
| LOSS OF FLORA | | | Aquatic, Terrestrial and Avian |
| IMPACT OF ALIEN INVASIVE PLANTS ON INDIGENOUS PLANTS | Aquatic, Terrestrial and Avian | | |

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| | | ALIEN INVASIVE PLANT INVASION & ENCROACHMENT | Terrestrial and Avian |
| | | IMPACT OF ALIEN INVASIVE PLANTS ON GROUND AND SURFACE WATER | Surface Water and Groundwater |
| | | IMPACT OF EROSION ON SURFACE WATER POLLUTION - SEDIMENTATION | Surface Water and Groundwater |
| | | IMPACT OF ALIEN INVASIVE PLANTS ON WATER QUALITY | Surface Water and Groundwater |
| | | IMPACT OF ALIEN INVASIVE PLANTS ON WATER QUALITY | Surface Water and Groundwater |
| | | CHANGES TO SURFACE WATER HYDROLOGY | Surface Water and Groundwater |
| | | LOSS OF HABITAT | Aquatic, Terrestrial and Avian |
| | | DISTURBANCE TO HABITAT | Aquatic, Terrestrial and Avian |
| | | IMPACT OF ALIEN INVASIVE PLANTS ON HABITAT | Aquatic, Terrestrial and Avian |
| | | LOSS OF HERITAGE RESOURCES | Heritage |
| Operation of Plant, including transporting and driving | Dust generation | DUST POLLUTION IMPACT ON FAUNA | Aquatic, Terrestrial and Avian |
| | | DUST POLLUTION IMPACT ON FLORA | Aquatic, Terrestrial and Avian |
| | | AIR POLLUTION DUST | Air |
| | | DUST POLLUTION IMPACT ON HEALTH | Health and Safety |
| | Noise generation | NOISE POLLUTION IMPACT ON ANIMALS & BIRDS | Aquatic, Terrestrial and Avian |
| | | AIR POLLUTION NOISE | Air |
| | | NOISE POLLUTION IMPACT ON HUMAN HEALTH | Health and Safety |
| | Speeding vehicles | LOSS OF FAUNA | Aquatic, Terrestrial and Avian |
| | | DAMAGE TO PROPERTY | People and Property |
| | | ACCIDENT IMPACT ON HEALTH | Health and Safety |
| Air emissions | AIR POLLUTION EMISSIONS | Air | |

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| | | AIR POLLUTION IMPACT ON HEALTH | Health & Safety |
| | Hydrocarbon releases (Incl. fuel and engine oil spillages) | CONTAMINATION OF SOIL | Soil and Rock |
| | | CONTAMINATION OF TOPSOIL | Soil and Rock |
| | | SURFACE WATER POLLUTION | Ground and Surface Water |
| | Restricted area operations | LOSS OF SOIL - EROSION | Soil and Rock |
| | | COMPACTION OF TOPSOIL | Soil and Rock |
| | | LOSS OF FAUNA | Aquatic, Terrestrial and Avian |
| | | LOSS OF FLORA | Aquatic, Terrestrial and Avian |
| | CONTAMINATION OF SURFACE WATER | Ground and Surface Water | |
| Abstracting water from rivers, boreholes and/or services. | Potable water, sanitation, and cooking | EXCESSIVE/WASTEFUL WATER USE - LOSS OF WATER | Ground and Surface Water |
| | Concrete mixing | EXCESSIVE/WASTEFUL WATER USE - LOSS OF WATER | Ground and Surface Water |
| | Cleaning plant and equipment | EXCESSIVE/WASTEFUL WATER USE - LOSS OF WATER | Ground and Surface Water |
| | Dust suppression | EXCESSIVE WATER USE IMPACT ON EROSION | Soil and Rock |
| | | EXCESSIVE/WASTEFUL WATER USE - LOSS OF WATER | Ground and Surface Water |
| Stockpiling (incl. spoil, material, mulch and windrows) | Damage to fauna via trampling and/or smothering | LOSS OF FAUNA | Aquatic, Terrestrial and Avian |
| | Damage to flora via trampling and/or smothering | LOSS OF FLORA | Aquatic, Terrestrial and Avian |
| | Storm water export of soil | SURFACE WATER POLLUTION - SEDIMENTATION | Ground and Surface Water |
| New and upgrade of | Vegetation Clearing | LOSS OF SOIL - EROSION | Soil and Rock |

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| access roads | Vegetation Clearing | LOSS OF FLORA | Aquatic |
| | Roads works close to watercourse | SURFACE WATER QUALITY- SILTATION | Ground and Surface Water |
| | Watercourse Crossings | HYDROLOGICAL FLOW | Ground and Surface Water |
| Earthworks (incl. Excavating, depositing, and moving soil) | Mixing of soil horizons | CONTAMINATION OF TOPSOIL | Soil and Rock |
| | Trapping of fauna | LOSS OF FAUNA | Aquatic, Terrestrial and Avian |
| | Unearthing of historical artefacts or graves. | LOSS OF HERITAGE RESOURCES | Heritage |
| | Stabilizing berm on the downstream face of the main embankment, including approximately 30 000 m ³ of earthworks, a new internal drainage system (sand & gravel filters, rock toe and drainpipes with inspection concrete manholes) and gabion retaining walls. | LOSS OF SOIL - EROSION | Soil and Rock |
| | | SURFACE WATER POLLUTION - SEDIMENTATION | Ground and Surface Water |
| | | LOSS OF AQUATIC FLORA | Aquatic |
| | | FAUNA BEHAVIOR | Aquatic, Terrestrial and Avian |
| | | FRAGMENTED AQUATIC HABITAT | Aquatic |
| | Raising of the right flank embankment to prevent overtopping and failure during large floods and to improve the stability of the embankment (earthworks to be confirmed). | LOSS OF SOIL - EROSION | Soil and Rock |
| | | SURFACE WATER POLLUTION - SEDIMENTATION | Ground and Surface Water |
| | Subsoil pipe drains above the berm of 133 m length | SURFACE WATER POLLUTION - SEDIMENTATION | Ground and Surface Water |
| LOSS OF SOIL - EROSION | | Soil and Rock | |

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| | with inspection concrete manholes. | FRAGMENTED AQUATIC HABITAT | Aquatic | |
| Generation of solid and liquid waste | Waste Storage | CONTAMINATION OF SOIL | Soil and Rock | |
| | | LOSS OF FAUNA | Aquatic, Terrestrial and Avian | |
| | | WATER POLLUTION IMPACT ON AQUATIC FAUNA | Aquatic | |
| | | GROUND AND SURFACE WATER POLLUTION | Ground and Surface Water | |
| | | WATER POLLUTION IMPACT ON HUMAN HEALTH | Health and Safety | |
| | Handling or Disposal (littering, illegal dumping and burning) | CONTAMINATION OF SOIL | Soil and Rock | |
| | | LOSS OF FAUNA | Aquatic, Terrestrial and Avian | |
| | | WATER POLLUTION IMPACT ON AQUATIC FAUNA | Aquatic | |
| | | GROUND AND SURFACE WATER POLLUTION | Ground and Surface Water | |
| | | AIR POLLUTION - SMOKE | Air | |
| | | SMOKE POLLUTION IMPACT ON HUMAN HEALTH | Health and Safety | |
| | | WATER POLLUTION IMPACT ON HUMAN HEALTH | Health and Safety | |
| | | | VISUALLY UNAESTHETIC | Visual |
| | Handling and Storage of hazardous substances (fuel/oil, cement, explosives, bitumen, sewage and grey water). | Batching sites (mixing concrete on the ground) | LOSS OF TOPSOIL | Soil and Rock |
| CONTAMINATION OF SOIL | | | Soil and Rock | |
| CONTAMINATION OF TOPSOIL | | | Soil and Rock | |
| LOSS OF FLORA | | | Aquatic, Terrestrial and Avian | |
| GROUND AND SURFACE WATER POLLUTION | | | Ground and Surface Water | |
| SURFACE WATER POLLUTION | | | Ground and Surface Water | |
| LOSS OF HABITAT | | | Aquatic, Terrestrial and Avian | |
| Sanitation (sewerage) | | CONTAMINATION OF TOPSOIL | Soil and Rock | |

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| | overflows, poor maintenance and burst pipes) | SURFACE WATER POLLUTION | Ground and Surface Water |
| | Refuelling (diesel/petrol spillages or underground fuel storage tank breaches) | CONTAMINATION OF TOPSOIL | Soil and Rock |
| | | SURFACE WATER POLLUTION | Ground and Surface Water |
| | | GROUND WATER POLLUTION | Ground and Surface Water |

Table 5: Activities and aspects including the affected environment for the operational phase of the Ngodwana Dam remediation. Aspects highlighted in “green” resulted in positive impacts.

| OPERATIONAL PHASE | | |
|--------------------------|--|--------------------------------|
| ACTIVITY | ENVIRONMENTAL ASPECT | ENVIRONMENTAL DESCRIPTOR |
| Readiness | POTENTIAL OFFENCES | Legal |
| Ngodwana Dam | LOSS OF SOIL - EROSION | Soil and Rock |
| | IMPACT ON DOWNSTREAM ENVIRONMENT AND USERS - DAM WALL CONTAINMENT FAILURE | Ground and Surface Water |
| | MAINTENANCE AND MONITORING ON DAM INFRASTRUCTURE - DAM SAFETY AND SURVEILLANCE | Ground and Surface Water |
| | ALIEN PLANT INVASION | Aquatic, Terrestrial and Avian |
| | IMPACT OF ALIEN PLANT INVASION ON HABITAT TRANSFORMATION | Aquatic, Terrestrial and Avian |
| | POTENTIAL OFFENCES | Legal |
| | INCREASED PRODUCTION AND REVENUE | Land Use |
| Access - Dust generation | DUST POLLUTION IMPACT ON FAUNA | Aquatic, Terrestrial and Avian |
| | DUST POLLUTION IMPACT ON FLORA | Aquatic, Terrestrial and Avian |

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|---|---|--------------------------------|
| | AIR POLLUTION - DUST | Atmosphere |
| | DUST POLLUTION IMPACT ON HEALTH | Health and Safety |
| Access - Noise generation | NOISE POLLUTION IMPACT ON FAUNA | Aquatic, Terrestrial and Avian |
| | AIR POLLUTION - NOISE | Air |
| | NOISE POLLUTION IMPACT ON HEALTH | Health and Safety |
| Consumption of resources (energy & water) | CONSUMPTION OF RESOURCES (energy) | Public Services |
| Staff employment | INCREASED PRODUCTION IMPACT ON JOB CREATION | People and Property |

Table 6: Activities & aspects including the affected environment for the decommissioning phase of the Ngodwana Dam remediation.

| DECOMMISSIONING PHASE | | |
|-----------------------|---|-------------------------------|
| ACTIVITY | ENVIRONMENTAL ASPECT | ENVIRONMENTAL DESCRIPTOR |
| Ngodwana Dam Closure | LOSS OF AQUATIC FLORA AND FAUNA | Aquatic |
| | DOWNSTREAM USERS OF SURFACE WATER AND GROUNDWATER | Surface Water and Groundwater |
| | POTENTIAL OFFENCES | Legal |

IDENTIFICATION OF ACTUAL AND POTENTIAL IMPACTS

The impacts are considered within the scope implicit within the listed activities. The relevant impacts resulting from the listed, actual and associated activities, including environmental, socio-economic and cultural heritage, were determined using a Leipold Matrix, comments received from Interested & Affected Parties (Table 7), and, where applicable, the findings contained in specialist studies (proposed specialist studies contained in Plan of Study and will be included in the Final Basic Assessment Report (FBAR)) (Figure 2).

