

Need and Desirability

3(1) A basic assessment report... must include –

(f) a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location.

Appendix 1 (Basic Assessment Report) of the EIA Regulations, 2014 as amended

Legislative Background and Strategic Context

The National Environmental Management Principles of NEMA, 1998, which guide the interpretation, administration, and implementation of NEMA, 1998 (and the EIA Regulations, 2014) specifically require *inter alia* that environmental management must place people and their needs at the forefront of its concern (Section 2(2)). The latter refers to the broader societal / community needs and interests, and is put into effect through the EIA Regulations, 2014, which require environmental impact assessments to specifically consider 'need and desirability' to ensure that the 'best practicable environmental option' is pursued, and that development more equitably serves broader societal needs now and in the future. Furthermore, it ensures that the proposed actions of individuals are measured against the long-term public interest.

Regulation 13(1)(b) and 13(1)(e) read together with Regulation 18 of the amended EIA Regulations, 2014, requires EAPs (and specialists) to have knowledge of any guidelines that have relevance to the proposed activity and have regard to the need for and desirability of the undertaking of the proposed activity. Consequently, the Guideline on Need and Desirability published by DEA (2017) has been taken into consideration.

What is needed and desired for a specific area must be strategically and democratically determined. The strategic context for informing need and desirability is best addressed and determined during the formulation of the sustainable development vision, goals, and objectives of Integrated Development Plans ('IDPs') and Spatial Development Frameworks ('SDFs') during which collaborative and participative processes play an integral part, and are given effect to, in the democratic processes at local government level. Need and desirability must therefore be measured against the contents of the credible IDP, SDF and EMF for the area, as well as the sustainable development vision, goals and objectives formulated in, and the desired spatial form and pattern of land use reflected in, the area's IDP and SDF. Integrated Development Planning (and the SDF process) effectively maps the desired route and destination, whilst the project-level EIA decision-making finds the alternative that will achieve the desired goal. However, inadequate planning or the absence of a credible IDP and SDF means that the EIA must address the broader need and desirability considerations. In summary, 'need and desirability' is determined by considering the broader community's needs and interests as reflected in a credible IDP, SDF and EMF for the area, and as determined in the EIA decision-making process.

Strictly speaking, "need" primarily refers to time and "desirability" refers to place, e.g., is this the right time and is it the right place for locating the type of land-use/activity being proposed? However, "need and desirability" are interrelated and the two components collectively can be considered in an integrated and holistic manner by engaging the **Questions** provided in the guideline document. The questions are divided into two broad categories relating to ecological sustainability (e.g., how the development will impact on ecosystems and biological diversity) and justifiable economic and social development.

We suspect the ecological category of questions address desirability and whether it is the right place, while the economic and social category of questions addresses broader societal needs, and whether this is the right time.

Need and desirability is like a drawstring that pulls the assessment process together to decide on the best option. When the sum of the impacts (evaluated during the impact assessment) is considered holistically through the lens of Need and Desirability, that is by presenting them within the framework of questions posed by the guideline, then Need and Desirability becomes the overall impact summary to determine if the proposed activity is the best option or to decide on the fate of the application.

When collectively considering ecological, social, and economic impacts it is important to remember that while there might be some trade-offs between the considerations, all development must in terms of Section 24 of the Constitution be ecologically sustainable, while economic and social development must be justifiable. Consequently, there are specific “trade-off rules that apply, namely environmental integrity may never be compromised, and the social and economic development must take a certain form and meet certain specific objectives for it to be considered justifiable.

“Securing ecological sustainable development and use of natural resources”

1. How will this development (and its separate elements/aspects) impact on the ecological integrity of the area?

- In terms of the ecological integrity it should be noted that the proposal is for a linear development being a low-level crossing over the Mokolo River, the proposal relates to the crossing and its approaches only and thus is less than 200 m in total length. Potential impacts on the ecological integrity, if any, will be temporary and the land can be returned to the current state within two years of the completion of the construction phase.
- The proposed development footprint will be restricted to the edge of the watercourse or macro-channel bank. No riparian vegetation will be affected by the ingress and egress of the crossing as these are existing roads and they will not be widened.
- The development site falls within a CBA and Protected Area in terms of NEMPAA, however the ecological integrity will not be negatively impacted by the proposed development. In fact, the proposed infrastructure is intended to facilitate the Management Authority's conservation mandate, including the pursuit of any biodiversity targets and the purpose for which the protected area was declared.
- The screening report identified the potential for African Marsh Rat at the proposed crossings, however there have been no observations of such. Furthermore, there was no observations on site of any tracks or nesting material (personal observation). There is the possibility that there are other species of conservation concern associated with rivers and therefore a Terrestrial Animal Species Specialist Assessment was undertaken.
- The screening report identified the development site has having low plant species sensitivity, there is no suspected occurrence of species of conservation concern. *Acacia erioloba* does occur on site and is protected under the NFA, 1998, however it is listed as Least Concern.
- The development site is within a perennial river and may affect the flow regime of the river, impact aquatic biota and vegetation, the extent of which will depend on the design. As such a full Aquatic Biodiversity specialist assessment has been undertaken.
- Terrestrial Biodiversity theme is **High** in the Screening Assessments because of the presence of a “CBA1, Focus Areas for land-based protected areas expansion and South African Protected Areas.”

Verified as **Low** in the Site Sensitivity Verification Report, but the Terrestrial Assessment for the Kaingo Low Level Bridge, Vaalwater, Limpopo Province (November 2021) prepared by The Biodiversity Company, confirmed the **High** sensitivity of certain habitats that overlap the study area.

- Not a RAMSAR site, and the study area is located 23km north of the Waterberg Strategic Water Source Area. However, the Mokolo River and associated wetland are recognised as “unclassified” National Freshwater Ecosystem Priority Areas. In terms of the South African Inventory of Inland Aquatic Ecosystem, the Mokolo River is an Endangered NBA River and the associated wetland is an “unclassified” NBA wetland.

Please see the full reports attached as Annexure D Terrestrial Assessment for the Kaingo Low Level Bridge, Vaalwater, Limpopo Province (November 2021) prepared by The Biodiversity Company.

1.1. How were the following ecological integrity considerations considered?

1.1.1. Threatened Ecosystems,

- Initial feasibility study was informed by the desktop indication of biodiversity sensitivity based on the spatial databases as controlled by SANBI. This data was used to generate a sensitivity map Appendix C in order to demonstrate areas that need to be taken into account, namely the threatened ecosystems, critical biodiversity areas, ecological support areas, etc.
- Not a critically endangered or endangered ecosystem in terms of SANBI's latest NBA (2018). The ecosystem threat status as per the NBA 2018 data provides a holistic view of the vegetation type, the threatened species associated with the ecosystem and the overall land use currently in the area. National vegetation type is Central Sandy Bushveld, which is an area of Least Concern in the National List of Threatened Ecosystems (NBA, 2018), yet the conservation status of this vegetation community is VU according to Mucina and Rutherford (2006). However, the Ecosystem Protection Level for Central Sandy Bushveld is categorised as Poorly Protected Ecosystem (NBA, 2018). This is confirmed by Mucina and Rutherford (2006); the area that is statutorily conserved is less than 3%, compared with the national conservation target of 19%.
- In addition, the potential impacts and quantification of cumulative impacts were assessed by the following appointed specialists:
 - Aquatic Biodiversity Specialist Assessment
 - Terrestrial Plant and Animal Species Specialist Assessment
 - Hydrological Assessment

1.1.2. Sensitive, vulnerable, highly dynamic, or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure,

- The proposed crossing is not located within close proximity to sensitive, vulnerable, highly dynamic, or stressed ecosystems in the form of coastal shores and estuaries.
- Not a RAMSAR site, and the study area is located 23km north of the Waterberg Strategic Water Source Area. However, the Mokolo River and associated wetland are recognised as “unclassified” National

Freshwater Ecosystem Priority Areas. In terms of the South African Inventory of Inland Aquatic Ecosystem, the Mokolo River is an Endangered NBA River and the associated wetland is an “unclassified” NBA wetland.

