Application for Environmental Authorization for Proposed Development of a 1Ml Reservoir at the Bakubung Lodge, Pilanesberg National Park, North West Province

APPENDIX H IMPACT ASSESSMENT TABLES

Compiled by:

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On behalf of:

Pilanesberg Resorts (Pty) Ltd

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1. ASSESSMENT CRITERIA

The impacts anticipated to occur as a result of the proposed development are assessed/ evaluated to determine their significance. The following assessment criteria are used:

Extent (how far the impact extends):

- **(1) Very low:** within the site only
- **(2) Low:** within the local neighbourhoods
- **(3) Medium:** within the region
- **(4) High:** Nationally
- **(5) Very high:** Internationally

Duration (the timeframe over which the effects of the impact will be felt):

- **(1) Very short:** 0-2 years
- **(2) Short:** 3-5 years
- **(3) Medium:** 5-15 years
- **(4) Long:** >15 years
- **(5) Permanent**

Magnitude (the severity or size of the impact):

- (**0) None**
- **(2) Minor**
- **(4) Low**
- **(6) Moderate**
- **(8) High**
- **(10) Very High**

Probability (the likelihood of the impact actually occurring):

- **(1) Very improbable:** Less than 20% sure of the likelihood of an impact occurring
- **(2) Improbable:** 20-40% sure of the likelihood of an impact occurring
- **(3) Probable:** 40-60% sure of the likelihood of an impact occurring
- **(4) Highly probable:** 60-80% sure of the likelihood of that impact occurring
- **(5) Definite:** More than 80% sure of the likelihood of that impact occurring

The **significance** of the potential visual impact is determined by the sum of the individual scores for extent, duration and magnitude multiplied by the **probability** of the impact occurring i.e. **significance = (extent + duration + magnitude) x probability.**

The significance rating scale is interpreted as follows:

- **(2-12) Negligible**: Impact would be of a very low order. In the case of negative impacts, almost no mitigation and or remedial activity would be needed, and any minor steps, which might be needed, would be easy, cheap, and simple. In the case of positive impacts, alternative means would almost all likely be better, in one or a number of ways, than this means of achieving the benefit.

- **(13-30) Low:** Impact would be of a low order and with little real effect. In the case of negative impacts, mitigation and / or remedial activity would be either easily achieved or little would be required, or both. In case of positive impacts alternative means for achieving this benefit would likely be easier, cheaper, more effective, less time-consuming, or some combination of these.

- **(31-56) Moderate**: Impact would be real but not substantial. In the case of negative impacts, mitigation and / or remedial activity would be both feasible and fairly easily possible. In the case of positive impacts, other means of achieving these benefits would be about equal in time, cost, and effort.

- **(57-90) High**: Impacts of a substantial order. In the case of negative impacts, mitigation and / or remedial activity would be feasible but difficult, expensive, time-consuming or some combination of these. In the case of positive impacts, other means of achieving this benefit would be feasible, but these would be more difficult, expensive, time-consuming or some combination of these.

- **(91-100) Very High:** Of the highest order possible. In the case of negative impacts, there would be no possible mitigation and / or remedial activity and in the case of positive impacts, there is no real alternative to achieving the benefit.

2. ENVIRONMENTAL IMPACT ASSESSMENT

The tables that follow detail the assessment of the significance of anticipated environmental impact during the entire project life cycle according to the impact assessment criteria. The findings of the various specialists appointed as part of the BAR process have informed the impact assessment below. These impacts been supplemented with additional impacts as deemed appropriate by the EAP.

2.1 Impacts that may result from the Planning and Design Phase

Planning and design phase impacts refer to those impacts that may be mitigated through planning decisions. In this respect, the potential impacts are articulated as '**risks**' rather than '**impacts**', because in reality, no impact occurs on the ground at all during the planning phase. The rationale behind this approach is to demonstrate the mitigating effect of environmentally responsible and appropriate planning and design during this phase.