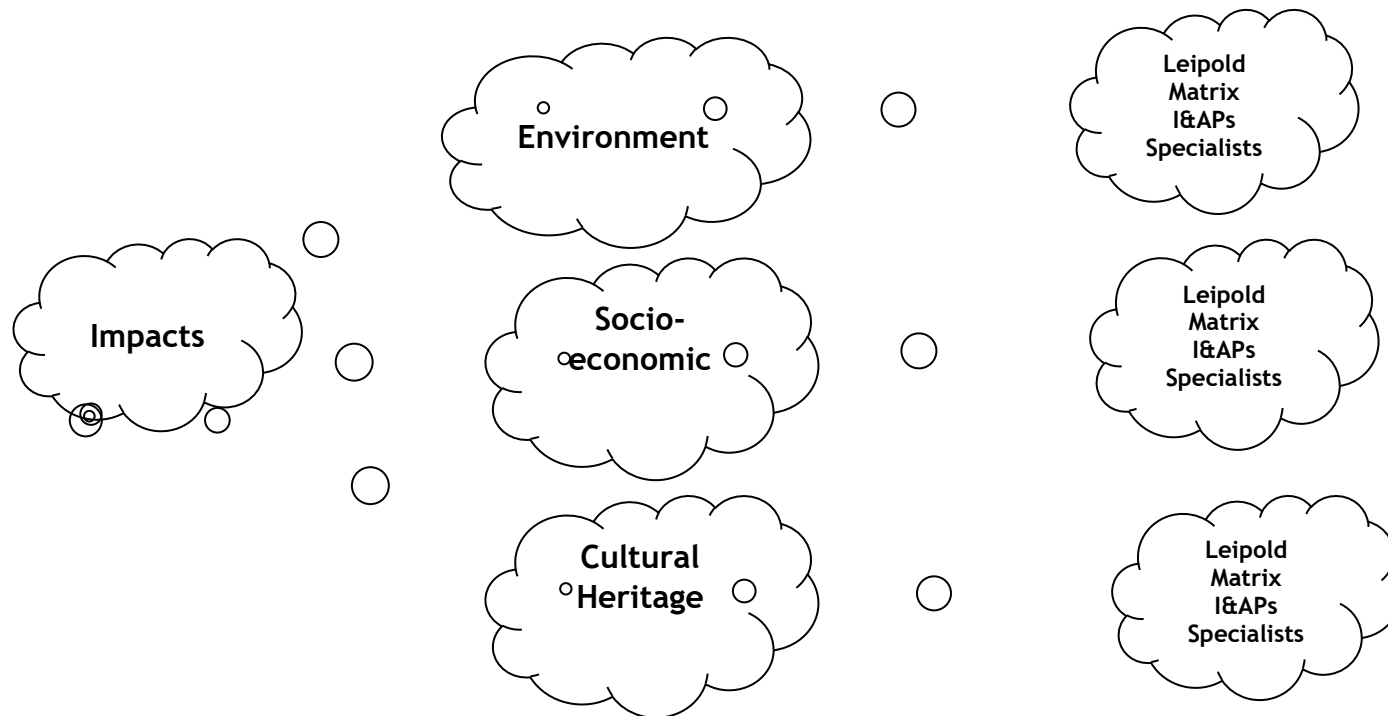


Figure 2. A breakdown of the different types of impacts including the resources used to identify them.

Table 7: Identification of potential impacts from registered Interested and Affected Parties (I&APs) as per Appendix 3 (h)(iii) “a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them”.

| I&APs | | | |
|---|----------------------------------|--|--------------------------|
| ACTIVITY | SUB-ACTIVITY | ENVIRONMENTAL ASPECT & IMPACT | ENVIRONMENTAL DESCRIPTOR |
| Layout (or Location) and Design (or Size), including the consideration of ALTERNATIVES & CUMULATIVE impacts | Vegetation Clearing & Earthworks | <p>In terms of the National Heritage Resources Act, no 25 of 1999 (NHRA), heritage resources, including archaeological or palaeontological sites over 100 years old, graves older than 60 years, structures older than 60 years are generally protected. They may not be disturbed without a permit from the relevant heritage resources authority. In contexts of development applications, the developer must ensure that no heritage resources will be impacted by the proposed development, by lodging an application to SAHRA and submitting detailed development specifications as a notification of intent to develop. If the application is made in terms of s. 38 (8) of the NHRA then it is incumbent on the developer to ensure that a Heritage Impact Assessment (HIA) is undertaken, as s. 38(2)a does not apply. Such a study should follow the SAHRA 2007 Minimum Standards: Archaeological Component of Impact Assessment Report, The SAHRA 2012 Minimum Standards: Palaeontological Component of Impact Assessment Report and section 38(3) of the NHRA.</p> <p>SAHRA as a commenting authority in this application requires an assessment of all heritage resources, including palaeontological resources to be conducted by</p> | Heritage Resources |

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| | | <p>suitably qualified archaeologist and palaeontologist respectively, within the EA application process. The development area is located on a moderate (green) palaeontology sensitive area according to the SAHRIS Palaeo-sensitivity Map, therefore a desktop study will be required along with protocol for finds. All required environmental documents must be submitted as well. If you are unaware of any archaeologists and palaeontologists a list of them working within the Heritage Resources Management field are provided in the following websites: (see www.asapa.co.za) and (see www.palaeosa.org). SAHRA will comment further on this proposed development once the requested reports are submitted to the case. This comment must be forwarded to the competent authority and proof of submission must be uploaded to the case.</p> <p align="center">Nokukhanya Khumalo - nkhumalo@sahra.org.za - SAHRA</p> | |
| <p align="center">N4 and Internal Haulage Routes</p> | <p align="center">Lengthening and upgrading of access roads</p> | <p>Kindly register me as an interested and affected party.</p> <p>I note on the sketch that mention is made of using the N4 as haul road.</p> <p>It is not clear what the extent of the hauling will be, and the period intended to be used as haul. Truck types, number of loads.</p> <p>Do you have further information in this regard? The Kaapse hoop/N4 intersection is currently operating near capacity during peak periods. Additional construction trucks would aggravate the situation and</p> | <p align="center">Traffic Management</p> |

| | | | |
|--|--|--|--|
| | | <p>could result in unsafe conditions.</p> <p>I will submit a signed response form as well to confirm our registration as I&AP.</p> <p>We need further information on the construction traffic, traffic management plan and Traffic Impact Statement/Assessment report to determine the effect of the construction traffic at the Kaapse hoop intersection and the other N4 intersecting point of the construction traffic.</p> <p>Duration of the construction? Types of trucks to be used and loads?</p> <p>Hoping to comment further once we have received additional information.</p> <p>Trac is responsible for managing of the TracN4 Toll Route. The BID document indicates the N4 to be used as a haul road for the dam. We will require further information on the intended use of the N4 for hauls.</p> <p>Types of vehicles, origin, and destination. Load? Weighing to check permissible loads? Number of trucks? Traffic Impact Statement/Assessment on the effect of traffic flow on the intersections affected by the construction trucks. Traffic Management Plans?</p> <p>Carla Davis - CDavis@tracn4.co.za – TracN4</p> | |
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| Vegetation Clearing | Loss of flora | <p>An interest to participate in this development arises in terms of Listing Notice 3 (GG No. 40772, GNo. 324, 07 April 2017) / Listed Activity 12 referenced in page 3 of this BID. In terms of anticipated issues in pg6 of this document, DEFF – (Forestry) would like to make inputs as follows (Terrestrial Biodiversity Impact Assessment – Ecological Study Report) should such reports become available for public scrutiny.</p> <p>Zinzile Mtotywa - ZinzileM@daff.gov.za – DAFF</p> | Aquatic and Terrestrial Flora |
|---------------------|---------------|---|-------------------------------|

Methodology for Assessing Environmental Aspects & Impacts

Requirement of Appendix 3, Regulation 3 (1)(h)(vi): “*the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks;*”

Natural environmental, socio-economic, and cultural heritage impacts were assessed using the approach outlined below.

Natural environmental, socio-economic, and cultural heritage impacts were identified systematically by considering how the site-specific activities for each phase of development will interact with all elements of the receiving environment. All impacts, including those identified by I&APs and Specialists, will be measured against the current land-use activity (the no-go option / option of not implementing the activity) and systematically assessed by rating a suite of criteria (Tables 3, 4 & 5) informed and adapted from the Department of Environmental Affairs and Tourism (DEAT 2002). The criteria are:

- Extent or spatial scale,
- Intensity or severity of the impact,
- Duration of the impact,
- Probability of the impact,
- Mitigatory potential,
- Social acceptability,
- Degree of certainty,
- Status of the impact, and
- Legal requirements.

The magnitude and significance of impacts were determined by describing the impacts in terms of the above criteria. The criteria provide a consistent and systematic basis for the comparison and application of judgements.

The suite of criteria was sought for its applicability to EIA, specifically by making provision for the variety of perspectives. Significance is an anthropocentric concept that makes use of value judgements and science-based criteria. Judgement and values are used to greater extent in EIA than science-based criteria and standards (DEAT 2002). Considering value judgements can vary greatly amongst different stakeholders, professional judgement, such as that of the EAP, should ideally be used in conjunction with the different value judgements expressed by various stakeholders. In other words, significance should be communicated from a variety of perspectives other than the professional opinion of a multidisciplinary study team, and include environmental, socio-economic

or cultural attributes perceived by society to be significant. Despite the potential variety of perspectives, they can be categorized into three broad forms of recognition for determination of impact significance, namely institutional (laws, plans or policy statements), public and technical (scientific or technical knowledge or judgement of critical resource characteristics) (DEAT 2002). Consequently, the magnitude and significance of impacts were as far as possible determined by reference to legal requirements, accepted scientific standards and / or social acceptability.

Table 8: Impact Evaluation Criteria, Ratings and Descriptors.

| Assessment criteria for the evaluation of impacts | | |
|---|--------------------|---|
| CRITERIA | CATEGORY | DESCRIPTION |
| Extent or spatial influence of impact | National | Within the country |
| | Regional | Within the province/ recognised region |
| | Local | On site or within 1000 m of the impact site |
| | | Along the alignment and within 500m of the line on each side |
| | | Within the immediate and operational Area |
| Magnitude of impact (at the indicated spatial scale) | High | Social and / or natural functions and / or processes are severely altered |
| | Medium | Social and / or natural functions and / or processes are notably altered |
| | Low | Social and / or natural functions and / or processes are slightly altered |
| | Very Low | Social and / or natural functions and / or processes are negligibly altered |
| | Zero | Social and / or natural functions and / or processes remain unaltered |
| Duration of impact | Short term | Construction period |
| | Medium Term | Up to 10 years after construction |
| | Long Term | More than 10 years after construction |
| *NOTE: Where applicable, the magnitude of the impact must be related to the relevant standard (threshold value specified, and source referenced). | | |

Definition of significance

The “significance” of an impact is derived by considering the temporal and spatial scales and magnitude. Such significance is also informed by the context of the impact, i.e. the character and identity of the receptor of the impact. The means of arriving at the different significance ratings is explained in the following table, developed as a means of minimizing subjectivity in such evaluations, i.e. to allow for replicability in the determination of significance.