- The proposal further falls within the core area of a Biosphere Reserve being the Waterberg Biosphere Reserve. However, as mentioned previously, the proposed infrastructure is intended to facilitate the Management Authority’s conservation mandate.
- The potential impacts and quantification of cumulative impacts were assessed by the following appointed specialists in relation to sensitive, vulnerable, highly dynamic or stressed ecosystems such as wetlands:
 - Aquatic Biodiversity Specialist Assessment
 - Terrestrial Biodiversity Specialist Assessment
 - Hydrological Assessment

1.1.3. Critical Biodiversity Areas (“CBAs”) and Ecological Support Areas (“ESAs”),

- A sensitivity map Appendix C was done in order to demonstrate areas that need to be taken into account, namely the threatened ecosystems, critical biodiversity areas, ecological support areas, etc.
- The proposed crossing does fall within a CBA1 area in terms of the Waterberg Bioregional Plan and CBA1 in the Limpopo C-Plan v2 (2018) which can be expected as the site is already a declared protected area in terms of NEMPAA.
- Terrestrial Biodiversity theme is High in both Screening Assessments because of the presence of a “CBA1, Focus Areas for land-based protected areas expansion and South African Protected Areas.” Verified as Low in the Site Sensitivity Verification Report, but the Terrestrial Assessment for the Kaingo Low Level Bridge, Vaalwater, Limpopo Province (November 2021) prepared by The Biodiversity Company, confirmed the High sensitivity of certain habitats that overlap the study area.
- The potential impacts and quantification of cumulative impacts were assessed by the following appointed specialists in relation to CBA and ESA areas:
 - Aquatic Biodiversity Specialist Assessment
 - Terrestrial Plant and Animal Species Specialist Assessment
 - Hydrological Assessment

1.1.4. Conservation targets,

- The proposed crossing is contributing towards conservation targets as it is a declared protected area being managed in accordance with an approved management plan.
- According to the Terrestrial Assessment for the Kaingo Low Level Bridge, Vaalwater, Limpopo Province (November 2021) prepared by The Biodiversity Company, only 19 of the 98 Red Listed mammals are regarded as threatened including inter alia, the Cape Clawless Otter (NT), the South African Hedgehog (NT), which is threatened by road collisions, and the Swamp Musk Shrew (NT), which has a distinct preference for marshy ponds, riverine and semi-aquatic vegetation, such as reed beds. However, only 6 mammal SCC were observed during the assessment, including inter alia lion, elephant, hippo and hyaena. Four of the 91 reptiles that are expected to occur within the area are regarded as threatened, including the Nile Crocodile (VU), the Waterberg Dwarf Gecko (NT), which inhabits rocky areas of the grassland and

savannas, the Northern Craig Lizard (NT) which inhabits rocky habitat and a savanna species, the Lobatse hinged-back tortoise (VU). However, only the Nile Crocodile was observed during the assessment. None of the 31 amphibian species expected to occur within the area are SCC. Only the Common River Frog was observed during the assessment. Six of the expected 257 Avifauna species are threatened, including *inter alia*, the Black Stork (VU), which forage in riverine and wetland areas, a migratory species that generally occurs near water, the Black-winged Pratincole (NT), the African Finfoot (VU), which is found along shoreline vegetation, and the Greater Painted-snipe (NT) which occurs in freshwater habitats. None of the 65 species that were observed during the assessment are regarded as SCC.

- The potential impacts and quantification of cumulative impacts were assessed by the following appointed specialists in relation to conservation targets:
 - Terrestrial Animal Species Assessment, specifically any found/observed protected species
 - Aquatic Biodiversity Assessment
 - Hydrological Assessment

1.1.5. Ecological drivers of the ecosystem,

A driver is any natural or human-induced factor that directly or indirectly causes a change in an ecosystem. A direct driver unequivocally influences ecosystem processes. An indirect driver operates more diffusely, by altering one or more direct drivers.

- The proposed crossing is within a perennial river and may affect *inter alia* the flow regime of the river, impact aquatic biota and vegetation, the extent of which will depend on the design.
- The impacts and quantification of cumulative impacts were assessed by the following appointed specialists:
 - Terrestrial Plant and Animal Species Assessment
 - Hydrological Assessment
 - Aquatic Biodiversity Assessment.
- According to the Terrestrial Assessment for the Kaingo Low Level Bridge, Vaalwater, Limpopo Province (November 2021) prepared by The Biodiversity Company, only 19 of the 98 Red Listed mammals are regarded as threatened including *inter alia*, the Cape Clawless Otter (NT), the South African Hedgehog (NT), which is threatened by road collisions, and the Swamp Musk Shrew (NT), which has a distinct preference for marshy ponds, riverine and semi-aquatic vegetation, such as reed beds. However, only 6 mammal SCC were observed during the assessment, including *inter alia* lion, elephant, hippo and hyaena. Four of the 91 reptiles that are expected to occur within the area are regarded as threatened, including the Nile Crocodile (VU), the Waterberg Dwarf Gecko (NT), which inhabits rocky areas of the grassland and savannas, the Northern Craig Lizard (NT) which inhabits rocky habitat and a savanna species, the Lobatse hinged-back tortoise (VU). However, only the Nile Crocodile was observed during the assessment. None of the 31 amphibian species expected to occur within the area are SCC. Only the Common River Frog was observed during the assessment. Six of the expected 257 Avifauna species are threatened, including *inter alia*, the Black Stork (VU), which forage in riverine and wetland areas, a migratory species that generally occurs near water, the Black-winged Pratincole (NT), the African Finfoot (VU), which is found along shoreline vegetation, and the Greater Painted-snipe (NT) which occurs in freshwater habitats. None of the 65 species that were observed during the assessment are regarded as SCC.
- No threatened plants are expected in the study area. Although two nationally protected trees and seven provincially protected plants are expected, only two nationally protected trees, namely *Boscia albitrunca*

and *Vachellia erioloba*, were observed in the study area (the Terrestrial Assessment for the Kaingo Low Level Bridge, Vaalwater, Limpopo Province (November 2021) prepared by The Biodiversity Company).

- A total of 16 indigenous plant species were recorded within the riverine habitat (no alien species were recorded), including three riparian indicator species (Buffalo-thorn (*Ziziphus mucronata*), River bushwillow (*Combretum erythrophyllum*) and Water elder (*Nuxia oppositifolia*). The final score (88.5%) of the VEGRAI assessment regarding the riparian and marginal zone integrity puts the project area in the (Riparian Vegetation) Ecological Category A/B or “Largely natural with few modifications”, meaning a small change in natural habitats and biota may have taken place but the ecosystem functions are essentially unchanged (Aquatic Assessment).

1.1.6. (Environmental attributes and management proposals contained in) Environmental Management Framework,

The objective of the Waterberg District EMF is to “develop a framework that will integrate policies and frameworks, and align different government mandates in a way that will streamline decision-making to improve cooperative governance and guide future development in an environmentally responsible manner” (Environomics, NRM Consulting and MetroGIS, 2010, p. 19).

The EMF serves a number of purposes, namely to:

- Encourage sustainable development;
- Establish development priorities;
- Identify strategic guidance and development management proposals;
- Identify the status quo, development pressures and trends in the area;
- Determine opportunities and constraints;
- Identify geographical areas in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA);
- Specify additional activities within identified geographical areas that will require EIA based on the environmental attributes of such areas;
- Specify currently listed activities that will be excluded from EIA within certain identified geographical areas based on the environmental attributes of such areas; and
- Develop a decision support system for development in the area to ensure that environmental attributes, issues and priorities are taken into account.

The EMF provides for Environmental Management Zones (EMZ) which indicate the preferred activities, compatible activities and undesired activities (as required in the EMF Regulations, 2010). The proposed crossing falls within Zone 1: Protection of natural vegetation, scenic landscape and rock painting areas, with limited appropriate tourism. This zone has been designated to correlate with the core of the Waterberg Biosphere Reserve and its associated management objectives as contained in the WBR Strategy and Action Plan, 2018. These pockets of formal biodiversity protection should be handled with caution and must be managed within the bigger context of other areas of biodiversity sensitivity.

Conservation is the priority land-use in this zone and should be promoted as the core activity in every instance.