Potential impacts:	Extent (1-5)	Duration (1-5)	Magnitude (0-10)	Probability (1-5)	**Significance**	**Proposed mitigation:**	Extent (1-5)	Duration (1-5)	Magnitude (0-10)	Probability (1-5)	**Significance**
PREFERRED ALTERNATIVE (ONLY ALTERNATIVE)											
Direct Impacts											
Ground water											
None.											
Hydrology (surface water)											
None.											
Soil											
Erosion risk to soils due to increased hard surface, associated increase in storm water runoff.	1	4	4	2	**18 L**	• Planning and compliance, including ground water, surface water, storm water management and waste management as per the EMPr (section 7.1). • Development footprint planning as per the EMPr (section 7.2).	1	4	2	1	**7 N**
Air											
None.											

Biodiversity (Flora)											
Risk to Pilanesberg Mountain Bushveld vegetation classified as Least Threatened and associated loss of species richness due to the placement of structures and infrastructure.	1	2	6	4	**36 M**	• Planning and compliance, including protected species, storm water management and waste management as per the EMPr (section 7.1). • Development footprint planning as per the EMPr (section 7.2).	1	2	4	3	**21 L**
Risk to sensitive habitats, specifically at the foothill due to the possible placement of structures and infrastructure.	1	2	6	4	**36 M**		1	2	4	3	**21 L**
Risk to Conservation Important Species and protected trees. i.e. *Sclerocarya birrea subsp. caffra, Pellaea calomelanos* and *Spirostachys africana* due to the placement of structures and infrastructure within the habitat.	1	5	8	3	**42 M**		1	5	4	2	**20 L**
Risk of invasion of natural habitat by alien plants – a seed-base of invasive alien species is already present within the impact footprint, and invasion by these species could increase as bare soil is exposed.	1	5	8	3	**42 M**		1	5	4	2	**20 L**
Biodiversity (Fauna)											
Risk of habitat fragmentation due to removal and alteration of the habitat and the development of structures and infrastructure.	1	4	4	3	**27 L**	• Planning and compliance, including protected species, storm water management and waste management as per the EMPr (section 7.1). • Development footprint planning as per the EMPr (section 7.2).	1	4	2	2	**14 L**
Land Use & Agricultural Potential											
None.											
Heritage											
None.											
Visual											
Risk to visual quality of the surrounding area and sense of place due to the development of structures and infrastructure at Bakubung Lodge within an otherwise natural environment.	3	4	8	4	**60 H**	• Development footprint planning as per the EMPr (section 7.2). • Visual environment planning as per the EMPr (section 7.3).	3	4	4	3	**33 M**
Socio-economics											

None.											
Municipal services & traffic											
None.											
Indirect Impacts											
None											
Cumulative Impacts											
Biodiversity (Flora)											
Cumulative loss of Pilanesberg Mountain Bushveld vegetation classified as Least Threatened and associated loss of species richness. This will result in the overall reduction of Pilanesberg Mountain Bushveld vegetation.	3	4	6	3	**39 M**	• Planning and compliance, including protected species, storm water management and waste management as per the EMPr (section 7.1). • Development footprint planning as per the EMPr (section 7.2).	3	4	4	2	**22 L**
Cumulative loss of sensitive habitats, specifically at the foothills. This will result in the overall reduction of mountain vegetation.	3	4	6	3	**39 M**		3	4	4	2	**22 L**
Cumulative reduction of Conservation Important Species and protected trees. i.e. *Sclerocarya birrea subsp. caffra, Pellaea calomelanos* and *Spirostachys africana*. This will result in the overall loss of these species.	3	5	8	3	**48 M**		3	5	4	2	**24 L**
Biodiversity (Fauna)											
Cumulative loss of faunal habitat.	2	4	8	3	**42 M**	• Planning and compliance, including protected species, storm water management and waste management as per the EMPr (section 7.1). • Development footprint planning as per the EMPr (section 7.2).	2	4	4	2	**20 L**
Heritage											
None.						•					

NO-PROJECT ALTERNATIVE											
Direct Impacts											
None.						•					
Indirect Impacts											
None.						•					

Cumulative Impacts												
None.						•						

2.2 Impacts that may result from the Construction Phase

Construction phase impacts refer to those impacts that may be mitigated through sound construction management.