Table 9: Significance ratings with associated criteria.

| SIGNIFICANCE RATINGS | LEVEL OF CRITERIA REQUIRED |
|-----------------------------|---|
| High | High magnitude with a regional extent and long-term duration |
| | High magnitude with either a regional extent and medium-term duration or a local extent and long-term duration |
| | Medium magnitude with a regional extent and long-term duration |
| Medium | High magnitude with a local extent and medium-term duration |
| | High magnitude with a regional extent and construction period or a site-specific extent and long-term duration |
| | High magnitude with either a local extent and construction period duration or a site-specific extent and medium-term duration |
| | Medium magnitude with any combination of extent and duration except site specific and construction period or regional and long term |
| | Low magnitude with a regional extent and long-term duration |
| Low | High magnitude with a site-specific extent and construction period duration |
| | Medium magnitude with a site-specific extent and construction period duration |
| | Low magnitude with any combination of extent and duration except site specific and construction period or regional and long term |
| | Very low magnitude with a regional extent and long-term duration |
| Very low | Low magnitude with a site-specific extent and construction period duration |
| | Very low magnitude with any combination of extent and duration except regional and long term |
| Neutral | Zero magnitude with any combination of extent and duration |

Table 10: Risk Rating categories and matrix

| EXTENT | MAGNITUDE | DURATION | COMBINED | RISK RATING |
|---------------|------------------|-----------------|-------------------------------|--------------------|
| Local | High | Long Term | Local High Long Term | High |
| Local | High | Medium Term | Local High Medium Term | Medium |
| Local | High | Short term | Local High Short Term | Low |
| Local | Low | Long Term | Local Low Long Term | Low |
| Local | Low | Medium Term | Local Low Medium Term | Low |
| Local | Low | Short term | Local Low Short Term | Very Low |
| Local | Medium | Long Term | Local Medium Long Term | Medium |
| Local | Medium | Medium Term | Local Medium Medium Term | Medium |
| Local | Medium | Short term | Local Medium Short Term | Low |
| Local | Very Low | Long Term | Local Very Low Long Term | Low |
| Local | Very Low | Medium Term | Local Very Low Medium Term | Very Low |
| Local | Very Low | Short term | Local Very Low Short Term | Very Low |
| Local | Zero | Long Term | Local Zero Long Term | Neutral |
| Local | Zero | Medium Term | Local Zero Medium Term | Neutral |
| Local | Zero | Short term | Local Zero Short Term | Neutral |
| National | High | Long Term | National High Long Term | High |
| National | High | Medium Term | National High Medium Term | High |
| National | High | Short term | National High Short Term | High |
| National | Low | Long Term | National Low Long Term | Medium |
| National | Low | Medium Term | National Low Medium Term | Low |
| National | Low | Short term | National Low Short Term | Low |
| National | Medium | Long Term | National Medium Long Term | Medium |
| National | Medium | Medium Term | National Medium Medium Term | Medium |
| National | Medium | Short term | National Medium Short Term | Medium |
| National | Very Low | Long Term | National Very Low Long Term | Medium |
| National | Very Low | Medium Term | National Very Low Medium Term | Very Low |
| National | Very Low | Short term | National Very Low Short Term | Very Low |

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| | | | | |
|----------|----------|-------------|-------------------------------|----------|
| National | Zero | Long Term | National Zero Long Term | Neutral |
| National | Zero | Medium Term | National Zero Medium Term | Neutral |
| National | Zero | Short term | National Zero Short Term | Neutral |
| Regional | High | Long Term | Regional High Long Term | High |
| Regional | High | Medium Term | Regional High Medium Term | High |
| Regional | High | Short term | Regional High Short Term | Medium |
| Regional | Low | Long Term | Regional Low Long Term | Low |
| Regional | Low | Medium Term | Regional Low Medium Term | Low |
| Regional | Low | Short term | Regional Low Short Term | Low |
| Regional | Medium | Long Term | Regional Medium Long Term | High |
| Regional | Medium | Medium Term | Regional Medium Medium Term | Medium |
| Regional | Medium | Short term | Regional Medium Short Term | Medium |
| Regional | Very Low | Long Term | Regional Very Low Long Term | Low |
| Regional | Very Low | Medium Term | Regional Very Low Medium Term | Low |
| Regional | Very Low | Short term | Regional Very Low Short Term | Very Low |
| Regional | Zero | Long Term | Regional Zero Long Term | Neutral |
| Regional | Zero | Medium Term | Regional Zero Medium Term | Neutral |
| Regional | Zero | Short term | Regional Zero Short Term | Neutral |

Table 11: Mitigatory potential.

| Criteria | Ratings and Descriptors | | | |
|--|---|--|---|---|
| | High (4) | Moderate (3) | Low (2) | No Impact (1) |
| Mitigatory Potential | High potential to mitigate and achieve objectives. | There is a moderate potential to mitigate and achieve objectives. | There is a potential to mitigate, but there remains a risk of the objectives not being met. | No mechanism for mitigation and achieving the objectives. |
| Acceptability | Unacceptable Abandon project or design. | Manageable with expensive regulatory controls and the project proponent's commitments. | Some risk to public health / environment, but it is easily averted using simple controls / mitigations. | Acceptable. No risk to public health / environment. |
| | Definite (D- 4) | Probable (P -3) | Improbable (I-2) | No Impact (N-1) |
| Degree of Certainty / Probability of the impact occurring | Substantial supportive data. Impact will occur regardless of preventive measures. High probability. >95%. | There is a chance / risk of the impact occurring. Moderate probability. 5-95%. | It is unlikely that the impact will occur. Low probability. <5%. | The impact will not occur. 0%. |

ASSESSMENT OF ASPECTS & IMPACTS

The identified actual and potential Impacts, comments received from I&APs and findings contained in specialist assessments, are segregated amongst the different phases of implementation (planning and design, pre-construction, construction, operation and decommissioning) so that they can be logically managed /mitigated for by the responsible role players at the appropriate time.

12. DEVELOPMENT PHASES

Table 12-1: Average significance across aspects associated with negative impacts assessed for each development phase.

| ENTIRE PHASE | EXTENT | MAGNITUDE | DURATION | SIGNIFICANCE | PROBABILITY |
|-------------------------|--------|-----------|------------|--------------|-------------|
| PLANNING | Local | Low | Long Term | Low | Improbable |
| PRE-CONSTRUCTION | Local | Very Low | Short-Term | Very Low | Improbable |
| CONSTRUCTION | Local | Medium | Short-Term | Low | Probable |
| OPERATIONAL | Local | Medium | Long Term | Medium | Probable |
| DECOMMISSIONING | Local | Medium | Long Term | Medium | Improbable |

Table 12-2: Significance across aspects associated with potential positive impacts assessed for each development phase.

| ASPECT | EXTENT | MAGNITUDE | DURATION | SIGNIFICANCE | PROBABILITY |
|-------------------|--------|-----------|------------|--------------|-------------|
| PLANNING & DESIGN | | | | | |
| N/A | | | | | |
| PRE-CONSTRUCTION | | | | | |
| N/A | | | | | |
| CONSTRUCTION | | | | | |
| INCREASED WEALTH | Local | Very Low | Short Term | Very Low | Improbable |

| OPERATIONAL | | | | | |
|---|-------|--------|-----------|--------|----------|
| IMPROVED ACCESS TO DAM FOR MAINTENANCE AND REPAIR REQUIREMENTS | Local | Medium | Long Term | Medium | Probable |
| IMPROVED STABILITY OF DAM WALL AND PROTECTION OF DOWNSTREAM ECOSYSTEM AND USERS | Local | Medium | Long Term | Medium | Probable |
| DECOMMISSIONING | | | | | |
| N/A | | | | | |

Table 12-3: Environmental aspects for each development phase categorised into environmental management classes. Aspects are highlighted by colour by their assessed pre-mitigation risk. Pre-mitigation risk is used to indicate worst case scenario if the prescribed mitigations are ineffective.

LEGEND:

| | |
|-----------------|--|
| Neutral Impact | |
| Very Low Impact | |
| Low Impact | |
| Medium Impact | |
| High Impact | |
| Positive Impact | |

| | | | | |
|-------------------|------------------|--------------|-----------|-----------------|
| Planning & Design | Pre-Construction | Construction | Operation | Decommissioning |
|-------------------|------------------|--------------|-----------|-----------------|

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| Entire Phase | | | | |
|--|--|--|---|---|
| Low | Very Low | Low | Medium | Medium |
| Compliance Management | | | | |
| POTENTIAL OFFENCES | POTENTIAL OFFENCES | | POTENTIAL OFFENCES | POTENTIAL OFFENCES |
| Integrated Water Resource Management | | | | |
| INCREASED ABSTRACTION OF WATER | HYDROLOGICAL IMPACT ON EROSION | CONTAMINATION OF GROUND & SURFACE WATER | IMPACT ON DOWNSTREAM ENVIRONMENT AND USERS - DAM WALL CONTAINMENT FAILURE | DOWNSTREAM USERS OF SURFACE WATER AND GROUNDWATER |
| IMPACT OF EROSION ON SURFACE WATER POLLUTION - SEDIMENTATION | HYDROLOGICAL IMPACT ON SURFACE WATER POLLUTION | IMPACT OF ALIEN INVASIVE PLANTS ON GROUND & SURFACE WATER | IMPROVED ACCESS TO DAM FOR MAINTENANCE AND REPAIR REQUIREMENTS | |
| | CHANGES TO SURFACE WATER HYDROLOGY | IMPACT OF EROSION ON SURFACE WATER POLLUTION - SEDIMENTATION | IMPROVED STABILITY OF DAM WALL AND PROTECTION OF DOWNSTREAM ECOSYSTEM AND USERS | |
| | | IMPACT OF ALIEN INVASIVE PLANTS ON WATER QUALITY | | |

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| | | | | |
|--------------------------------|------------------------------------|---|------------------------|---------------------------------|
| | | CHANGES TO SURFACE WATER HYDROLOGY | | |
| | | SURFACE WATER POLLUTION | | |
| | | CONTAMINATION OF SURFACE WATER | | |
| | | SURFACE WATER POLLUTION - SEDIMENTATION | | |
| | | WATER POLLUTION IMPACT ON AQUATIC FAUNA | | |
| | | GROUND & SURFACE WATER POLLUTION | | |
| | | LOSS OF FISH SPECIES | | |
| | | AQUATIC FAUNA BEHAVIOR | | |
| Biodiversity Management | | | | |
| LOSS OF SOIL - EROSION | LOSS OF FLORA | CONTAMINATION OF SOIL | LOSS OF SOIL - EROSION | LOSS OF AQUATIC FLORA AND FAUNA |
| LOSS OF FLORA | HYDROLOGICAL IMPACT ON DEGRADATION | BUSHFIRE IMPACT ON FAUNA | ALIEN PLANT INVASION | |

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| TERRESTRIAL ECOSYSTEM DEGRADATION | TERRESTRIAL DEGRADATION | BUSHFIRE IMPACT ON FLORA | IMPACT OF ALIEN PLANT INVASION ON HABITAT TRANSFORMATION | |
|-----------------------------------|-------------------------|--|--|--|
| | | BUSHFIRE IMPACT ON HABITAT | | |
| | | LOSS OF FAUNA | | |
| | | LOSS OF FLORA | | |
| | | LOSS OF SOIL - EROSION | | |
| | | COMPACTION OF SOIL | | |
| | | IMPACT OF ALIEN INVASIVES ON SOIL QUALITY | | |
| | | IMPACT OF ALIEN INVASIVE PLANTS ON FAUNA | | |
| | | IMPACT OF ALIEN INVASIVE PLANTS ON INDIGENOUS PLANTS | | |
| | | ALIEN INVASIVE PLANT INVASION | | |
| | | LOSS OF HABITAT | | |
| | | DISTURBANCE TO HABITAT | | |
| | | IMPACT OF ALIEN INVASIVE PLANTS ON HABITAT | | |

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| | | | | |
|-------------------------------|--|--|----------------------------------|--|
| | | CONTAMINATION OF TOPSOIL | | |
| | | COMPACTION OF TOPSOIL | | |
| | | FRAGMENTED AQUATIC HABITAT | | |
| | | LOSS OF TOPSOIL | | |
| Air Quality Management | | | | |
| VISUALLY UNAESTHETIC | AIR POLLUTION NOISE THAT IS A NUISANCE | NOISE POLLUTION IMPACT ON FAUNA | DUST POLLUTION IMPACT ON ANIMALS | |
| | AIR POLLUTION BAD ODOURS | AIR POLLUTION NOISE | DUST POLLUTION IMPACT ON PLANTS | |
| | | AIR POLLUTION BUSHFIRE SMOKE | AIR POLLUTION - DUST | |
| | | DUST POLLUTION IMPACT ON FAUNA | NOISE POLLUTION IMPACT ON FAUNA | |
| | | AIR POLLUTION DUST | AIR POLLUTION - NOISE | |
| | | NOISE POLLUTION IMPACT ON FAUNA | | |
| | | NOISE POLLUTION IMPACT ON HUMAN HEALTH | | |
| | | AIR POLLUTION EMISSIONS | | |
| | | AIR POLLUTION - SMOKE | | |