1.1.7. (Environmental attributes and management proposals contained in) Spatial Development Framework, and

Waterberg District Municipality SDF (09/07/2021 - Rev 1):

The proposed crossing falls within the Environment, Heritage Protection and Tourism Focus Area of the SDF and responds to Spatial Development Objective 1. Development objective 1 of the SDF aims to ensure that support and protection of the heritage, biodiversity and environmentally sensitive areas in the District are prioritised, and these resources promote eco-tourism and stimulate the local economy. The area identified and recognised by UNESCO as the Waterberg Biosphere Reserve forms the core area for this component of the Municipal SDF. The Municipal SDF therefore acknowledges the Waterberg Biosphere Reserve, which includes four categories or environmental management zones, of which the proposed crossing falls within the Core Area which consist of formally Protected Areas and areas seeking formal protection within the Waterberg Biosphere Reserve. The aim of these sites is to conserve biodiversity. Non-destructive research and other low-impact land uses are recommended.

Further, Vaalwater (48km south of the site) is proposed as a tourism hub in support of the Biosphere as well as the wildlife and hunting industry. It is located centrally in the Biosphere as well as strategically along the R33 to fulfil this role.

Any development, land use or activity in the Environment, Heritage Protection and Tourism Focus Areas should be consistent with proposals and guidelines of the Waterberg Environmental Management Framework (EMF) and associated environmental management legislation and the identified Environmental Management Zones (EMZ) which provide compatible and incompatible activities land uses) contemplated in the Waterberg Environmental Management Framework, 2021

Lephalale Local Municipality SDF (2017):

The SDF makes provision for the following environmental considerations:

A number of declared conservation areas can be found in the area (the bulk of which are private in nature). These areas are important due to the revenue and job opportunities generated by tourism/and related (e.g. hunting) activities. Also considered are CBA and ESA areas.

The proposed crossing falls within the Environmental Management Zone 1 which is for the protection of Natural Vegetation, Scenic Landscape and Rock Paintings Areas, with limited appropriate tourism. This zone represents areas with a generally high natural, visual and cultural quality that provides the core natural and cultural resource base for the establishment of the Waterberg as a conservation (even wilderness) destination.

Preferred activities in this zone:

Conservation of nature in protected areas in terms of the National Environmental Management: Protected Areas Act. Compatible activities

Limited tourism facilities that take place in a manner that:

- Limits disturbance to natural vegetation to the minimum possible after undertaking an environmental assessment as required in terms of Government Notice No. R. 564 of 18 June 2010;
- does not consume additional natural resources;

- does not impact negatively on the sense of place of the area, being particularly sensitive to not breaking the skyline or impeding on views;
- recycles its waste products; and o treats its sewage before release into natural streams.
- Existing game farms that are managed with conservation as the core activity;
- Existing hunting activities but within the context of conservation of nature as the main priority; Existing farming activities that takes place in a manner that does not consume additional, natural resources and does not impact negatively on the sense of place of the area; and
- Existing and new unpaved roads that are maintained at a basic level to provide access to the area that do not require 4X4 vehicles in a way limits disturbance to natural vegetation to the minimum possible, after undertaking an environmental assessment as required in terms of Government Notice No.R. 564 of 18 June 2010.

1.1.8. Global and international responsibilities relating to the environment (e.g., RAMSAR sites, Climate Change, etc.).

The proposed crossing is not anticipated to impact on any global or international commitments.

Not a RAMSAR site, and the study area is located 23km north of the Waterberg Strategic Water Source Area.

The site falls within the Waterberg System according to BirdLife International (2021) Important Bird Areas factsheet, however the proposed low level crossing is expected to have no impacts on this system.

1.2. How will this development disturb or enhance ecosystems and/or result in the loss or protection of biological diversity? What measures were explored to firstly avoid these negative impacts, and where these negative impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?

- Limited disturbance will occur within a portion of the watercourse and its banks being sterilised under the footprint of the new low-level crossing and its already existing approaches. It is estimated that the area which will be disturbed is approximately 700sqm.
- The following specialist studies were undertaken, which identified all the potential impacts and how they could be managed and the findings of the assessment have been included in the Impact Assessment and Environmental Management Programme (refer to Appendix D & Appendix F, respectively).
 - Terrestrial biodiversity impact assessment
 - Aquatic Biodiversity Assessment
 - Hydrology Assessment

A summary of the findings is provided below:

Terrestrial Assessment for the Kaingo Low Level Bridge, Vaalwater, Limpopo Province (November 2021) prepared by The Biodiversity Company:

- High sensitivity habitats include the riparian, sandy bushveld, and rocky ridge habitats.

- Degraded bushveld were given a moderate sensitivity.
- Modified bushveld and transformed habitat were given a low sensitivity.
- Two protected trees: the Camel Thorn (*Vachellia erioloba*) and the Shepherds trees (*Boscia albitrunca*) were found just outside the direct footprint, it is imperative that these trees not be disturbed during the construction process.
- Greatest impact would be on the Hippopotamus and the Crocodile as this would be a direct alteration in their habitats and would result in the disruption of an ecological corridor.
- Construction must take place in the winter months to ensure the water borne SCCs are not directly impacted and have temporarily moved out of the area to the upstream weir. Should this mitigation not be adhered to this would be regarded as a fatal flaw for the project.

Heritage exemption letter dated 26 November 2021 prepared by Kudzala antiquity:

- Because of the small footprint and the location of the proposed crossing as well as the result of a physical inspection by an archaeologist, the proposed activities will not have an impact on any heritage resources and no remedial action or mitigation is needed.
- Whole area is in the Cleremont Formation sandstones and of about 2000 million years old. At that age, the only life forms were microscopic or small marine invertebrates and only trace fossils might occur. None has been reported from this formation. It is extremely unlikely that any fossils would be found or recognised.
- Chance Find Protocol to commence once the excavations / drilling activities begin.

Hydrology Assessment for the Proposed Mokolo River Bridge Crossing, Report Final 2, 08 December 2021, prepared by GCS Water and Environment (Pty) Ltd, GCS Project Number: 21-1007:

- The river crossing bridge is designed to allow for adequate flow throughout the year, and will not impede river flow.
- It is proposed that water quality monitoring be implemented.
- All waste generated during construction on site (this is temporary waste i.e. building rubble, used oil and paint containers etc.) must be stored in designated areas that are isolated from drainage lines.
- Waste storage facilities should be covered to prevent dust and litter from leaving the containment area and rainwater accumulation.
- Minimise the amount of exposed ground.
- Minimise the amount of exposed stockpiles of building material (i.e. river sand, cement bags, rock, rebar) to prevent suspended solid transport loads and leaching of rocks/materials.
- Stockpiles can be covered, and sediment fences constructed from a suitable geotextile.

Aquatic Biodiversity Impact Study prepared by Dr Andrew Deacon dated October 2021):

- No significant adverse impact has been predicted during the study and impact assessment that could jeopardise the surrounding environment.

- All the biological aspects will not be influenced should the mitigation proposed for the project be adhered to. Water quality and flows will also be unchanged by the construction phase.
- Hydrological functioning, sediment regime, modification of ecosystem and risks to downstream water use are not enough to impair any ecological processes, no matter the period of inundation.
- Impacts on base flows, quantity/quality of water, changes in the hydrogeomorphic typing, ecological connectivity, flood attenuation, sediment trapping, streamflow regulation, water quality parameters are considered not significant.
- The following areas should be avoided during construction:
 - Riverine areas outside the construction footprint (3m working servitude on either side of the crossing), except when obtaining sand from the designated sand mining area,
 - Riparian area inside the 10m ecological buffer on both sides of the Mokolo river (except for the 3m working servitude).
- The recommended development footprint identified (Site 1) is considered to be the site with the lowest aquatic biodiversity sensitivity because of the extensive bedrock structure underlying the site and low riparian vegetation cover.
- It is proposed that the project should be authorised with the provision that the mitigation measures prescribed in this document are, where applicable, included in the EMPr.

Please see the full reports attached as Annexure D.

1.3. How will this development pollute and/or degrade the biophysical environment? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?