Potential impacts:	Extent (1-5)	Duration (1-5)	Magnitude (0-10)	Probability (1-5)	Significance	Proposed mitigation:	Extent (1-5)	Duration (1-5)	Magnitude (0-10)	Probability (1-5)	Significance
PREFERRED ALTERNATIVE (ONLY ALTERNATIVE)											
Direct Impacts											
Ground water											
None.											
Hydrology (surface water)											
None.											
Soil											
Soil contamination and pollution due to: • Unmanaged surface runoff (grey water, cement slurry and wash water) • Solvent, paints and chemical spills • Litter and other inert construction waste.	1	1	6	4	**32 M**	• Pre-construction planning, including planning and preparation as per the EMPr (section 8.1) • Site establishment, including site demarcation, accommodation, pollution control and access roads as per the EMPr (section 8.2) • Materials management, including solid, liquid and hazardous waste, concrete and cement work, fuel and hazardous material as per the EMPr (section 8.3). • Stockpiles, storage and handling as per the EMPr (section 8.4). • Erosion control, including water management, storm water management, excavation, backfilling and	1	1	4	3	**18 L**
Soil erosion by wind and rain due to: • The removal of stabilising vegetation • Soil compaction by movement of construction vehicles, equipment and activities • Decrease in water infiltration and an increase of	1	4	6	3	**33 M**		1	4	4	2	**18 L**

water runoff in construction areas • Disturbance of sensitive soils						trenching as per the EMPr (section 8.5). • Vehicles and equipment management as per the EMPr (section 8.7). • Rehabilitation as per the EMPr (section 8.10).						
Air												
None.						•						
Biodiversity (Flora)												
Removal of invader alien species found on site (positive impact).	*1*	*1*	*4*	*3*	***18 L***	• Pre-construction planning, including planning and preparation as per the EMPr (section 8.1) • Site establishment, including site demarcation, accommodation, pollution control, access roads, protection of flora, and protection of the riparian system as per the EMPr (section 8.2) • Materials management, including solid, liquid and hazardous waste, concrete and cement work, fuel and hazardous material as per the EMPr (section 8.3). • Stockpiles, storage and handling as per the EMPr (section 8.4). • Erosion control, including water management, storm water management, excavation, backfilling and trenching as per the EMPr (section 8.5). • Alien plant control as per the EMPr (section 8.6). • Vehicles and equipment management as per the EMPr (section 8.7). • Fire management as per the EMPr (section 8.9). • Rehabilitation as per the EMPr (section 8.10).	*1*	*1*	*4*	*5*	***30 L***
Loss of Waterberg Mountain Bushveld vegetation classified as Least Threatened and associated loss of species richness due to: • Site clearing ahead of construction • General construction activities and movement of construction vehicles • Solvent, paints and chemical spills • Hydrocarbon and fuel leaks and spills • Litter and other inert construction waste	1	4	4	5	**45 M**		1	4	2	4	**28 L**
Disturbance of sensitive habitats due to: • Site clearing ahead of construction • General construction activities and movement of construction vehicles • Solvent, paints and chemical spills • Litter and other inert construction waste. • Hydrocarbon and fuel leaks and spills	1	4	6	4	**44 M**		1	4	4	4	**36 M**
Destruction and damage to Conservation Important Species and protected trees. i.e. *Sclerocarya birrea subsp. caffra, Boscia albitrunca, Elaeodendron transvaalense* and *Spirostachys africana* due to: • Site clearing ahead of construction • General construction activities and movement of	1	5	8	4	**56 M**		1	5	4	2	**20 L**