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| | | | | |
|---------------------------------------|------------------|--|--|--|
| | | DUST POLLUTION IMPACT ON PLANTS | | |
| Resource Use & Management | | | | |
| INCREASED DEMAND ON ELECTRICITY | | INCREASED PRESSURE ON PUBLIC SERVICES | MAINTENANACE AND MONITORING ON DAM INFRASTRUCTURE - DAM SAFTEY AND SURVEILANCE | |
| | | BUSHFIRE IMPACT ON PROPERTY | | |
| | | DAMAGE TO PROPERTY | | |
| | | EXCESSIVE/WASTEFUL WATER USE - LOSS OF WATER | | |
| | | EXCESSIVE WATER USE IMPACT ON EROSION | | |
| Heritage Resource Management | | | | |
| LOSS OF HERITAGE RESOURCES | LOSS OF HERITAGE | LOSS OF HERITAGE | | |
| Health & Safety Management | | | | |
| | | BUSHFIRE IMPACT ON HUMAN LIFE | DUST POLLUTION IMPACT ON HUMAN HEALTH | |

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| | | | | |
|---------------------------------|-------------------------|--|--|--|
| | | DUST POLLUTION IMPACT ON HUMAN HEALTH | NOISE POLLUTION IMPACT ON HUMAN HEALTH | |
| | | ACCIDENT IMPACT ON HUMAN HEALTH | | |
| | | AIR POLLUTION IMPACT ON HUMAN HEALTH | | |
| | | WATER POLLUTION IMPACT ON HUMAN HEALTH | | |
| | | SMOKE POLLUTION IMPACT ON HUMAN HEALTH | | |
| | | INCREASED WEALTH | | |
| Visual Impact Management | | | | |
| | VISUALLY UNAESTHETIC | VISUALLY UNAESTHETIC | | |

Table 12-4: **Significant potential impacts** associated with each phase of development. Table 12-3 indicates the MODAL / MEAN significance which down scales any potential significant impacts.

| ASPECT | IMPACT | EXTENT | MAGNITUDE | DURATION | SIGNIFICANCE | PROBABILITY |
|------------------------------------|---|--------|-----------|-----------|--------------|-------------|
| PLANNING & DESIGN PHASE | | | | | | |
| No significant impacts. | | | | | | |
| PRE-CONSTRUCTION PHASE | | | | | | |
| No significant impacts. | | | | | | |
| CONSTRUCTION PHASE | | | | | | |
| No significant impacts. | | | | | | |
| OPERATIONAL PHASE | | | | | | |
| POTENTIAL OFFENCES | Any person who contravenes or fails to comply with any provision of the National Water Act (1998) or a condition or requirement of a permit shall be guilty of an offence and upon conviction liable to a fine not exceeding R10 000 or to imprisonment for a period not exceeding 6 months. For example, The applicant who builds a new dam classified by the Director-General as a NWA (1998) | Local | Medium | Long Term | Medium | Probable |

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| | | | | | | |
|------------------------|---|-------|--------|-----------|--------|------------|
| | Category III safety risk shall be guilty of an offence and upon conviction liable to a fine and/or imprisonment if he closes the river diversion works and commences with the storage of water before he is in possession of a permit to impound, issued by the Minister. | | | | | |
| LOSS OF SOIL - EROSION | Disturbed and recently rehabilitated areas are vulnerable to erosion, including hydro-seeded slopes and temporary access roads. | Local | Medium | Long Term | Medium | Improbable |
| ALIEN PLANT INVASION | Disturbed areas, including those recently rehabilitated by the contractor are susceptible to the recruitment of weed, invader and alien plants. | Local | Medium | Long Term | Medium | Improbable |

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|--|---|-------|--------|-----------|--------|------------|
| IMPACT ON DOWNSTREAM ENVIRONMENT AND USERS - DAM WALL CONTAINMENT FAILURE | In the event of a failure in the containment of the dam wall, the release of water can cause an emergency via surface runoff and flooding. | Local | Medium | Long Term | Medium | Improbable |
| MAINTENANCE AND MONITORING ON DAM INFRASTRUCTURE - DAM SAFETY AND SURVEILLANCE | The poor maintenance and monitoring of the dam wall and associated infrastructure leading to the deterioration and stability of the dam wall. | Local | Medium | Long Term | Medium | Probable |
| IMPACT OF ALIEN PLANT INVASION ON HABITAT TRANSFORMATION | Disturbed areas, including those recently rehabilitated by the contractor are susceptible to the recruitment of weed, invader and alien plants, which replace indigenous plant communities if not controlled. | Local | Medium | Long Term | Medium | Probable |

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|---|--|-------|--------|-----------|--------|------------|
| POTENTIAL OFFENCES | The applicant may not comply with the EA or GA conditions that pertain to the operation, maintenance, and management of the dam. | Local | Medium | Long Term | Medium | Improbable |
| DECOMMISSIONING PHASE | | | | | | |
| LOSS OF AQUATIC FLORA AND FAUNA | The decommissioning the dam will change the aquatic habitat leading to potential loss of aquatic species adapted to open water ecosystems. | Local | Medium | Long Term | Medium | Improbable |
| DOWNSTREAM USERS OF SURFACE WATER AND GROUNDWATER | The decommissioning the dam will change the hydrology for local downstream users on the Ngodwana River leading to potential flooding and changes in river flows. | Local | Medium | Long Term | Medium | Improbable |
| POTENTIAL OFFENCES | Any person who contravenes or fails to comply with any provision of the EA or WUL decommissioning conditions shall be guilty of an offence and | Local | Medium | Long Term | Medium | Improbable |

| | | | | | | |
|--|--|--|--|--|--|--|
| | <p>upon conviction liable to a fine not exceeding R10 000 or to imprisonment for a period not exceeding 6 months. For example, The applicant who intends on decommissioning a category 3 dam must comply with the relevant conditions and requirements pertaining to the WUL and EA, including an application to the Director-General for decommissioning and post closure report.</p> | | | | | |
|--|--|--|--|--|--|--|

From the above tables (12-3 & 12-4), it can be concluded that the significance of the impacts throughout the entire life cycle of the project is medium and occurs during operation and decommissioning phase.

12.4: Significant Terrestrial and Aquatic (including Riparian delineation) Ecology Assessment Specialist Findings Summary

Phase: Construction

Activity 1. Stabilizing the berm and toe drain.

| Aspect 1.2: Disturbance - Altering the bed, banks, course of a watercourse. | | | | |
|---|---|--------------------|--------------|--------------|
| 4 | The covering of indigenous riverine vegetation will be associated with the construction of the berm and toe | Construction phase | Medium (-ve) | Medium (-ve) |

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| | | | | |
|---|---|--------------------|--------------|--------------|
| | drain. | | | |
| 5 | Covering the marginal vegetation on the embankment will lead to loss of potential habitat and biodiversity. | Construction phase | Medium (-ve) | Medium (-ve) |

Activity 3. Haul route – both sides of the river.

| | | | | |
|--|---|--------------------|------------|--------------|
| Aspect 3.1: Vegetation clearing. | | | | |
| 11 | Removal of indigenous riparian vegetation, considering coves of White Stinkwood along the western haul route. | Construction phase | High (-ve) | Medium (-ve) |
| Aspect 3.2: Fragmentation or riparian corridor | | | | |
| 12 | Impacting on indigenous riparian vegetation, fragmenting the riparian corridor. | Construction phase | High (-ve) | Medium (-ve) |
| Aspect 3.3: Impacting stream flow of the Ngodwana catchment seep on the western slope. | | | | |
| 13 | Impacting the flow and water quality of this near-pristine mountain stream due to construction activities. | Construction phase | High (-ve) | Medium (-ve) |

13. DEVELOPMENT FOOTPRINT ALTERNATIVES

Several footprint alternatives exist, including internal haul routes and site establishment areas (including laydown and temporary stockpile areas). As far as practicable, these footprints have been overlaid on top of current and/or previously disturbed and degraded areas, as the entire project area falls within Critical Biodiversity Areas. The roads and site establishment areas were selected based on the lowest possible impacts as the project area falls within several biodiversity sensitive area.

The summary tables below provide explanation as to which road and establishment area alternatives were found to be most reasonable and feasible, which have been assessed in the Impact Assessment against the no-go option. Aspects that relate to the same component of the environment have been placed into environmental aspects (i.e. Topography, Sensitive receptors, Human Health, Existing Infrastructure and Land Use), along with the associated impacts and mitigations, which are dealt with in the following section.

LEGEND:

| | |
|-----------------|--|
| Neutral Impact | |
| Very Low Impact | |
| Low Impact | |
| Medium Impact | |
| High Impact | |
| Positive Impact | |

TABLE 13.1: FOOTPRINT ALTERANTIVES IMPACT ASSESSMENT AVERAGE SCORE SUMMARY.

| ASPECT | EXTENT | MAGNITUDE | DURATION | SIGNIFICANCE | PROBABILITY |
|---------------------------------------|--------|-----------|------------|--------------|-------------|
| WORKS AREA 1 (Main Embankment) | Local | Low | Short-Term | Very Low | Improbable |
| WORKS AREA 2 (Right Flank Embankment) | Local | Low | Short-Term | Very Low | Probable |
| ESTABLISHMENT AREA ALTERNATIVE 1 | Local | Low | Short-Term | Very Low | Probable |

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|----------------------------------|-------|-----|------------|----------|------------|
| ESTABLISHMENT AREA ALTERNATIVE 2 | Local | Low | Short-Term | Very Low | Improbable |
| ESTABLISHMENT AREA ALTERNATIVE 3 | Local | Low | Short-Term | Very Low | Improbable |
| ESTABLISHMENT AREA ALTERNATIVE 4 | Local | Low | Short-Term | Very Low | Improbable |
| ESTABLISHMENT AREA ALTERNATIVE 5 | Local | Low | Short-Term | Very Low | Improbable |
| Haulage Route 1- SECTION 6 | Local | Low | Short-Term | Very Low | Improbable |
| Haulage Route 1- SECTION 7 | Local | Low | Short-Term | Very Low | Probable |
| Haulage Route 1- SECTION 5 | Local | Low | Short-Term | Very Low | Probable |
| Haulage Route 2-SECTION 2&3 | Local | Low | Short-Term | Very Low | Improbable |
| Haulage Route 2- SECTION 4 | Local | Low | Short-Term | Very Low | Probable |
| No Go Option | Local | Low | Short-Term | Very Low | Improbable |

TABLE 13.2: TOPOGRAPHY FOOTPRINT ALTERNATIVE ASSESSEMENT SUMMARY (AVERAGE SCORES).

| | | | | | | |
|--|------------|-------|--------|------------|----------|------------|
| WORKS AREA 1 (Main Embankment) | Topography | Local | Medium | Short-Term | Low | Probable |
| WORKS AREA 2 (Right Flank) | Topography | Local | Medium | Short-Term | Low | Probable |
| ESTABLISHMENT AREA ALTERNATIVE 1 (Proposed) | Topography | Local | Low | Short-Term | Very Low | Improbable |
| ESTABLISHMENT AREA ALTERNATIVE 2 (Main Embankment) | Topography | Local | Medium | Short-Term | Low | Improbable |
| ESTABLISHMENT AREA 3 (Right Flank & Stockpile) | Topography | Local | Low | Short-Term | Very Low | Improbable |
| ESTABLISHMENT AREA 4 (Contractors Offices) | Topography | Local | Low | Short-Term | Very Low | Improbable |
| ESTABLISHMENT AREA 5 (Stockpile, WTW) | Topography | Local | Low | Short-Term | Very Low | Improbable |
| Haulage Route 1- SECTION 6 (East-Fishing Club) | Topography | Local | Low | Short-Term | Very Low | Improbable |
| Haulage Route 1- SECTION 7 (New Spillway Access) | Topography | Local | Low | Short-Term | Very Low | Probable |
| Haulage Route 1- SECTION 5 (New access to Right Flank) & Route 2 - SECTION 4 (Main Embankment) | Topography | Local | Medium | Short-Term | Low | Probable |
| Haulage Route 2-SECTION 2&3 (West-WTW) | Topography | Local | Low | Short-Term | Very Low | Improbable |
| Haulage Route 2- SECTION 4 New River Bridge Route | Topography | Local | Low | Short-Term | Very Low | Probable |

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| | | | | | | |
|--------------|------------|-------|-----|------------|----------|------------|
| No Go Option | Topography | Local | Low | Short-Term | Very Low | Improbable |
|--------------|------------|-------|-----|------------|----------|------------|

Footprint Alternative Assessment Interpretation

The WORKS AREA 1 (Main Embankment), WORKS AREA 2 (Right Flank), ESTABLISHMENT AREA ALTERNATIVE 2 (Main Embankment), Haulage Route 1- SECTION 5 (New access to Right Flank) and Route 2 - SECTION 4 (Main Embankment) are scoring medium for magnitude due to having steep slopes associated with these works and establishment areas.