An Impact Assessment, considering all specialist studies was completed and an EMPr has been formulated as part of the environmental impact assessment within the consultation BAR (refer to Appendix F for the full findings and management thereof). Mitigation measures which apply to the pre-construction, construction and post-construction phases have also been incorporated into the Environmental Management Programme (EMPr)

1.4. What waste will be generated by this development? What measures were explored to firstly avoid waste, and where waste could not be avoided altogether, what measures were explored to minimise, reuse and/or recycle the waste? What measures have been explored to safely treat and/or dispose of unavoidable waste?

Expected waste generation includes general domestic waste, cement slurry and some building rubble. Waste generated from construction activity may accumulate as debris and construction material on the site and surrounds causing an impact on the receiving environment. If not adequately managed or mitigated, the waste poses detrimental impacts on the immediate environment. However, for the construction phase of the development, the EMPr (Appendix F) details in length with the management of waste.

1.5. How will this development disturb or enhance landscapes and/or sites that constitute the nation's cultural heritage? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?

- Archaeological and Cultural Heritage theme is **Low** in both Screening Assessments – Verified as Low in the Site Sensitivity Verification Report and in the (Exemption Letter for) Low level crossing on the Mokolo River, Kaingo Private Nature Reserve (26 November 2021), prepared by Kudzala antiquity cc – “Because of the small footprint and the location of the proposed crossing as well as the result of a physical inspection by an archaeologist, the proposed activities will not have an impact on any heritage resources and no remedial action or mitigation is needed.”
- Palaeontology theme is Medium in both Screening Assessments – Verified as Low in the Site Sensitivity Verification Report and in the Request for Exemption of any Palaeontological Impact Assessment for the proposed Kayingo low-water bridge, below Mokolo Dam, Farm Laurel 195, Limpopo Province (02 December 2021), prepared by Prof Marion Bamford (Palaeobotanist; PhD Wits 1990) – “The moderate sensitivity indicated by the SAHRIS palaeosensitivity map (Fig 2) is inconsistent with the interpretation for this formation in the Limpopo Palaeotechnical Report (Groenewald et al., 2004).”
- A “Chance Find Protocol” has been included in the above reports which details the response required should any aspects of cultural heritage be found on site.

1.6. How will this development use and/or impact on non-renewable natural resources? What measures were explored to ensure responsible and equitable use of the resources? How have the consequences of the depletion of the non-renewable natural resources been considered? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?

There is no anticipated impact on or use of non-renewable resources by the construction of the proposed low-level crossing.

Please refer to the Impact Assessment in Section D.

1.7. How will this development use and/or impact on renewable natural resources and the ecosystem of which they are part? Will the use of the resources and/or impact on the ecosystem jeopardise the integrity of the resource and/or system taking into account carrying capacity restrictions, limits of acceptable change, and thresholds? What measures were explored to firstly avoid the use of resources, or if avoidance is not possible, to minimise the use of resources? What measures were taken to ensure responsible and equitable use of the resources? What measures were explored to enhance positive impacts?

- As per this project description, the proposed crossing will not require significant resources during the operational phase and will thus not promote an increased dependency on resources.
- Water would be used for the construction phase – it is proposed to use water from the Mokolo River. The need for dust suppression should be minimal and the construction phase is not expected to require large amounts of water. The upper limit volume of concrete that can be practically mixed and place per

day, using labour and a mixer, is approximately 4 m³, this translates to a maximum water demand of roughly 1.0 m³/day.

- Topsoil will be removed and stockpiled for re-use during the rehabilitation phase.
- Sand mining must as far as possible be confined to the physical footprint of the Rubble Masonry Concrete (RMC) Culvert Structure and concrete causeway approaches.
- Wet Pit Mining for construction activities in the active flow channel is prohibited because ecological risks are too high. Sand shall be mined using the Dry Pit Mining method, which requires scraping off the top layer from within dry ephemeral streambeds and/or from exposed sand bars without excavating below the low-flow water level, e.g., conventional sand bar skimming, or scalping.
- Skim as little sand as possible (300-600mm) from different sand banks/ bars outside the active channel to minimise impacts at one area.
- Re-instatement of the original landscape levels must be done concurrent with mining operations.
- The final grading of the mined area should not significantly alter the flow characteristics of the river during periods of high flows, e.g., shaped to natural forms that blend in with pre-mining topography.

Please refer to the EMPr (Appendix F) and the Impact Assessment (Section D).

1.7.1. Does the proposed development exacerbate the increased dependency on increased use of resources to maintain economic growth or does it reduce resource dependency (i.e. de-materialised growth)? (Note: sustainability requires that settlements reduce their ecological footprint by using less material and energy demands and reduce the amount of waste they generate, without compromising their quest to improve their quality of life).

The proposed crossing will reduce resource dependency. The proposed crossing is to facilitate existing development in a safe and more viable manner and to ensure proper management of a declared protected area. The total footprint that will be modified is considered small.

1.7.2. Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when considering intra- and intergenerational equity, and are there more important priorities for which the resources should be used (e.g., what are the opportunity costs of using these resources this the proposed development alternative?)

The development is proposed in response to the need for the Management Authority of the Nature Reserve to fulfil their conservation mandate, including the pursuit of any biodiversity targets and the purpose for which the protected area was declared.

Two sites were indicated and investigated for possible river crossings of which the first site, about 120 meters below the existing concrete weir, was found to be the most favourable in terms of construction costs and geotechnical aspects.

It is anticipated that the proposed land use can be considered as one of the best uses of this land, which is the main "natural resource" in question.

1.7.3. Do the proposed location, type and scale of development promote a reduced dependency on resources?

As per this project description, this development will not require significant resources during the operational phase and will thus not promote an increased dependency on resources.

1.8. How were a risk-averse and cautious approach applied in terms of ecological impacts:

- There are old lands (already modified areas) on both sides of the river, which fall outside the 1:100-year flood line, and both are close to the bridge access. Therefore there is need to open undisturbed areas for the construction camp.
- Wet Pit Mining for construction activities in the active flow channel is prohibited because ecological risks are too high. Sand shall be mined using the Dry Pit Mining method, which requires scraping off the top layer from within dry ephemeral streambeds and/or from exposed sand bars without excavating below the low-flow water level, e.g., conventional sand bar skimming, or scalping.
- Skim as little sand as possible (300-600mm) from different sand banks/ bars outside the active channel to minimise impacts at one area.
- A terrestrial biodiversity impact assessment and an aquatic biodiversity assessment was undertaken to assess how the area is going to be affected and mitigations on how to avoid, minimise and mitigate the impacts. Please refer to Appendix D for the full reports of the findings.
- According to the Terrestrial Assessment for the Kaingo Low Level Bridge, Vaalwater, Limpopo Province (November 2021) prepared by The Biodiversity Company, only 19 of the 98 Red Listed mammals are regarded as threatened including inter alia, the Cape Clawless Otter (NT), the South African Hedgehog (NT), which is threatened by road collisions, and the Swamp Musk Shrew (NT), which has a distinct preference for marshy ponds, riverine and semi-aquatic vegetation, such as reed beds. However, only 6 mammal SCC were observed during the assessment, including inter alia lion, elephant, hippo and hyaena. Four of the 91 reptiles that are expected to occur within the area are regarded as threatened, including the Nile Crocodile (VU), the Waterberg Dwarf Gecko (NT), which inhabits rocky areas of the grassland and savannas, the Northern Craig Lizard (NT) which inhabits rocky habitat and a savanna species, the Lobatse hinged-back tortoise (VU). However, only the Nile Crocodile was observed during the assessment. None of the 31 amphibian species expected to occur within the area are SCC. Only the Common River Frog was observed during the assessment. Six of the expected 257 Avifauna species are threatened, including inter alia, the Black Stork (VU), which forage in riverine and wetland areas, a migratory species that generally occurs near water, the Black-winged Pratincole (NT), the African Finfoot (VU), which is found along shoreline vegetation, and the Greater Painted-snipe (NT) which occurs in freshwater habitats. None of the 65 species that were observed during the assessment are regarded as SCC.
- No threatened plants are expected in the study area. Although two nationally protected trees and seven provincially protected plants are expected, only two nationally protected trees, namely *Boscia albitrunca* and *Vachellia erioloba*, were observed in the study area (the Terrestrial Assessment for the Kaingo Low Level Bridge, Vaalwater, Limpopo Province (November 2021) prepared by The Biodiversity Company).
- No modification is expected. The area downstream of the proposed weir consists of bedrock channels through an extensive bedrock control, and downstream of the control, an extensive reed “swamp” covers the river for nearly 400m. Any water or sediment flowing through the rocky control will be absorbed and buffered by this inundated reedy section (Aquatic Assessment).