construction vehicles											
Increase in exotic vegetation/alien species and bush encroachment into disturbed soils and areas due to: • Unmanaged cleared and disturbed areas, as well as, stockpiles • Unrehabilitated areas cleared and disturbed during construction • Construction vehicles operating on other sites and carrying material and seed onto site Bush encroachment is the process, which transforms grassy vegetation into a woody species-dominated one. This is recognised as a very serious problem throughout Sub-Saharan Africa, as it means that large areas of grazing lands are lost (or reduced in capacity), and it transforms habitats and reduces species diversity.	1	4	8	4	**52 M**		1	4	8	2	**26 L**
Biodiversity (Fauna)											
Loss of general faunal habitat and ecological connectivity.	2	4	8	4	**56 M**	• Pre-construction planning, including planning and preparation as per the EMPr (section 8.1) • Site establishment, including site demarcation, accommodation, pollution control, access roads, protection of flora, protection of the riparian system and protection of fauna as per the EMPr (section 8.2) • Materials management, including solid, liquid and hazardous waste, concrete and cement work, fuel and hazardous material as per the EMPr (section 8.3). • Erosion control, including excavation, backfilling and trenching as per the EMPr (section 8.5). • Alien plant control as per the EMPr (section 8.6). • Vehicles and equipment management as per the EMPr (section 8.7). • Socio-economic management, including staff as per	2	4	4	3	**30 L**
Mortality of fauna due to:	2	1	8	3	**33 M**		2	1	4	2	**14 L**

• Dangerous trenches and excavations • Persecution and extermination • Solvent, paints and chemical spills (poisoning) • Construction material, litter and other inert construction waste (suffocation) • Collisions with construction vehicles						the EMPr (section 8.8). • Fire management as per the EMPr (section 8.9). • Rehabilitation as per the EMPr (section 8.10).					
Poaching and snaring of fauna on site by construction staff.	2	1	10	3	**39 M**		2	1	6	3	**27 L**
Increased opportunity for smuggling of poached items out of the Pilanesberg National Park due to regular presence of large construction vehicles.	2	1	10	3	**39 M**		2	1	6	3	**27 L**
Land Use & Agricultural Potential											
None.											
Heritage											
Possible discovery of new important artefacts (positive impact)	*1*	*1*	*6*	*3*	***24 L***	• Pre-construction planning, including planning and preparation as per the EMPr (section 8.1) • Site establishment, including site demarcation, access roads and protection of cultural heritage as per the EMPr (section 8.2)	*1*	*1*	*6*	*3*	***24 L***
Damage to and / or destruction of archaeological, paleontological or historical artefacts unearthed during construction due to: • Site clearing ahead of construction • General construction activities and movement of construction vehicles	1	5	6	3	**36 M**		1	5	2	2	**16 L**
Visual											
Visual impact of construction, lighting and dust on sensitive visual receptors owing to the presence of construction equipment, camps and workers.	2	1	8	4	**44 M**	• Pre-construction planning, including planning and preparation as per the EMPr (section 8.1) • Site establishment, including site demarcation, accommodation, pollution control and access roads as per the EMPr (section 8.2) • Materials management, including solid, liquid and hazardous waste, concrete and cement work, fuel and hazardous material as per the EMPr (section 8.3). • Stockpiles, storage and handling as per the EMPr (section 8.4).	2	1	4	3	**21 L**
Visual impact of construction, lighting and dust on conservation areas within the region (Pilanesberg National Park).	3	1	6	4	**40 M**		3	1	2	2	**12 N**