TABLE 13.3: SENSITIVE RECEPTORS FOOTPRINT ALTERNATIVE ASSESSEMENT SUMMARY (AVERAGE SCORES).

| | | | | | | |
|--|---------------------|-------|--------|-------------|----------|----------|
| WORKS AREA 1 (Main Embankment) | Sensitive Receptors | Local | Medium | Medium Term | Medium | Probable |
| WORKS AREA 2 (Right Flank) | Sensitive Receptors | Local | Medium | Short-Term | Low | Probable |
| ESTABLISHMENT AREA ALTERNATIVE 1 (Proposed) | Sensitive Receptors | Local | Medium | Short-Term | Low | Probable |
| ESTABLISHMENT AREA ALTERNATIVE 2 (Main Embankment) | Sensitive Receptors | Local | High | Short-Term | Low | Probable |
| ESTABLISHMENT AREA 3 (Right Flank & Stockpile) | Sensitive Receptors | Local | Medium | Short-Term | Low | Probable |
| ESTABLISHMENT AREA 4 (Contractors Offices) | Sensitive Receptors | Local | Medium | Short-Term | Low | Probable |
| ESTABLISHMENT AREA 5 (Stockpile, WTW) | Sensitive Receptors | Local | Medium | Short-Term | Low | Probable |
| Haulage Route 1- SECTION 6 (East-Fishing Club) | Sensitive Receptors | Local | Medium | Short-Term | Very Low | Probable |
| Haulage Route 1- SECTION 7 (New Spillway Access) | Sensitive Receptors | Local | Medium | Short-Term | Very Low | Probable |
| Haulage Route 1- SECTION 5 (New access to Right Flank) & Route 2 - SECTION 4 (Main Embankment) | Sensitive Receptors | Local | Medium | Short-Term | Very Low | Probable |

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|---|---------------------|-------|--------|-------------|--------|----------|
| Haulage Route 2-SECTION 2&3 (West-WTW) | Sensitive Receptors | Local | Medium | Medium Term | Medium | Probable |
| Haulage Route 2- SECTION 4 New River Bridge Route | Sensitive Receptors | Local | High | Medium Term | Medium | Probable |
| No Go Option | Sensitive Receptors | Local | High | Medium Term | Medium | Probable |

Footprint Alternative Assessment Interpretation

All footprint alternatives apart from alternative 2 and Route 2 (Section 4) are scoring medium for magnitude under due to the area being within a CBA and withing riparian buffer zones. However, the significance is lower due to the short-term duration and local nature of the proposed remediation including the mitigating factors of locating footprints in already disturbed areas and that are less sensitive.

ESTABLISHMENT AREA ALTERNATIVE 2 (Main Embankment) is scoring high for magnitude due to the potential impact on sensitive receptors from its steep position and resultant soil erosion and siltation of watercourses.

Haulage Route 2- SECTION 4 New River Bridge Route is scored high for magnitude due to the requirement of a new watercourse crossing as part of the haulage routes. A low-water concrete causeway will be installed that will provide access only during low water flows and will not impede or divert water within this channel, nor the free movement of aquatic organisms. Clearance of aquatic vegetation (mostly reeds) and limited riparian vegetation will be required

The no-go option is scored high for magnitude due to the impact of a possible flooding of the downstream riparian environment should the dam wall be breached during any failure if the remediation works were not completed.

TABLE 13.4: HUMAN HEALTH FOOTPRINT ALTERNATIVE ASSESSEMENT SUMMARY (AVERAGE SCORES).

| | | | | | | |
|--|-------------------------------|-------|-----|------------|----------|------------|
| WORKS AREA 1 (Main Embankment) | Human Health | Local | Low | Short-Term | Very Low | Improbable |
| WORKS AREA 2 (Right Flank) | Human health | Local | Low | Long Term | Low | Probable |
| ESTABLISHMENT AREA ALTERNATIVE 1 (Proposed) | Human health/nuisance effects | Local | Low | Long Term | Low | Probable |
| ESTABLISHMENT AREA ALTERNATIVE 2 (Main Embankment) | Human health/nuisance effects | Local | Low | Long Term | Low | Probable |

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| | | | | | | |
|---|-------------------------------|-------|--------|------------|----------|----------|
| ESTABLISHMENT AREA 3 (Right Flank & Stockpile) | Human health/nuisance effects | Local | Low | Short-Term | Very Low | Probable |
| ESTABLISHMENT AREA 4 (Contractors Offices) | Human health/nuisance effects | Local | Medium | Short-Term | Low | Probable |
| ESTABLISHMENT AREA 5 (Stockpile, WTW) | Human health/nuisance effects | Local | Medium | Short-Term | Low | Probable |
| Haulage Route 1- SECTION 6 (East-Fishing Club) | Human health/nuisance effects | Local | Medium | Short-Term | Low | Probable |
| Haulage Route 1- SECTION 7 (New Spillway Access) | Human health/nuisance effects | Local | Medium | Short-Term | Low | Probable |
| Haulage Route 1- SECTION 5 (New access to Right Flank) & Route 2 - SECTION 4 (Main Embankment) | Human health/nuisance effects | Local | Low | Long Term | Low | Probable |
| Haulage Route 2-SECTION 2&3 (West-WTW) | Human health/nuisance effects | Local | Low | Short-Term | Very Low | Probable |
| Haulage Route 2- SECTION 4 New River Bridge Route | Human health/nuisance effects | Local | Low | Long Term | Low | Probable |
| No Go Option | Human health/nuisance effects | Local | High | Long Term | High | Probable |

Footprint Alternative Assessment Interpretation

The no-go option is scored high for magnitude due to the impact of a possible flooding causing a high risk of detrimental effects on the human population downstream should the dam wall be breached during any failure if the remediation works were not completed.

TABLE 13.5: EXISTING INFRASTRUCTURE FOOTPRINT ALTERNATIVE ASSESSEMENT SUMMARY (AVERAGE SCORES).

| | | | | | | |
|--|-------------------------|-------|-----|------------|----------|------------|
| WORKS AREA 1 (Main Embankment) | Existing Infrastructure | Local | Low | Short-Term | Very Low | Improbable |
| WORKS AREA 2 (Right Flank) | Existing Infrastructure | Local | Low | Short-Term | Very Low | Improbable |
| ESTABLISHMENT AREA ALTERNATIVE 1 (Proposed) | Existing Infrastructure | Local | Low | Short-Term | Very Low | No Impact |
| ESTABLISHMENT AREA | Existing Infrastructure | Local | Low | Short-Term | Very Low | Improbable |

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|--|-------------------------|-------|-----|------------|----------|------------|
| ALTERNATIVE 2 (Main Embankment) | | | | | | |
| ESTABLISHMENT AREA 3 (Right Flank & Stockpile) | Existing Infrastructure | Local | Low | Short-Term | Very Low | Improbable |
| ESTABLISHMENT AREA 4 (Contractors Offices) | Existing Infrastructure | Local | Low | Short-Term | Very Low | Improbable |
| ESTABLISHMENT AREA 5 (Stockpile, WTW) | Existing Infrastructure | Local | Low | Short-Term | Very Low | Improbable |
| Haulage Route 1- SECTION 6 (East-Fishing Club) | Existing Infrastructure | Local | Low | Short-Term | Very Low | Improbable |
| Haulage Route 1- SECTION 7 (New Spillway Access) | Existing Infrastructure | Local | Low | Short-Term | Very Low | Improbable |
| Haulage Route 1- SECTION 5 (New access to Right Flank & Route 2 - SECTION 4 (Main Embankment)) | Existing Infrastructure | Local | Low | Short-Term | Very Low | Improbable |
| Haulage Route 2-SECTION 2&3 (West-WTW) | Existing Infrastructure | Local | Low | Short-Term | Very Low | Improbable |
| Haulage Route 2- SECTION 4 New River Bridge Route | Existing Infrastructure | Local | Low | Short-Term | Very Low | Improbable |
| No Go Option | Existing Infrastructure | Local | Low | Short-Term | Very Low | Improbable |

Footprint Alternative Assessment Interpretation

All alternative footprints are assessed as low for existing infrastructure as it is an existing operational dam with associated permanent infrastructure in place.

TABLE 13.6: LAND USE FOOTPRINT ALTERNATIVE ASSESSEMENT SUMMARY (AVERAGE SCORES).

| | | | | | | |
|--|------------------------|-------|-----|------------|----------|------------|
| WORKS AREA 1 (Main Embankment) | Land Use Compatibility | Local | Low | Short-Term | Very Low | Improbable |
| WORKS AREA 2 (Right Flank) | Land Use Compatibility | Local | Low | Short-Term | Very Low | Improbable |
| ESTABLISHMENT AREA ALTERNATIVE 1 (Proposed) | Land Use Compatibility | Local | Low | Short-Term | Very Low | Improbable |
| ESTABLISHMENT AREA ALTERNATIVE 2 (Main Embankment) | Land Use Compatibility | Local | Low | Short-Term | Very Low | Improbable |

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| | | | | | | |
|---|------------------------|-------|-----|-------------|----------|------------|
| Embankment) | | | | | | |
| ESTABLISHMENT AREA 3 (Right Flank & Stockpile) | Land Use Compatibility | Local | Low | Short-Term | Very Low | Improbable |
| ESTABLISHMENT AREA 4 (Contractors Offices) | Land Use Compatibility | Local | Low | Short-Term | Very Low | Improbable |
| ESTABLISHMENT AREA 5 (Stockpile, WTW) | Land Use Compatibility | Local | Low | Short-Term | Very Low | Improbable |
| Haulage Route 1- SECTION 6 (East-Fishing Club) | Land Use Compatibility | Local | Low | Short-Term | Very Low | Improbable |
| Haulage Route 1- SECTION 7 (New Spillway Access) | Land Use Compatibility | Local | Low | Short-Term | Very Low | Improbable |
| Haulage Route 1- SECTION 5 (New access to Right Flank) & Route 2 - SECTION 4 (Main Embankment) | Land Use Compatibility | Local | Low | Medium Term | Low | Improbable |
| Haulage Route 2-SECTION 2&3 (West-WTW) | Land Use Compatibility | Local | Low | Short-Term | Very Low | Improbable |
| Haulage Route 2- SECTION 4 New River Bridge Route | Land Use Compatibility | Local | Low | Medium Term | Low | Improbable |
| No Go Option | Land Use Compatibility | Local | Low | Medium Term | Low | Improbable |

Footprint Alternative Assessment Interpretation

All alternative footprints are assessed as low for land compatibility as the proposed dam remediation will not involve a change in land use and the temporary nature of establishment alternatives will be short term in duration.

PLANNING AND DESIGN PHASE

Table 14-1: Description of potential negative impacts of the planning & design phase.

| ENTIRE PHASE | EXTENT | MAGNITUDE | DURATION | SIGNIFICANCE | PROBABILITY |
|--------------|--------|-----------|-----------|--------------|-------------|
| PLANNING | Local | Low | Long Term | Low | Improbable |

Uncertainties & limitations with predicting the impacts

- The geotechnical survey findings have not been completed.

Assumptions made when assessing the impact

- Protected plants that need to be searched will be visible at the time.
- The water use license will all be approved within the same timeframes as the BAR.
- No new roads will be constructed, nor existing roads widened and associated bridges (where and if applicable) more than the permissible thresholds in the Listed Activities of the EIA Regulations (2014), as amended.
- Construction will be constrained to within the dry season as far as possible.
- The requisite “General Authorisation” under the NWA will be in place prior to construction.
- No new roads will be constructed, nor existing roads widened and associated bridges (where and if applicable) more than the permissible thresholds in the Listed Activities of the EIA Regulations (2014), as amended.
- The site is not so remote that chemical / mobile toilet service providers will not be able to service the site, if required.
- Construction will be constrained to within the dry season as far as possible.
- The project construction phase will not include any sand mining, borrow pits, blasting or rock drilling.