- A 3000mm x 1200mm precast concrete portal culvert is proposed for the crossing at the river's low flow section. This will assist in an unobscured flow regime at the low flow critical section in the river, thus not allowing any damming / containment of water at the crossing structure.

1.8.1. What are the limits of current knowledge (Note: the gaps, uncertainties and assumptions must be clearly stated)?

The magnitude of the following impacts is not known:

- the extent of ground and surface water contamination during construction;
- the amount of energy/power/electricity required for construction and the amount likely to be wasted;
- the amount of soil that will be lost;
- the extent and severity of the soil and water pollution;
- the extent and severity of the loss of terrestrial, aquatic and avi-fauna and vegetation;
- the applicant and professional team are not aware of the relevant environmental legislation and how it affects certain activities associated with the proposed development.
- the magnitude of the impact, specifically the extent of non-compliance
- The following assumptions are made:
- the engineer is not aware of the negative impacts, specifically on flora and water quality, resulting from an inappropriate layout and design.
- the contractor and his/her labourers are not aware of the actual and potential impacts resulting from their activities.
- none of the activities require an atmospheric emissions or waste management license.
- erosion is a natural phenomenon and cannot be prevented. It can, however, be controlled /reduced.
- The area was only surveyed during a single site visit and therefore, this assessment does not consider temporal trends;
- Only a single season survey will be conducted for the respective studies, this would constitute a wet season survey;
- A surface area of approximately 2500 to 3500 m² will be required for parking machinery and site offices. An additional 1000m² will be required for laydown areas for the cement, aggregates, and culverts. So, two areas covering 50mx50m and 30mx30m will be required (pers. comm. Martin Mulder PG Consulting Engineers).

1.8.2. What is the level of risk associated with the limits of current knowledge?

The risk of the limits of current knowledge highlighted above is low, the specialist findings have been incorporated into the Basic Assessment Report and addressed in the impact assessment and mitigations in the EMPr.

The level of risk is low and can be minimised or avoided, through the monitoring and/or adherence of the EMPr.

1.8.3. Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?

A risk averse and cautious approach, as per the principles in Section 2 of NEMA, has been applied in the identification and assessment of potential impacts. The consequences of all impacts have been identified in the impact assessment, and mitigation measures provided to ensure the impacts are as low as possible. In so doing, the precautionary principle of environmental management has been applied throughout the Basic Assessment Process to ensure that all potential negative (and positive) ecological and socio-economic impacts are assessed.

1.9. How will the ecological impacts resulting from this development impact on people's environmental right in terms following:

1.9.1. Negative impacts: e.g., access to resources, opportunity costs, loss of amenity (e.g. open space), air and water quality impacts, nuisance (noise, odour, etc.), health impacts, visual impacts, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?

- The restricted development footprint within the Mokolo River and low level of the proposed water crossing, will not alter the visual landscape in any way. The proposed infrastructure will be less visually intrusive than the existing weir.
- The impact of alien invasive plant recruitment on visual aesthetic values is adequately mitigated
- The proposed activity will not provide the most benefit and cause the least damage to the existing natural environment if compared with the no-go option. It will result in the temporary disturbance of the riparian habitat. However, the terrestrial and aquatic ecosystems will be returned to the current state within two years of the completion of the construction phase. The aquatic habitat is 'Irreplaceable,' but the proposed remediation including prescribed mitigations, should not have a detrimental effect on the surface water hydrology.
- There will be no loss or degradation of all or part of any unique or important features associated with or within the aquatic ecosystem since the bridge will be constructed on a bedrock control, one of many in this river reach, and which is not a sensitive or special habitat for the Mokolo River.
- The possible influence of the construction and operation of the bridge structure will not have an adverse impact on the quality of water in the river system as it let through the same quality of water received from the upstream area.
- In conclusion, the negative natural environmental impacts occur at a cost acceptable to society and the economy.

1.9.2. Positive impacts: e.g., improved access to resources, improved amenity, improved air or water quality, etc. What measures were taken to enhance positive impacts?

Positive impacts include, but are not limited to:

- Creation of job opportunities during the construction phase; and
- Improved management of the protected area.

1.10. Describe the linkages and dependencies between human wellbeing, livelihoods and ecosystem services applicable to the area in question and how the development's ecological impacts will result in socio-economic impacts (e.g. on livelihoods, loss of heritage site, opportunity costs, etc.)?

Apart from temporary disturbances during the construction phase, it is not anticipated that there would be any negative socio-economic impacts related to this project. In addition it is noted that the total ecosystem-function loss will be minimal and limited to the construction phase, with impacts during operation as per the current status.

1.11. Based on all the above, how will this development positively or negatively impact on ecological integrity objectives/targets/considerations of the area?

- As mentioned above, the total ecosystem-function loss will be minimal and that limited to the construction phase, with impacts during operation as per the current status.
- A terrestrial biodiversity impact assessment was undertaken to investigate how the proposed crossing will positively or negatively impact on ecological integrity objectives/targets/considerations of the area.
- According to the Terrestrial Assessment for the Kaingo Low Level Bridge, Vaalwater, Limpopo Province (November 2021) prepared by The Biodiversity Company, only 19 of the 98 Red Listed mammals are regarded as threatened including *inter alia*, the Cape Clawless Otter (NT), the South African Hedgehog (NT), which is threatened by road collisions, and the Swamp Musk Shrew (NT), which has a distinct preference for marshy ponds, riverine and semi-aquatic vegetation, such as reed beds. However, only 6 mammal SCC were observed during the assessment, including *inter alia* lion, elephant, hippo and hyaena. Four of the 91 reptiles that are expected to occur within the area are regarded as threatened, including the Nile Crocodile (VU), the Waterberg Dwarf Gecko (NT), which inhabits rocky areas of the grassland and savannas, the Northern Craig Lizard (NT) which inhabits rocky habitat and a savanna species, the Lobatse hinged-back tortoise (VU). However, only the Nile Crocodile was observed during the assessment. None of the 31 amphibian species expected to occur within the area are SCC. Only the Common River Frog was observed during the assessment. Six of the expected 257 Avifauna species are threatened, including *inter alia*, the Black Stork (VU), which forage in riverine and wetland areas, a migratory species that generally occurs near water, the Black-winged Pratincole (NT), the African Finfoot (VU), which is found along shoreline vegetation, and the Greater Painted-snipe (NT) which occurs in freshwater habitats. None of the 65 species that were observed during the assessment are regarded as SCC.
- Plant Species theme is **Low** in both Screening Assessments. No threatened plants are expected in the study area. Although two nationally protected trees and seven provincially protected plants are expected, only two nationally protected trees, namely *Boscia albitrunca* and *Vachellia erioloba*, were observed in the study area (the Terrestrial Assessment for the Kaingo Low Level Bridge, Vaalwater, Limpopo Province (November 2021) prepared by The Biodiversity Company).
- The possible influence of the construction and operation of the bridge structure will not have an adverse impact on the quality of water in the river system as it let through the same quality of water received from the upstream area.
- There will be no loss or degradation of all or part of any unique or important features associated with or within the aquatic ecosystem since the bridge will be constructed on a bedrock control, one of many in this river reach, and which is not a sensitive or special habitat for the Mokolo River

Please refer to the full reports in Appendix D.

1.12. Considering the need to secure ecological integrity and a healthy biophysical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the “best practicable environmental option” in terms of ecological considerations?

Three different crossing structure options were investigated by means of a desktop study,

- 1) Gabion basket structure
- 2) Conventional reinforced concrete deck bridge with piers, and
- 3) 3) Rubble masonry concrete culver structure.

The latter was found to be the most practical and economical with respect to the topography and exposed bedrock at the site. The first two options were found to be much more expensive where structural reinforcing steel and gabion units are required. It is also more labour intensive. The stability and structural integrity of these two options were also evaluated and found to be less structurally sound and stable during high floods compared to option 3.