						• Erosion control, including water management, storm water management, excavation, backfilling and trenching as per the EMPr (section 8.5). • Vehicles and equipment management as per the EMPr (section 8.7). • Socio-economic management, including staff, visual as per the EMPr (section 8.8). • Fire management as per the EMPr (section 8.9). • Rehabilitation as per the EMPr (section 8.10).					
Socio-economics												
None.						•						
Services & traffic												
Increase in traffic on the surrounding local roads due to construction vehicles.	2	1	6	4	**36 M**	• Pre-construction planning, including planning and preparation as per the EMPr (section 8.1) • Site establishment, including access roads as per the EMPr (section 8.2) • Vehicles and equipment management as per the EMPr (section 8.7). • Socio-economic management, including visual as per the EMPr (section 8.8).	2	1	4	3	**21 L**
Increase in the number and frequency of construction vehicles accessing the site and the resultant noise, dust, and safety impacts on other road users and guests.	2	2	6	4	**40 M**		2	1	2	3	**15 L**
Indirect Impacts												
Biodiversity (Flora)												
Loss of floral biodiversity, Conservation Important Species and protected trees due to increased incidence of veld fires	3	1	6	3	**30 L**	• As above	3	1	4	2	**16 L**
Biodiversity (Fauna)												
Loss of faunal biodiversity due to increased incidence of veld fires	3	1	8	3	**36 M**	• As above	3	1	6	2	**20 L**
Socio-economics												
Loss of property and threat to human life due to increased incidence of veld fires	3	1	6	3	**30 L**	• As above	3	1	4	2	**16 L**
Traffic and services												
Degradation of local roads due to the increase in the numbers of heavy vehicles.	2	1	6	4	**36 M**	• As above	2	1	4	3	**21 L**

Cumulative Impacts											
Biodiversity (Flora)											
Cumulative loss of Loss of Pilanesberg Mountain Bushveld vegetation classified as Least Threatened and associated loss of species richness.	3	4	6	3	**39 M**	• Pre-construction planning, including planning and preparation as per the EMPr (section 8.1) • Site establishment, including site demarcation, accommodation, pollution control, access roads, protection of flora, and protection of the riparian system as per the EMPr (section 8.2) • Materials management, including solid, liquid and hazardous waste, concrete and cement work, fuel and hazardous material as per the EMPr (section 8.3). • Stockpiles, storage and handling as per the EMPr (section 8.4). • Erosion control, including water management, storm water management, excavation, backfilling and trenching as per the EMPr (section 8.5). • Alien plant control as per the EMPr (section 8.6). • Vehicles and equipment management as per the EMPr (section 8.7). • Fire management as per the EMPr (section 8.9). • Rehabilitation as per the EMPr (section 8.10).	3	4	2	3	**27 L**
Cumulative loss of ecological function of sensitive habitats.	3	4	8	3	**45 M**		3	4	6	2	**26 L**
Cumulative reduction and damage to Conservation Important Species and protected trees. i.e. *Sclerocarya birrea subsp. caffra, Pellaea calomelanos* and *Spirostachys africana*.	3	5	8	4	**64 H**		3	5	4	2	**24 L**
Biodiversity (Fauna)											
Cumulative loss of faunal habitat.	2	4	8	3	**42 M**	• Pre-construction planning, including planning and preparation as per the EMPr (section 8.1) • Site establishment, including site demarcation, accommodation, pollution control, access roads, protection of flora, protection of the riparian system and protection of fauna as per the EMPr (section 8.2) • Materials management, including solid, liquid and hazardous waste, concrete and cement work, fuel and hazardous material as per the EMPr (section 8.3). • Erosion control, including excavation, backfilling and trenching as per the EMPr (section 8.5). • Alien plant control as per the EMPr (section 8.6).	2	4	6	2	**20 L**

						• Vehicles and equipment management as per the EMPr (section 8.7). • Socio-economic management, including staff as per the EMPr (section 8.8). • Fire management as per the EMPr (section 8.9). • Rehabilitation as per the EMPr (section 8.10).					
Heritage												
None.						•						
Socio-economics												
None.						•						
Services & traffic												
Cumulative increase in traffic and the resultant noise, dust, and safety impacts on other road users and guests.	3	1	6	4	**40 M**	• Pre-construction planning, including planning and preparation as per the EMPr (section 8.1) • Site establishment, including access roads as per the EMPr (section 8.2) • Vehicles and equipment management as per the EMPr (section 8.7). • Socio-economic management, including visual as per the EMPr (section 8.8).	3	1	4	2	**16 L**

NO-PROJECT ALTERNATIVE												
Direct Impacts												
None						•						
Indirect Impacts												
None.						•						
Cumulative Impacts												
None.						•						

2.3 Impacts that may result from the Operational Phase

Operational phase impacts refer to those impacts that may be mitigated through effective and efficient operating procedures.