Table 14-2: Mitigatory potential assessment.

| Alternative | Mitigation Action | Probability | Acceptability | Status | Mitigation potential (to meet objectives) |
|--------------|-------------------|-------------|---------------|----------|---|
| WORKS AREA 1 | Without | 4 | 3 | Negative | H |

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|--|---------|---|---|----------|---|
| (Main Embankment) | With | 3 | 2 | Negative | |
| WORKS AREA 2 (Right Flank) | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |
| ESTABLISHMENT AREA ALTERNATIVE 1 (Proposed) | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |
| ESTABLISHMENT AREA ALTERNATIVE 2 (Main Embankment) | Without | 4 | 4 | Negative | L |
| | With | 3 | 3 | Negative | |
| ESTABLISHMENT AREA 3 (Right Flank & Stockpile) | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |
| ESTABLISHMENT AREA 4 (Contractors Offices) | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |
| ESTABLISHMENT AREA 5 (Stockpile, WTW) | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |
| Haulage Route 1-SECTION 6 (East-Fishing Club) | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |
| Haulage Route 1-SECTION 7 (New Spillway Access) | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |

| | | | | | |
|---|---------|---|---|----------|-----|
| Haulage Route 1-SECTION 5 (New access to Right Flank) & Route 2 - SECTION 4 (Main Embankment) | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |
| Haulage Route 2-SECTION 2&3 (West-WTW) | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |
| Haulage Route 2-SECTION 4 New River Bridge Route | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |
| No-go | N/A | 1 | 1 | Neutral | N/A |

Mitigations:

Objective(s) (including targets):

- Comply with all relevant legislation, regulations, ordinances, and by-laws.
- Ensure all planning approvals are in place prior to commencement of construction.
- Endeavour to relocate all affected protected fauna and flora as far as practicable.
- Inform ultimate design criteria to reduce impact on the receiving environment.

Table 14-3: Mitigation table including responsible authority.

| Type of mitigation | Responsible authority | Mitigation |
|--------------------|-----------------------|--|
| Avoidance | Applicant | The applicant shall be guilty of an offence and upon conviction liable to a fine and / or imprisonment if the remediation of the Ngodwana Dam commences without an EA, issued by the MDARDLEA. |

PRE-CONSTRUCTION PHASE

Table 15-1: Description of potential negative impacts of the pre-construction phase (no positive impacts were assessed).

| ENTIRE PHASE | EXTENT | MAGNITUDE | DURATION | SIGNIFICANCE | PROBABILITY |
|------------------|--------|-----------|------------|--------------|-------------|
| PRE-CONSTRUCTION | Local | Very Low | Short-Term | Very Low | Improbable |

Uncertainties & limitations with predicting this impact

- None.

Assumptions made when assessing the impact

- Only one servitude wayleave will be required for Haulage Route 1: Section 6 (Eskom Servitude) prior to commencement of construction.
- The requisite “Environmental Authorisation” to “develop” under the NEMA will be in place prior to construction.
- The requisite “General Authorisation” for altering bed, banks, or course of a watercourse, under the NWA will be in place prior to construction.
- The requisite “Dam with safety risk repair licence” to “repair” under the Regulations Regarding the Safety of Dams in terms of Section 123 (1) of the NWA. will be in place prior to construction.

Table 15-2: Mitigatory potential assessment.

| Alternative | Mitigation Action | Probability | Acceptability | Status | Mitigation potential (to meet objectives) |
|-----------------------------------|-------------------|-------------|---------------|----------|---|
| WORKS AREA 1 (Main Embankment) | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |
| WORKS AREA 2 (Right Flank) | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |

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|--|---------|---|---|----------|---|
| ESTABLISHMENT AREA ALTERNATIVE 1 (Proposed) | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |
| ESTABLISHMENT AREA ALTERNATIVE 2 (Main Embankment) | Without | 4 | 4 | Negative | L |
| | With | 3 | 3 | Negative | |
| ESTABLISHMENT AREA 3 (Right Flank & Stockpile) | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |
| ESTABLISHMENT AREA 4 (Contractors Offices) | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |
| ESTABLISHMENT AREA 5 (Stockpile, WTW) | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |
| Haulage Route 1-SECTION 6 (East-Fishing Club) | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |
| Haulage Route 1-SECTION 7 (New Spillway Access) | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |
| Haulage Route 1-SECTION 5 (New access to Right Flank) & Route 2 -SECTION 4 (Main | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |

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|--|---------|---|---|----------|-----|
| Embankment) | | | | | |
| Haulage Route 2-SECTION 2&3 (West-WTW) | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |
| Haulage Route 2-SECTION 4 New River Bridge Route | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |
| No-go | N/A | 1 | 1 | Neutral | N/A |

Mitigations:

Objective(s) (including targets):

- An independent Environmental Control Officer (ECO) is appointed to be able to inform and oversee the construction process in a compliant state.
- All protected plants are translocated where practicable following the issuance of necessary permits.
- Site establishment must well-structured and clearly planned by means of a site layout plan.

Table 15-3: Mitigation table including responsible authority.

| Type of mitigation | Responsible authority | Mitigation |
|--------------------|-------------------------|--|
| Avoidance | Applicant | An independent and suitably qualified & accredited ECO must be appointed prior to commencement and notification of such appointment made to MDARDLEA. |
| Avoidance | Applicant | The ECO must undertake a pre-construction audit, to ensure all pre-construction compliance issues have been addressed, and highlight outstanding items. All outstanding issues identified must be addressed prior to initiation of construction. |
| Avoidance | Applicant Contractor | The applicant shall apply for and obtain the relevant licenses / permits from the appropriate authorities (DAFF & MTPA) prior to disturbing or destroying any protected species. |
| Reduction | Applicant Contractor | As far as practicable, the affected protected plants must be relocated outside of the works area, into a similar habitat (including soil type, aspect, slope etc.). |
| Avoidance | Applicant | A layout plan must be developed for the full project including approved sites for site establishment including but not limited to laydown areas, stockpiles, and stores. |

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| Avoidance | Applicant | Activities with high pollution potential must not be located on the watercourse-side of established footprints, and adequate provision must be made to contain any waste streams from these activities. |
| Avoidance | Applicant | All construction activities must be carried out in an environmentally sensitive manner (including clearing of stockpiles) to ensure no deterioration in the agricultural potential of the land results. |
| Avoidance | Contractor | Avoid using fences aligned perpendicular to the contour as well as dirt roads which increase surface water runoff, cause erosion and / or sedimentation of a watercourse. |
| Avoidance | Applicant | Drilling operations must not be undertaken outside of normal working hours, to reduce noise impacts on affected landowners. |
| Avoidance | Applicant | Emergency breakdowns in the parking areas or along roads, must be addressed after adequate pollution containment measures have been implemented including but not limited to drip trays and spill kits. |
| Avoidance | Applicant | Ensure that following new information that may impact the development footprint, these changes are adopted where the change results in a nett environmental benefit. |
| Avoidance | Applicant | Ensure that the preferred environmentally friendly layout and design is inclusive of all environmental aspects and impacts and employs the necessary mitigations. |
| Avoidance | Applicant | Imported material stockpiles shall be located outside (to also avoid driving on top of them) the demarcated riparian systems and on a disturbed site or other site approved by the ECO as a stockpile area. |
| Avoidance | Applicant | Material stockpiles shall be located on a disturbed site or other site approved by the ECO. |
| Avoidance | Applicant | No residues of stockpiled material must be left on site, that can impede restoration of ecological function and remain a visual intrusion on the landscape. |
| Avoidance | Applicant | No servicing or washing of vehicles or plant may take place in parking bays, and all servicing must be done off-site, no service or wash-bays are to be constructed on site. |
| Avoidance | Applicant | No staff must be permitted outside the designated construction area, to avoid contamination of watercourses and littering. |
| Avoidance | Applicant | Noise generation must be managed, including the use of radios and other music playing appliances. |
| Avoidance | Applicant | Once impacted upon, disturbed habitats must be rehabilitated immediately before further disturbance. |
| Avoidance | Applicant | Permanent and temporary construction footprints (including fence poles) must be designated, and sensitive terrestrial and aquatic habitats demarcated as no-go areas during construction, including suitable buffer zones. |
| Avoidance | Applicant | Placement of infrastructure and laydown and stockpile areas must be done so as not to negatively affect surface water runoff in a way that leads to erosion and export of material to be deposited in any watercourses. |
| Avoidance | Applicant | Refuelling of vehicles and plant may only take place at a designated and permitted (from local Fire Chief) fuel |

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| | | storage tank or mobile fuel bowser, under the guidance of a Specific Operating Procedure (SOP) that limits spillage and addresses remedial actions in the event of a spillage. |
| Avoidance | Applicant | The Contractor shall locate the construction camp on existing disturbed or the least sensitive sites above the 1:100-year flood line or more than 35m from the edge of a watercourse, whichever is greatest. |
| Avoidance | Applicant | The contractor shall restrict the following activities to the construction camp: Sanitation, Waste storage, Parking, Storing hazardous materials, Emergency vehicle & plant repair & maintenance Re-fuelling, Ready-mix concrete truck cleaning area Material stockpiles, and Lay down areas. |
| Avoidance | Applicant | The site establishment footprint must be clearly demarcated on the ground to ensure that no construction creep results toward any watercourses or defined sensitive areas. |
| Avoidance | Applicant | Use chemical toilets that contain the sewerage in a closed and removable 'tank', i.e. do not use open drums. Environmentally friendly toilets should also be considered e.g. E-loos. |
| Avoidance | Applicant | Use drip trays for refuelling, repair / maintenance work and all stationary construction plant and equipment that can leak, such as TLBs, compressors and generators. |
| Avoidance | Applicant | Vehicles and plant must be in a good state of repair to limit noisy operations. |
| Avoidance | Applicant | Washing of construction plant and mechanical equipment including brushes shall not occur on site or in a watercourse but shall be restricted to the main construction camp where adequate containment measures are in place. |
| Avoidance | Applicant | Zero tolerance policy must be implemented toward harvesting any natural products from the veld. |

CONSTRUCTION PHASE

Table 16-1: Description of potential negative impacts of the construction phase.

| ENTIRE PHASE | EXTENT | MAGNITUDE | DURATION | SIGNIFICANCE | PROBABILITY |
|--------------|--------|-----------|------------|--------------|-------------|
| CONSTRUCTION | Local | Medium | Short-Term | Low | Probable |

Table 16-2: Description of potential positive impacts of the construction phase.

| ENVIRONMENTAL ASPECT | ENVIRONMENTAL IMPACT | ENVIRONMENTAL DESCRIPTOR | IMPACT ASSESSMENT CRITERIA | | | | |
|----------------------|--|--------------------------|----------------------------|-----------|------------|-------------|--------------|
| | | | EXTENT | MAGNITUDE | DURATION | PROBABILITY | SIGNIFICANCE |
| INCREASED WEALTH | New employment opportunities could bring additional income in the region where the development occurs. | People & Property | Local | Medium | Short-Term | Probable | Low |

Uncertainties & limitations with predicting this impact

- The total number of labourers in the construction work force is unknown, but is estimated at 25-30.

Assumptions made when assessing the impact

- The site is not so remote that chemical / mobile toilet service providers will not be able to service the site.
- Construction will be constrained to within the dry season.
- The project construction phase will not include any sand mining, borrow pits, blasting or rock drilling.
- Project proponents will always strive to avoid and mitigate potentially negative project related impacts on the environment, with impact avoidance being considered the most successful approach, followed by mitigation. It further assumes that the project proponents will seek to enhance potential positive impacts on the environment.