Two sites were indicated and investigated for possible river crossings of which the first site, about 120 meters below the existing concrete weir, was found to be the most favourable in terms of construction costs and geotechnical aspects.

Refer to Alternatives Section A (2) - Alternatives

1.13. Describe the positive and negative cumulative ecological/biophysical impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and existing and other planned developments in the area?

All the biological aspects will not be influenced should the mitigation proposed for the project be adhered to. The site is located centrally within a 17 000 ha declared protected area with surrounding land uses being conservation and agriculture.

Cumulative positive impacts would be the improvement in the management of the declared protected area as the low level crossing would provide quick and direct access to the full extent of the reserve.

Refer to Impact Assessment (Section D) and Alternatives in Section A (2) – Alternatives.

“Promoting justifiable economic and social development”

2.1. What is the socio-economic context of the area, based on, amongst other considerations, the following considerations:

2.1.1. The IDP (and its sector plans' vision, objectives, strategies, indicators, and targets) and any other strategic plans, frameworks of policies applicable to the area,

Lephalale Local Municipality IDP (31 March 2021):

The long term vision of Lephalale Local Municipality is as follows: “a vibrant city and the energy hub”. the mission is “we are committed to integrated development, provision of quality, sustainable and affordable services, financial viability , good governance, local economic development and job creation.”

One of the core values is “Environmental Care With all the development in Lephalale, the municipality will focus on taking care of the environment.”

Lephalale Municipality has an environmental function to execute and ensure that the fundamental environmental rights of the community as enshrined in the constitution are realized. The fundamental rights as stated in the constitution are:-

- To prevent pollution and ecological degradation.
- To promote conservation.
- To secure ecologically sustainable development and use of the natural resources while promoting justifiable economic and social development.

The Municipality has sensitive and conservation worthy areas within its jurisdiction, such as the wetlands, river systems, cultural sites, rare and endangered species and part of the Waterberg biosphere.

Unemployment in the area is at 22% of the population. Further demographics state that the Lephalale Municipality has a population of 140 240 people (Statistics South Africa, 2016). The youth represent 40.7% of the population. Approximately 43 002 households live within the municipality, with an average household size of 3.2 people. The community survey of 2016 projected a 21.8% in the male population compared to the 13.5% of the female population with an overall increase of 18% in 2016 against the 35.8% of 2011.

2.1.2. Spatial priorities and desired spatial patterns (e.g., need for integrated of segregated communities, need to upgrade informal settlements, need for densification, etc.),

Although the proposed crossing does not entail the densification and use of vacant land or upgrading of informal settlement, it does contribute to the vision of the Lephalale SDF as protected areas have been identified as areas which are important due to the revenue and job opportunities generated by tourism/and related (e.g. hunting) activities . As per Section E, the proposed crossing aligns with the district and local SDFs.

2.1.3. Spatial characteristics (e.g., existing land uses, planned land uses, cultural landscapes, etc.), and

The land is currently zoned as agriculture in terms of the Lephalale Town Planning Scheme, however the current land use is as a protected area which has been endorsed on the title deeds and will remain as a protected area land use for 99 years. The proposed crossing is not within visible range to the neighbours.

An Archaeological and Cultural Heritage Impact Compliance Statement was completed to address the cultural landscapes of the project area and the findings have been incorporated into the consultation BAR. No sites of heritage or archaeological significance were identified in the proposed project area.

2.1.4. Municipal Economic Development Strategy (“LED Strategy”).

The projects approval and success will help create job opportunities during the construction phase for the surrounding community as well as the use of local services such as contractors, hence strengthening the economic state of the municipality.

2.2. Considering the socio-economic context, what will the socio-economic impacts be of the development (and its separate elements/aspects), and specifically also on the socio-economic objectives of the area?

The proposed crossing will be confined to a single, consolidate Private Nature Reserve for the benefit of the Management Authority during its day-to-day operations or management of the Nature Reserve. As such the activity does not affect or impact any broader societal needs, communities or economies.

2.2.1. Will the development complement the local socio-economic initiatives (such as local economic development (LED) initiatives), or skills development programs?

The projects approval and success will help create job opportunities during the construction phase for the surrounding community as well as the use of local services such as contractors, hence strengthening the economic state of the municipality.

2.3. How will this development address the specific physical, psychological, developmental, cultural, and social needs and interests of the relevant communities?

One of the main socio-economic impacts of the development will be the positive impact of job creation during the construction phase. In addition, there is the opportunity for skills development through the construction phase of the proposed crossing.

2.4. Will the development result in equitable (intra- and inter-generational) impact distribution, in the short- and long-term? Will the impact be socially and economically sustainable in the short- and long-term?

The DEA Need and Desirability Guideline (2017) defines intra and intergenerational equity as ensuring that development is sustainable enough to ensure that the needs of the present generation are met without compromising the ability of future generations to meet their own needs. On condition that the recommendations of the specialists are implemented, the development is sustainable in that it will not result in or obstruct access to natural resources for the present generation (intra-generational equity) or for future generations (inter-

generational equity). Thus, the economic and social impacts are anticipated to be positive in both the short and long term.

2.5. In terms of location, describe how the placement of the proposed development will:

2.5.1. result in the creation of residential and employment opportunities in close proximity to or integrated with each other,

The proposed development will not include residential development but will create employment opportunities in the area during the construction phase.

2.5.2. reduce the need for transport of people and goods,

Access to the neighbouring property is required by the Management Authority to fulfil its conservation mandate during the day-to-day operations or management of both Nature Reserves. There is currently one existing dirt and gravel crossing that is only accessible during the dry winter months of the year. For the remainder of the year, access to the neighbouring property would entail an extended round trip that requires any driver to exit Kaingo Game Reserve and then enter the Mokolo River Private Nature Reserve. The proposed crossing will negate the unnecessary and wasteful expenditure of time and money to access the neighbouring property.

2.5.3. result in access to public transport or enable non-motorised and pedestrian transport (e.g., will the development result in densification and the achievement of thresholds in terms public transport),

The proposed crossing does not aim to provide access to public or non-motorized and pedestrian transport as the crossing will be on private land. However, the proposal seeks instead to optimise existing development and to ensure that the existing management authority is ably served by infrastructure which serves to enhance the management of the protected area.

2.5.4. compliment other uses in the area,

The proposed crossing will complement the agricultural uses and conservation uses in the area, as it will ensure the Management Authority to fulfil its conservation mandate during the day-to-day operations or management of both Nature Reserves.

2.5.5. be in line with the planning for the area,

The area is mainly an agricultural area as well as a conservation use area. The area is also within the core area of the Waterberg Biosphere Reserve and so the proposed crossing required by the Management Authority to fulfil its conservation mandate during the day-to-day operations or management of both Nature Reserves will be in line with the current plan of the area.

2.5.6. for urban related development, make use of underutilised land available with the urban edge,

This is a non-urban related development.

2.5.7. optimise the use of existing resources and infrastructure,

There is currently one existing dirt and gravel crossing that is only accessible during the dry winter months of the year. For the remainder of the year, access to the neighbouring property would entail an extended round trip that requires any driver to exit Kaingo Game Reserve and then enter the Mokolo River Private Nature Reserve. The proposed crossing will negate the unnecessary and wasteful expenditure of time and money to access the neighbouring property.

Further. Contractors and machinery will be accommodated on site in existing staff accommodation housing and workshops.

2.5.8. opportunity costs in terms of bulk infrastructure expansions in non-priority areas (e.g. not aligned with the bulk infrastructure planning for the settlement that reflects the spatial reconstruction priorities of the settlement),

This development is not provided for in the infrastructure planning of the municipality but will not have an impact on the infrastructure planning because it is isolated from urban developments and is on private land.

2.5.9. discourage "urban sprawl" and contribute to compaction/densification,

N/A. The construction of a proposed crossing on private land which is outside an urban area, and not intended to facilitate additional urban development.

2.5.10. contribute to the correction of the historically distorted spatial patterns of settlements and to the optimum use of existing infrastructure in excess of current needs,

While the development is unlikely to have a significant impact on spatial patterns, it does provide a desired community amenity as well as short-term employment opportunities in an area of high unemployment.