Potential impacts:	Extent (1-5)	Duration (1-5)	Magnitude (0-10)	Probability (1-5)	**Significance**	Proposed mitigation:	Extent (1-5)	Duration (1-5)	Magnitude (0-10)	Probability (1-5)	**Significance**
PREFERRED ALTERNATIVE (ONLY ALTERNATIVE)											
Direct Impacts											
Ground water											
None.											
Hydrology (surface water)											
None.											
Soil											
None.											
Air											
None.											
Biodiversity (Flora)											
Destruction and damage to Conservation Important Species and protected trees. i.e. *Sclerocarya birrea subsp. caffra, Boscia albitrunca, Elaeodendron transvaalense* and *Spirostachys africana* due to uncontrolled vegetation clearing and access by staff and visitors.	1	5	8	3	**42 M**	•	1	5	4	2	**20 L**
Increase in exotic vegetation/alien species and bush encroachment into disturbed soils and areas in the event that the rehabilitation process is not successful. Colonisation and re-emergence of exotic vegetation / alien species and bush encroachment into disturbed soils and poorly rehabilitated areas. Alien invasive species tend to out-compete indigenous, slower growing species and could also result in unsuccessful rehabilitation.	1	4	8	3	**39 M**		1	4	6	2	**22 L**

Biodiversity (Fauna)												
None.												
Land Use & Agricultural Potential												
None.												
Heritage												
None.												
Visual												
Potential visual impact on sensitive visual receptors in close proximity to the proposed developments.	1	4	6	3	**33 M**	• Socio economic management, including staff management and visual impact management as per the EMPr (section 9.5)	1	4	4	3	**24 L**
Potential visual impact on sensitive visual receptors within the region	2	4	4	3	**30 L**		2	4	4	2	**20 L**
Potential visual impact on protected and conservation areas (i.e. the Waterberg Biosphere Reserve & Lapalala Wilderness Reserve) within the study area.	2	4	4	3	**30 L**		2	4	2	1	**8 N**
Potential visual impact of the solar panels on sensitive visual receptors in close proximity thereto	2	4	6	3	**36 M**		2	4	2	2	**16 L**
The potential visual impact of safety and security lighting of the developments at night on sensitive visual receptors in close proximity	2	4	6	3	**36 M**		2	4	4	2	**20 L**
Socio-economics												
None.						•						
Service and traffic												
Operational cost of running services and infrastructure, specifically electricity (positive impact). *Operational cost is expected to be minimal in the long term as a result of passice design.*	*1*	*4*	*2*	*4*	***28 L***	• Socio economic management, including staff management and visual impact management as per the EMPr (section 9.5)	*1*	*4*	*2*	*4*	***28 L***
Indirect Impacts												
Visual												
The potential visual impact of the development on the visual character of the landscape and sense of place of the region (particularly Pilanesberg National	3	4	6	3	**39 M**	• Socio economic management, including staff management and visual impact management as per the EMPr (section 9.5)	3	4	2	2	**18 L**

Park).											
Cumulative Impacts											
Biodiversity (Flora)											
None.											
Heritage											
None.						•					
Visual											
The accumulation of built forms and within an otherwise natural environment.	3	4	8	4	**60 H**	• Socio economic management, including staff management and visual impact management as per the EMPr (section 9.5)	3	4	4	2	**22 L**
Socio-economics											
None.						•					
Services and traffic											
None.						•					

NO-PROJECT ALTERNATIVE											
Direct Impacts											
No much needed upgrades to infrastructure resulting in no water savings	3	4	6	4	**52 M**	• None.	3	4	6	4	**52 M**
Indirect Impacts											
None.						•					
Cumulative Impacts											
Resulting in water loss in drought conditions	3	4	6	4	**52 M**	• None.	3	4	6	4	**52 M**

2.4 Decommissioning Phase

The decommissioning of the facility is not anticipated at this stage and, therefore, no impacts are assessed.