- Wetland areas within transformed landscapes, are often affected by disturbances that restrict the use of available wetland indicators, such as hydrophytic vegetation or soil indicators (e.g. because of the dominance of alien vegetation and canalization).
- Due to the relatively brief duration of the field surveys (seven days in total) conducted during a single growing season, the species list provided for the area cannot be regarded as comprehensive. Only species of plants visible and / or flowering at that time were detected. It is possible that plants which flower at other times of the year are under-represented.
- Red List species are, by their nature, usually very rare and difficult to locate. Compiling the list of species that could potentially occur in an area is limited by the paucity of collection records that make it difficult to predict whether a species may occur in an area or not. The methodology used in this assessment is designed to reduce the risks of omitting any species, but it is always possible that a species that does not occur on a list may be in an area where it was not formerly known to exist.
- The lists of fauna for the site are based on those observed at the site as well as those likely to occur in the area based on their distribution and habitat preferences. Due to the nature and habits of most faunal taxa it is unlikely that all species would have been observed during a site assessment of limited duration. Therefore, site observations are compared with literature studies where necessary.
- Animal species, especially birds, are mostly highly mobile and often migrate seasonally. Any field assessment of relatively short duration is therefore unlikely to record anything more than the most common species that happen to be on site at the time of the survey. Such field surveys are generally a poor reflection of the overall diversity of species that could potentially occur on site.

Table 16-3: Mitigatory potential assessment.

| Alternative | Mitigation Action | Probability | Acceptability | Status | Mitigation potential (to meet objectives) |
|--|--------------------------|--------------------|----------------------|---------------|--|
| WORKS AREA 1 (Main Embankment) | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |
| WORKS AREA 2 (Right Flank) | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |
| ESTABLISHMENT AREA ALTERNATIVE 1 (Proposed) | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |
| ESTABLISHMENT AREA ALTERNATIVE 2 (Main Embankment) | Without | 4 | 4 | Negative | L |
| | With | 3 | 3 | Negative | |
| ESTABLISHMENT AREA 3 (Right Flank & Stockpile) | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |
| ESTABLISHMENT AREA 4 (Contractors Offices) | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |
| ESTABLISHMENT AREA 5 (Stockpile, WTW) | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |

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|--|---------|---|---|----------|-----|
| Haulage Route 1-SECTION 6 (East-Fishing Club) | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |
| Haulage Route 1-SECTION 7 (New Spillway Access) | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |
| Haulage Route 1-SECTION 5 (New access to Right Flank) & Route 2 -SECTION 4 (Main Embankment) | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |
| Haulage Route 2-SECTION 2&3 (West-WTW) | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |
| Haulage Route 2-SECTION 4 New River Bridge Route | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |
| No-go | N/A | 1 | 1 | Neutral | N/A |

Mitigations:

Objective(s) (including targets):

- Comply with all relevant legislation, regulations, ordinances & by-laws.
- Ensure all planning approvals are in place prior to commencement of construction.
- Endeavour to relocate all affected protected fauna and flora as far as practicable.
- Ensure preferred development footprint is outside any riparian zone and buffer on the property.
- Inform ultimate design criteria to reduce impact on the receiving environment.

Table 16-4: Mitigation table including responsible authority.

| Type of mitigation | Responsible authority | Mitigation |
|---------------------------|------------------------------|---|
| Avoidance | Contractor | Clear and grub activities must be undertaken in a sensitive manner to minimise injury to fauna and must be preceded by a “search & rescue” in collaboration with the appointed ECO. |
| Avoidance | Contractor | Any fauna affected by clear and grub activities must be relocated in accordance with the provisions of the MNCA (Act 10 of 1998) and undertaken by a suitably qualified person. |
| Avoidance | Contractor | A search and rescue must be undertaken of all footprints that will be temporarily or permanently affected during site establishment. All fauna and flora that are protected or of conservation importance must either be cordoned off and protected or translocated outside of the site establishment and dam footprint, into habitats of a similar nature. All search & rescue & translocation activities must be carried out by suitably qualified specialists; in accordance with the provisions of the MNCA (Act 10 of 1998). |
| Avoidance | Contractor | Topsoil must be cleared from the construction footprint and stockpiled and protected to avoid contamination and compaction, thereby ensuring its viability for reinstatement during rehabilitation. Topsoil stockpiles are to be designated as “no-go” areas. |
| Reduction | Contractor | Ensure a no fire policy where the risk of runaway fires can occur. |
| Reduction | Contractor | Noise generation must be limited and managed to ensure that neither neighbouring landowners nor wildlife or livestock in the area are negatively affected. |
| Avoidance | Contractor | No harvesting of natural resources may be permitted by contractor staff. Adequate induction training must be undertaken to sensitise the staff to this matter. |
| Reduction | Contractor | Clearance of vegetation must be limited as far as possible to reduce the extent of exposed soil that is susceptible to erosion. |
| Reduction | Contractor | Heavy equipment, and associated compaction of soils outside of the development footprint, must be limited to facilitate successful rehabilitation and return of ecological function. |
| Reduction | Contractor | The emergence of all alien, invasive and declared weeds must be controlled in accordance with the requirements of CARA (Act 43 of 1983) & the Alien Invasive Regulations under NEM:BA. |
| Reduction | Contractor | Alien invasive vegetation recruitment must be controlled within the construction footprint. Manual control measures are preferred, but where herbicides are used, they must be those endorsed & selective for the target species with the lowest environmental toxicity. |

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| Avoidance | Contractor | Construction creep must not be permitted, and activities must only take place within the works area. It may be necessary to demarcate this area to effectively enforce this provision. |
| Avoidance | Contractor | Dust emissions must be managed and reduced to minimise fallout on surrounding vegetation and limit expose to the workforce. |
| Avoidance | Contractor | Over-wetting of access roads and the construction footprint must be avoided, as this not only wastes water but may lead to hazardous construction conditions. |
| Avoidance | Contractor | Speeding of vehicles must be managed, and a speed limit of 40 km/h enforced to avoid the likelihood of collisions with animals and other vehicles. |
| Reduction | Contractor | Vehicles and plant must be maintained in a good state of repair to limit emissions and spills. Any plant responsible for excessive emissions and spills must be removed from site and only returned to site once problem areas have been adequately addressed. |
| Avoidance | Contractor | Excavations must not be left for extended periods of time, which can channel storm water and trap small animals. |
| Reduction | Contractor | Ensure that water laden with silt does not exit excavations and cause sedimentation of aquatic and / or terrestrial systems. |
| Reduction | Contractor | Borrow pits, water-filled excavations and drill holes should as far as possible have smooth slopes, allowing access and exit points to animals, especially when filled with water. |
| Rectification | Contractor | Should any heritage or archaeological artefacts be exposed or unearthed during excavations, works must immediately cease to allow the appointed specialist to undertake the necessary investigation and advise on the way forward. |
| Reduction | Contractor | It is unlikely that any drilling or blasting will take place, but if it is required, drilling must be done in a way that mitigates dust emissions and blasting mats or controlled blasts must be undertaken to reduce dust emissions and fly rock damage to vegetation. |
| Reduction | Applicant Contractor | As far as possible, commence construction (clearing) at the onset of the dry season to prevent erosion, siltation and wash-away of topsoil and sedimentation into the wetlands, seepage areas, drainage lines or rivers. |
| Reduction | Contractor | Establish and implement an Integrated Waste Management Strategy including avoidance, reduction, re-using, recycling and disposal, i.e. the production of hazardous waste can be avoided by providing drip trays, reduce waste by using the correct quantities, re-use concrete rubble as back fill or recycle steel off-cuts and dispose of non-hazardous solid waste at a registered municipal dump site. |
| Reduction | Contractor | Induct all labourers on the waste management strategy and enforce it through regular (at least weekly) toolbox talks. |

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|-----------|------------|---|
| Reduction | Contractor | Adequate waste receptacles must be available, including those that track with the active work fronts, to ensure effective waste management. |
| Reduction | Contractor | Separate general, recyclable, natural (vegetation and soil/rock) and hazardous waste and demarcate different containers for different waste types using colour codes. |
| Avoidance | Contractor | Designate a temporary waste storage area, enclose it in a fence that cannot be breached by fauna, and provide sufficient scavenger proof dust bins with black bags inside the construction camp. |
| Avoidance | Contractor | A dedicated, lined facility must be provided for ready-mix concrete trucks to wash their chutes, before leaving site. Once no longer needed this dry, inert waste can be disposed of at a local registered municipal landfill site. |
| Reduction | Contractor | Break up all concrete hard pan layers and dispose of appropriately (at a legitimate dump site) or re-use the concrete. |
| Reduction | Contractor | Do not mix concrete on open ground. Mix in a wheelbarrow, a mixing tray or on a level plastic sheet. |
| Reduction | Contractor | Do not litter, burn or bury waste on any property. |
| Reduction | Contractor | Follow housekeeping rules to avoid littering (littering is likely to be more prevalent at designated eating/rest areas). |
| Avoidance | Contractor | Use drip trays for refuelling, repair / maintenance work and all stationary construction plant and equipment that can leak, such as TLBs, compressors and generators. |
| Avoidance | Contractor | Drip trays can be filled with hydrophobic hydrocarbon absorbent material to avoid content being leached out during rainfall events. |
| Avoidance | Contractor | Immediately remove contaminated soil to the depth of penetration and temporarily store in a designated solid hazardous waste container until sufficient volume warrants disposal via a registered service provider at a registered hazardous waste dump site. |
| Avoidance | Contractor | The contractor shall contain contaminated water from washing brushes in a conservancy tank until sufficient volume warrants disposal by a registered hazardous waste management company. |
| Reduction | Contractor | The contractor shall implement appropriate procedures, such as the use of a ground cover, to prevent the contamination of the ground when handling hazardous materials, including re-fuelling. |
| Reduction | Contractor | The contractor shall prevent the run-off of slurry or cement contaminated water from concrete / plaster mixing sites. |
| Reduction | Contractor | No burning, burying or illegal dumping of waste will be permitted. |
| Avoidance | Contractor | Re-fuelling with a mobile fuel bowser shall take place outside any watercourse. |
| Reduction | Contractor | Remove ineffective danger tape / netting that has begun to litter the site or surrounding areas. |
| Reduction | Contractor | The contractor is prohibited from discharging wastewater, including domestic water from sanitation facilities, and |

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| | | grey water from washing equipment or plant into a watercourse. |
| Avoidance | Contractor | The contractor shall return used oil to the supplier or an oil recycling company. |
| Avoidance | Contractor | All personnel should undergo environmental induction to ensure an understanding of the content and requirements of the overarching environmental documents related to the project. |
| Reduction | Contractor | Anthropogenic impacts must be minimized to reduce impacts on nocturnal species, including but not limited to reduced lighting that may influence bat & insect foraging behaviour. |
| Reduction | Applicant / Contractor | The use of lighting at night should be kept to a minimum, so as not to unnecessarily attract invertebrates to the solar facility and possibly their avian predators, and to minimise disturbance to birds flying over the facility at night. |
| Reduction | Applicant / Contractor | Ensure that suitable measures are employed to manage jobseekers, to avoid inadvertent impacts by trespassers on fauna & flora and affected landowners. |
| Reduction | Applicant Contractor | Existing roads must be used to avoid additional impacts on the fauna & flora of the area. |
| Reduction | Applicant Contractor | Newly constructed access roads may not be wider than 4 metres with a reserve less than 13.5 metres, nor the widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre. |
| Avoidance | Contractor | It is recommended that during the rehabilitation phase, a seed mix containing a variety of the local floral species is used and that the management practices are focused on biodiversity conservation |
| Reduction | Contractor Applicant | Abstraction volumes must be measured and recorded to ensure the resource is not over utilised according to the Geohydrological specialist report. |
| Rectification | Contractor | All water bowsers must maintain logbooks in which quantities used for construction and dust suppression are recorded. |
| Avoidance | Contractor | An environmentally friendly water-soluble dust control additive / binder must be added as an additive to the water used for dust suppression. The additives generally assist with surface stabilization thereby significantly reducing water usage. |
| Avoidance | Contractor | Chemical toilets shall be in the shade, at least 100m from any watercourse. |
| Avoidance | Contractor | Do not place high risk (pollution generating) construction activities within proximity to a watercourse as it can cause pollution. |
| Reduction | Applicant / Contractor | Only impact an area of the watercourse that will be affected (do not demarcate large areas unnecessarily). |
| Reduction | Contractor | The footprint of borrow pits must be surveyed and clearly demarcated to ensure no construction creep takes place increasing the impact. |