2.5.11. encourage environmentally sustainable land development practices and processes,

The proposed crossing has been shaped by environmental sustainability concerns (see Section 2.2 above). Additionally, Section 2.4 above, the proposed crossing is sustainable as it aims to assist in the management of the two Nature Reserves. Furthermore, the mitigation measures proposed and incorporated into the EMP (Appendix F) also contribute to the development being sustainable and the minimising of negative impacts while optimising positive impacts.

2.5.12. take into account special locational factors that might favour the specific location (e.g., the location of a strategic mineral resource, access to the port, access to rail, etc.),

The preferred site is the most practical and economical with respect to the topography and exposed bedrock at the site as well as the stability and structural integrity being stable during high floods.

As mentioned previously, there is currently one existing dirt and gravel crossing that is only accessible during the dry winter months of the year. For the remainder of the year, access to the neighbouring property would entail an extended round trip that requires any driver to exit Kaingo Game Reserve and then enter the Mokolo River Private Nature Reserve.

2.5.13. the investment in the settlement or area in question will generate the highest socio-economic returns (e.g., an area with high economic potential),

The proposed project will ensure that temporary job opportunities are created during the construction phase.

2.5.14. impact on the sense of history, sense of place and heritage of the area and the socio-cultural and cultural-historic characteristics and sensitivities of the area, and

An Archaeological and Cultural Heritage Impact Assessment was completed to address the cultural landscapes of the project area and the findings have been incorporated into the consultation BAR. No sites of heritage or archaeological significance were identified in the proposed project areas.

2.5.15. in terms of the nature, scale and location of the development promote or act as a catalyst to create a more integrated settlement?

The intent is not to facilitate additional development in the area. Rather the proposal serves to meet the requirements of the existing management authority to ensure the proper management of both Nature Reserves.

2.6. How were a risk-averse and cautious approach applied in terms of socio-economic impacts?

As mentioned in Section 1.8 above, a risk-averse and cautious approach was applied in the impacts that were identified as a result of the proposed development. The mitigation measures provided also indicate the implementation of a risk-averse approach in order to avoid significantly negative impacts on the surrounding environment.

2.6.1. What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?

The EAP assumes that information gathered from the applicant, specialists, and consulting engineer is accurate and adequate for the assessment of potential impacts that may arise from the proposed crossing. It is also assumed that all mitigation, management, and monitoring measures prescribed in the Basic Assessment Report and the accompanying Environmental Management Programme will be implemented by the proponent.

The magnitude of the following impacts is not known:

- the extent of ground and surface water contamination during construction;

- the amount of energy/power/electricity required for construction and the amount likely to be wasted;
- the amount of soil that will be lost;
- the extent and severity of the soil and water pollution;
- the extent and severity of the loss of terrestrial, aquatic and avi-fauna and vegetation;
- the applicant and professional team are not aware of the relevant environmental legislation and how it affects certain activities associated with the proposed development.
- the magnitude of the impact, specifically the extent of non-compliance

The following assumptions are made:

- the engineer is not aware of the negative impacts, specifically on flora and water quality, resulting from an inappropriate layout and design.
- the contractor and his/her labourers are not aware of the actual and potential impacts resulting from their activities.
- none of the activities require an atmospheric emissions or waste management license.
- erosion is a natural phenomenon and cannot be prevented. It can, however, be controlled /reduced.
- dust is unlikely to impact plants

Refer to Impact Assessment (Section D), where each aspect of the proposed project lists the gaps, uncertainties and assumptions associated with the project.

2.6.2. What is the level of risk (note: related to inequality, social fabric, livelihoods, vulnerable communities, critical resources, economic vulnerability and sustainability) associated with the limits of current knowledge?

The risk of the limits of current knowledge highlighted above is low, the specialist findings have been incorporated into the Basic Assessment Report and addressed in the impact assessment and mitigations in the EMPr.

The level of risk is low and can be minimised or avoided, through the monitoring and/or adherence of the EMPr.

2.6.3. Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?

The scale and nature of the development, and the fact that socio-economic impacts are anticipated to be primarily positive while negative biophysical impacts can be mitigated to acceptable levels, means that any limitation in knowledge is acceptable and does not pose a risk. Nevertheless, a risk averse approach was applied to the development in the assessment and identification of impacts.

Finally, an Environmental Management Programme (Appendix F) was formulated to help minimise and/or avoid any risks that might occur.

2.7. How will the socio-economic impacts resulting from this development impact on people's environmental right in terms following:

2.7.1. Negative impacts: e.g., health (e.g., HIV-Aids), safety, social ills, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?

The contractor who is likely to be on site for no longer than three (3) months. During which the daily/weekly toolbox talks will include but will not be limited to health, safety, environment and social.

Significant noise and odour impacts are not anticipated because the area where the development is proposed is a protected area on private land. Furthermore, health impacts such as HIV/Aids and social ills are not expected to be a result of the development.

2.7.2. Positive impacts. What measures were taken to enhance positive impacts?

Positive impacts include, but are not limited to:

- Creation of job opportunities during the construction phase; and
- Improved management of the protected area.

2.8. Considering the linkages and dependencies between human wellbeing, livelihoods and ecosystem services, describe the linkages and dependencies applicable to the area in question and how the development's socio-economic impacts will result in ecological impacts (e.g., over utilisation of natural resources, etc.)?

Apart from temporary disturbances during the construction phase, it is not anticipated that there would be any negative socio-economic impacts related to this project. In addition it is noted that the total ecosystem-function loss will be minimal and that limited to the construction phase, with impacts during operation as per the current status if not improved.

2.9. What measures were taken to pursue the selection of the “best practicable environmental option” in terms of socio-economic considerations?

The location of the preferred low level crossing is situated on land owned by the applicant on both sides of the Mokolo River. Further, downstream users are the Limpopo Provincial Conservation Authority and the Mokolo Dam.

Please refer to Public the Participation Process in Section C and Appendix E.

2.10. What measures were taken to pursue environmental justice so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons (who are the beneficiaries and is the development located appropriately)?

Considering the need for social equity and justice, do the alternatives identified, allow the “best practicable environmental option” to be selected, or is there a need for other alternatives to be considered?

Three different crossing structure options were investigated by means of a desktop study,

- 4) Gabion basket structure

- 5) Conventional reinforced concrete deck bridge with piers, and
- 6) 3) Rubble masonry concrete culver structure.

The latter was found to be the most practical and economical with respect to the topography and exposed bedrock at the site. The first two options were found to be much more expensive where structural reinforcing steel and gabion units are required. It is also more labour intensive. The stability and structural integrity of these two options were also evaluated and found to be less structurally sound and stable during high floods compared to option 3.

Two sites were indicated and investigated for possible river crossings of which the first site shown, about 120 meters below the existing concrete weir, was found to be the most favourable in terms of construction costs and geotechnical aspects.

Refer to Alternatives Section A (2).

2.11. What measures were taken to pursue equitable access to environmental resources, benefits and services to meet basic human needs and ensure human wellbeing, and what special measures were taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination?

Please refer to Public the Participation Process in Section C and Appendix E.

2.12. What measures were taken to ensure that the responsibility for the environmental health and safety consequences of the development has been addressed throughout the development's life cycle?

An EMPr has been compiled for the development, providing the measures to be taken to ensure that the environmental health and safety consequences of all stages of the development are adequately addressed during the construction and operational phases. The mitigation measures provided by specialists are representative of the measures that have been taken to ensure that the responsibility for the environmental health and safety consequences are addressed.

Please refer to the Impact Assessment and Environmental Management Programme in Section D & Appendix F, respectively.

2.13. What measures were taken to:

2.13.1. ensure the participation of all interested and affected parties,

The public participation process has identified all relevant interested and effected parties to ensure all aspects and potential concerns will be received and addressed in the final BAR.

Please refer to Public the Participation Process in Section C and Appendix E.

2.13.2. provide all people with an opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation,

The public participation process has identified all relevant interested and effected parties to ensure all aspects and potential concerns will be received and addressed in the final BAR.

All public participation documentation states that I&APs are welcome to contact EAP for any queries or questions of clarity. A background information document has been compiled to ensure that the basic information is accessible and clear to the public.