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| Reduction | Contractor | All areas of heritage value must be demarcated and avoided. Incidental discoveries during clearing and grubbing must be disclosed to site management with immediate cessation of activities until their significance can be assessed by a qualified heritage specialist. |
| Reduction | Contractor | All formal and informal cemeteries and burials must be left in situ and not be disturbed. If this is not possible, a permit must be applied for in terms of Section 36 of the NHRA (Act 25 of 1999) and is subject to mandatory public consultation. |
| Remedial | Contractor | Any archaeological artefacts unearthed during excavations must be protected and left in situ. Works must cease until the significance of the finding can be assessed by a qualified archaeological specialist. |
| Avoidance | Contractor | Contact a professional archaeologist or palaeontologist, depending on the nature of the finds, as soon as possible to inspect the findings. |
| Avoidance | Contractor | Ensure that none of the layout and designs of permanent footprints will disturb sites of historical significance, including graves. |
| Avoidance | Contractor | <u>In the event of discovering a heritage resource, stop reconstruction activities and alert the SAHRA Archaeology, Palaeontology and Meteorites (APM) Unit immediately. Nokukhanya Khumalo, Heritage Officer T: +27 21 462 4502 F: +27 21 462 4509 C: +27 82 507 0378. E: nkhumalo@sahra.org.za</u> |
| Avoidance | Contractor | <p>Include an awareness of heritage resources in the environmental induction. Categories of heritage resources include, inter alia:</p> <ul style="list-style-type: none"> • Evidence of archaeological sites or remains include remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, marine shell and charcoal/ash concentrations. • Archaeological or paleontological sites over 100 years old, • Sites of cultural significance associated with oral histories, • Significant cultural landscapes or viewsapes, • Burial grounds, unmarked human burials, graves of victims of conflict, and/or graves older than 60 years, • Structures older than 60 years, • Fossils, etc. |

OPERATIONAL PHASE

Table 17-1: Description of potential negative impacts of the operational phase.

| ENTIRE PHASE | EXTENT | MAGNITUDE | DURATION | SIGNIFICANCE | PROBABILITY |
|--------------|--------|-----------|-----------|--------------|-------------|
| OPERATIONAL | Local | Medium | Long Term | Medium | Probable |

Uncertainties & limitations with predicting this impact

- None.

Assumptions made when assessing the impact

- There is a potential negative impact from the existing unlined mortality pit.

Table 17-2: Mitigatory potential assessment.

| Alternative | Mitigation Action | Probability | Acceptability | Status | Mitigation potential (to meet objectives) |
|---|-------------------|-------------|---------------|----------|---|
| WORKS AREA 1 (Main Embankment) | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |
| WORKS AREA 2 (Right Flank) | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |
| ESTABLISHMENT AREA ALTERNATIVE 1 (Proposed) | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |
| ESTABLISHMENT | Without | 4 | 4 | Negative | L |

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| AREA ALTERNATIVE 2 (Main Embankment) | With | 3 | 3 | Negative | |
| ESTABLISHMENT AREA 3 (Right Flank & Stockpile) | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |
| ESTABLISHMENT AREA 4 (Contractors Offices) | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |
| ESTABLISHMENT AREA 5 (Stockpile, WTW) | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |
| Haulage Route 1-SECTION 6 (East-Fishing Club) | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |
| Haulage Route 1-SECTION 7 (New Spillway Access) | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |
| Haulage Route 1-SECTION 5 (New access to Right Flank) & Route 2 -SECTION 4 (Main Embankment) | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |
| Haulage Route 2-SECTION 2&3 (West-WTW) | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |
| Haulage Route 2- | Without | 4 | 3 | Negative | H |

| | | | | | |
|----------------------------------|------|---|---|----------|-----|
| SECTION 4 New River Bridge Route | With | 3 | 2 | Negative | |
| No-go | N/A | 1 | 1 | Neutral | N/A |

Mitigations:

Objective(s) (including targets):

- To ensure the operations are sustainably managed.

Table 17-3: Mitigation table including responsible authority.

| Type of mitigation | Responsible authority | Mitigation |
|--------------------|-----------------------|---|
| Avoidance | Applicant | The rehabilitated footprint shall be monitored for the recruitment of weed, invader and alien plant species, and the necessary control measures implemented. |
| Avoidance | Applicant | Areas disturbed and rehabilitated during construction shall be monitored for signs of erosion and if found to occur, immediately corrected ('source') and repaired ('symptom'). |
| Reduction | Applicant | Correct any cause of erosion at the onset thereof by controlling / diverting storm water run-off, immediately repairing and stabilizing / rehabilitating impacted areas in the most appropriate manner. |
| Reduction | Applicant | Protect all areas (including rehabilitated areas) susceptible to erosion by installing all the necessary, temporary and / or permanent mechanisms for controlling / diverting storm water run-off, dissipating water energy and encouraging infiltration as soon as possible. |
| Avoidance | Applicant | All conditions stipulated in any environmental and water authorisation, including WML, must be implemented throughout the lifespan of the mortality pits, where applicable to its operation. |
| Avoidance | Applicant | Ensure downlighting is utilised to reduce the distance of visual intrusion, both to surrounding land users and wildlife. |
| Avoidance | Applicant | If the site must be lit at night for security purposes, this should be done with downward-directed low-UV type lights (such as most LEDs), which do not attract insects. |

DECOMMISSIONING PHASE

Mitigation Measures legend: (addressing requirement of Appendix 2, Regulation 2. (1) (v) (aa) – (cc))

REV = Reversible

IRR = Irreversible

AV = Avoid

MAN = Manage

MIT = Mitigate

MON = Monitoring (can be informally or formally monitored)

Table 18-1: Description of potential negative impacts of the decommissioning phase, no positive impacts were assessed.

| ENTIRE PHASE | EXTENT | MAGNITUDE | DURATION | SIGNIFICANCE | PROBABILITY |
|-----------------|--------|-----------|-----------|--------------|-------------|
| DECOMMISSIONING | Local | Medium | Long Term | Medium | Improbable |

Uncertainties & limitations with predicting this impact

- None.

Assumptions made when assessing the impact

- The mortality pits are unlikely to be decommissioned when the chicken houses are.

Table 18-2: Mitigatory potential assessment.

| Alternative | Mitigation Action | Probability | Acceptability | Status | Mitigation potential (to meet objectives) |
|-----------------------------------|-------------------|-------------|---------------|----------|---|
| WORKS AREA 1 (Main Embankment) | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |
| WORKS AREA 2 | Without | 4 | 3 | Negative | H |

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| (Right Flank) | With | 3 | 2 | Negative | |
| ESTABLISHMENT AREA ALTERNATIVE 1 (Proposed) | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |
| ESTABLISHMENT AREA ALTERNATIVE 2 (Main Embankment) | Without | 4 | 4 | Negative | L |
| | With | 3 | 3 | Negative | |
| ESTABLISHMENT AREA 3 (Right Flank & Stockpile) | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |
| ESTABLISHMENT AREA 4 (Contractors Offices) | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |
| ESTABLISHMENT AREA 5 (Stockpile, WTW) | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |
| Haulage Route 1-SECTION 6 (East-Fishing Club) | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |
| Haulage Route 1-SECTION 7 (New Spillway Access) | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |
| Haulage Route 1-SECTION 5 (New access to Right Flank) & Route 2 - | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |

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|--|---------|---|---|----------|-----|
| SECTION 4 (Main Embankment) | | | | | |
| Haulage Route 2-SECTION 2&3 (West-WTW) | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |
| Haulage Route 2-SECTION 4 New River Bridge Route | Without | 4 | 3 | Negative | H |
| | With | 3 | 2 | Negative | |
| No-go | N/A | 1 | 1 | Neutral | N/A |

Mitigations:

Objective(s) (including targets):

- To mitigate impacts in the unlikely event of decommissioning.

Table 18-3: Mitigation table including responsible authority.

| Type of mitigation | Responsible authority | Mitigation |
|--------------------|-----------------------|---|
| Avoidance | Applicant | Should the applicant decide to decommission the Ngodwana Dam for any reason, he/she must interact with MDEDET and DWS to the procedural correctness thereof, to mitigate impact on local environment. |
| Avoidance | Applicant | The applicant who intends on decommissioning the Ngodwana Dam must comply with the relevant conditions and requirements pertaining to EA or relevant Norms & Standards. |

References (legal, scientific, social, or other criteria) used for the assessment and mitigations

1. Conservation of Agricultural Resources Act (No 43 of 1983) and the regulations dealing with declared weeds and invader plants as amended from time to time.
2. DEA (2011), National list of ecosystems that are threatened and in need of protection. GN 1002, GG 34809, 9 December 2011.
3. DEA (undated). Booklet guideline for the administration of emergency incidents.
4. DEA Regulations No. R.154. Noise Control Regulations promulgated in terms of Section 25 of the Environment Conservation Act, 1989 (Act No. 73 of 1989). GG No. 13717, 10 January 1992.
5. GN No. R. 983 & 984, 04th December 2014, as amended.
6. Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002); Exemptions Section 106, sub-section 3.
7. Minerals and Petroleum Resources Development Act, 2002 (No 28 of 2002). GG No. 23922 dated 10 October 2002.
8. National Dust Control Regulations. GG No. 36974, GN No. R. 827, 1 November 2013, read in combination with SANS 1929: 2005.
9. National Environmental Management: Biodiversity Act – Threatened or protected species regulations, GG No. 38600, GN No. 255, 31 March 2015;
10. National Environmental Management: Biodiversity Act, 2004 (No 10 of 2004). GG No. 26436 dated 7 June 2004.
11. National Environmental Management: Biodiversity Act, 2004 (No 10 of 2004), Alien and invasive species lists. GG No. 37885, GN No. 598, 1 August 2014.
12. National Environmental Management: Biodiversity Act, 2004 (No 10 of 2004), Threatened or protected species regulations. GG No. No. 38600, GN No. 255, 31 March 2015.
13. National Heritage Resources Act, 1999 (No 25 of 1999). GG No. 19974, 28 April 1999.
14. National Water Act, 1998 (Act No. 38 of 1998).
15. SANS 241-1:2015. South African drinking water standards.
16. South African National Standard (SANS) 10103:2008: The measurement and rating of environmental noise with respect to annoyance and speech communication and the Noise Control Regulations promulgated in terms of Section 25 of the Environment Conservation Act, 1989(Act No. 73of 1989). Govt. Gazette. No. 13717, 10 January 1992.
17. The National Forests Act, 1998 (Act No. 84 of 1998), including Schedule in Government Notice No. 1042, dated 10 September 2004.

18. The Principles of NEMA require that a proponent is responsible for any development s/he has initiated from the beginning to the end of the project (“From the cradle to the grave”). This responsibility is passed on from one title deed holder to the next. In line with this principle a rehabilitation plan has got to be drawn up to specify how the area will be rehabilitated once the project has ceased for whatever reason.
19. Conservation of Agriculture Resources Act (Act 43 of 1983) as amended, and administered by the DAFF, including the following:
20. Section 15A (1) of CARA, 1983, as amended: Category 1 plants may not occur on any land or inland water surface other than in biological control reserves.
21. Section 15A(2) of CARA, 1983, as amended: A land user shall control any category 1 plants that occur on any land or inland water surface in contravention of the provisions of sub-regulation (1) by means of the methods prescribed in regulation 15E.
22. Section 15B (1) of CARA, 1983, as amended: Category 2 plants may not occur on any land or inland water surface other than a demarcated area or a biological control reserve.
23. Section 15B(8) of CARA, 1983, as amended: A land user shall control any category 2 plants that occur on any land or inland water surface in contravention of the provisions of sub-regulation (1) by means of the methods prescribed in regulation 15E.
24. Section 15C (1) of CARA, 1983, as amended: Category 3 plants shall not occur on any land or inland water surface other than in a biological control reserve.
25. Section 15C(3)(a) of CARA, 1983, as amended: No land user shall allow category 3 plants to occur within 30 meters of the 1:50 year flood line of a river, stream, spring, natural channel in which water flows regularly or intermittently, lake, dam or wetland.