Please refer to Public the Participation Process in Section C and Appendix E.

2.13.3. ensure participation by vulnerable and disadvantaged persons,

The public participation process has identified all relevant interested and effected parties to ensure all aspects and potential concerns will be received and addressed in the final BAR.

All public participation documentation states that I&APs are welcome to contact EAP for any queries or questions of clarity. A background information document has been compiled to ensure that the basic information is accessible and clear to the public.

Please refer to Public the Participation Process in Section C and Appendix E.

2.13.4. promote community wellbeing and empowerment through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means,

All registered I&AP's will receive copies of the Draft BAR and draft EMPr that will share the knowledge of the environmental aspects and impacts of the project and how they will be addressed and mitigated.

The public participation process has provided the opportunity to raise environmental awareness and environmental education within the Background Information Documents (BID) and the consultation BAR that is to be disseminated.

Further, EMPr indicates that regular environmental awareness talks during toolbox talks with employees should be held, educating them of the impacts of littering and incorrect waste management. Both of these measures will raise environmental awareness and thereby contribute to community wellbeing

Please refer to Public the Participation Process in Section C and Appendix E.

2.13.5. ensure openness and transparency, and access to information in terms of the process,

To ensure transparency, all specialist information is attached to the consultation BAR. The public are notified that their comments will be addressed and that they will be able to view their comments with responses in the Final BAR.

Please refer to Public the Participation Process in Section C and Appendix E.

2.13.6. ensure that the interests, needs and values of all interested and affected parties were taken into account, and that adequate recognition were given to all forms of knowledge, including traditional and ordinary knowledge, and

Every comment received will be addressed and considered, and where necessary, changes will be made to the proposal. In this way, the public participation process will take cognisance of the interests, needs and values expressed by all I&APs based on all forms of knowledge.

Please refer to Public the Participation Process in Section C and Appendix E.

2.13.7. ensure that the vital role of women and youth in environmental management and development were recognised and their full participation therein were be promoted?

Participation by all I&APs, including women and youth, is promoted and opportunities for engagement provided during the environmental assessment process. All comments received from Interested and Affected Parties will be given due consideration and will be addressed. No Interested and Affected Parties will be discriminated against based on their gender or age.

Please refer to the Public Participation Process in Section C and Appendix E for the details of the interested and affected parties were brought into consideration, what issues & concern they raised and how they are going to be addressed.

2.14. Considering the interests, needs and values of all the interested and affected parties, describe how the development will allow for opportunities for all the segments of the community (e.g., a mixture of low-, middle-, and high-income housing opportunities) that is consistent with the priority needs of the local area (or that is proportional to the needs of an area)?

It is anticipated that construction-phase employment will provide opportunities primarily for local, low-income residents. As stated in Section 2.3 of this document, it is recommended by the EAP that local sub-contractors and labour should be prioritised in the construction contract. Thus, the local community specifically stands to benefit from the proposed crossing.

2.15. What measures have been taken to ensure that current and/or future workers will be informed of work that potentially might be harmful to human health or the environment or of dangers associated with the work, and what measures have been taken to ensure that the right of workers to refuse such work will be respected and protected?

A section on social, health and safety has been incorporated into the Impact Assessment (Section D) as well as the Environmental Management Programme (Appendix F). The workforce will have relevant toolbox talks daily and everyone will be required to attend an induction before commencing work on the project.

In addition to the environmental awareness programme included in the EMPr, health and safety concerns will also be addressed by the implementation of occupational health and safety legislation. An Environmental Control Officer will be appointed to monitor compliance.

2.16. Describe how the development will impact on job creation in terms of, amongst other aspects:

2.16.1. the number of temporary versus permanent jobs that will be created,

The exact number of temporary and permanent jobs to be created cannot be determined at this stage in time but is estimated to be 18 unskilled and 2 skilled jobs. However, jobs are anticipated to be primarily temporary in nature as they will only last for the duration of the construction phase of the development.

2.16.2. whether the labour available in the area will be able to take up the job opportunities (i.e. do the required skills match the skills available in the area),

The contractor is likely to come with his own skilled team. However, during the construction phase, labour available in the area will be able to take up the job opportunities as their skills are very likely to be sufficient to match those needed for the construction

2.16.3. the distance from where labourers will have to travel,

There are two contractors' camps on site (for general workers) that house 24 PAX. There is two senior contractors' accommodation facilities that can accommodate 14 PAX. This accommodation has ablutions and communal kitchen facilities.

2.16.4. the location of jobs opportunities versus the location of impacts (i.e. equitable distribution of costs and benefits), and

Impacts will be local and primarily low to medium in significance, and job creation will be primarily local. It is considered that the distribution of costs and benefits will be relatively equitable.

2.16.5. the opportunity costs in terms of job creation (e.g., a mine might create 100 jobs, but impact on 1000 agricultural jobs, etc.).

No opportunity costs are anticipated if the authorisation is granted. No jobs would be lost through construction of the crossing.

2.17. What measures were taken to ensure:

2.17.1. that there were intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment, and

All applicable legislation, policies and guidelines were considered as part of the Basic Assessment process
All relevant Organs of State having jurisdiction over aspects of the development have been identified and will be given opportunities to comment during the various commenting periods as part of this Basic Assessment process (Section C).

The EAP also had a pre-application brief discussion with LEDET to discuss the project and relevant legislation.

2.17.2. that actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures?

No conflicts encountered to date.

Please refer to the Public Participation Process in Section C and Appendix E for the details.

2.18. What measures were taken to ensure that the environment will be held in public trust for the people, that the beneficial use of environmental resources will serve the public interest, and that the environment will be protected as the people's common heritage?

The proposal was strongly controlled by environmental and heritage aspects from inception, with a protracted feasibility process so as to ensure that all such requirements were considered prior to the detailed design of the proposed watercourse crossing being entered into

An impact assessment that shows that almost all identified impacts can be affectively mitigated was undertaken, indicating that the cumulative impact effect will also be mitigated, was undertaken. Additional impacts and quantification of cumulative impacts were assessed by the following appointed specialists:

- Terrestrial Plant and Animal Species Specialist Assessment
- Aquatic Biodiversity Assessment
- Hydrological Assessment

Please refer to the specialist reports in Appendix D and the impact assessment in Section D.

2.19. Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left?

The mitigation measures proposed are considered to be realistic without resulting in a long-term environmental burden. Through the implementation of the mitigation measures, a long term environmental burden will be avoided.

2.20. What measures were taken to ensure that the costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects will be paid for by those responsible for harming the environment?

The proposal put forward aimed to limit safety issues to the local community, reduce waste generation, and enhance the ecological functionality of the watercourse with ecosystem services thus provided. In addition, the EMPr includes requirements linked to NEMA's "polluter pays principle", stating that the costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects will be borne by those responsible for harming the environment during both construction and operation.

Please refer to the specialist studies (Appendix D) and the draft EMPr (Appendix F).

2.21. Considering the need to secure ecological integrity and a healthy bio-physical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the best practicable environmental option in terms of socio-economic considerations?

Yes. The infrastructure enhancement will allow for the management authority to access both Nature Reserves in order to carry out their conservation mandate in terms of the approved management plan. It is thus considered that all appropriate alternatives have been considered.

Please refer to the alternative types within Section A (2).

2.22. Describe the positive and negative cumulative socio-economic impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and other planned developments in the area?

During construction, negative cumulative impacts would include construction related noise, visual and air quality impacts, which would contribute to similar impacts from other construction activities if present in the surrounding areas. However, this would be short lived. The long-term impacts of the proposal are all knock-on in nature but are seen to be opportunities that will be unlocked by the presence of a viable access point to allow the management authority to access both Nature Reserves in order to carry out their conservation mandate in terms of the approved management plan.

Conclusion

The level of risk for this proposed crossing is low and can be minimised or avoided, through the monitoring and/or adherence of the EMPr. People will not be negatively affected by the proposed remediation; in-fact temporary job opportunities will be created.

The proposed infrastructure is intended to facilitate the Management Authority's conservation mandate, including the pursuit of any biodiversity targets and the purpose for which the protected area was declared.