

**Application for Environmental Authorization in terms of Section 24 G of NEMA:  
Development of Tourist Lodge and Other Infrastructure in Qwabi Private Game  
Reserve, Limpopo Province**

**APPENDIX F IMPACT ASSESSMENT TABLES**

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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 impacts during the entire project life cycle according to the impact assessment criteria. The findings of the various specialists appointed as part of the S24 G process have informed the impact assessment below. These impacts have been supplemented with additional impacts as deemed appropriate by the EAP.

### 2.1 Impacts that resulted from the Planning, Design Phase and Construction Phases

Planning, design and Construction phase impacts have been assessed with the assumption that no mitigating effects were taken into consideration. As such, proposed mitigation measures are to be implemented during the operational phase. A retrospective assessment was conducted in order to assess potential impacts that might have occurred as a result of the unauthorised activities.

<b>Direct Impact: Ground water</b>		
<b>Nature of Impact:</b> Depletion of ground water due to overuse and waste during construction activities.		
	<b>No mitigation</b>	<b>Mitigation considered</b>
<b>Extent</b>	2	-
<b>Duration</b>	1	-
<b>Magnitude</b>	6	-
<b>Probability</b>	3	-
<b>Significance</b>	<b>27 L</b>	-
<b>Status (positive or negative)</b>	Negative	-
<b>Mitigation</b>		
Specific		
<ul style="list-style-type: none"> <li>• Ensure that the Water Use license for the property is in place and up to date.</li> <li>• Monitor water consumption to ensure that there is no undue waste. Keep up to date records of water monitoring</li> <li>• Water saving devices such as low flow shower heads and taps, and the use of grey water for activities such as road wetting and irrigation should be considered at all lodges and staff accommodation.</li> <li>• Leak detection systems should be considered, and any leaks promptly attended to.</li> <li>• Installation of water consumption monitoring meters to be undertaken at each borehole abstraction point.</li> <li>• Guests are to be sensitized to water conservation efforts through notices at the lodges.</li> </ul>		
General		
<ul style="list-style-type: none"> <li>• Ground water protection as per the EMPr (section 7.2.1)</li> </ul>		
<b>Time Frames</b>		

- Throughout operational phase. Measures to be implemented upon upgrading and maintenance of rooms.
- Installation of water consumption monitoring meters to be undertaken at each borehole abstraction point. The installation of these meter must be undertaken within 6 months of the S24G being approved.
- Water consumption to monitored on a monthly basis

**Direct Impact: Ground water**

**Nature of Impact:**

Pollution and contamination of ground water due to:

- Surface runoff
- Unmanaged sewage discharge, leaks and spills
- Solvent, paints and chemical spills
- Hydrocarbon and fuel leaks and spills

The Mvubu dam is located to the west of the Letamo Lodge. During construction materials and liquids such as cement, fuel, oil and paints could have been handled and stored incorrectly.

	<b>No mitigation</b>	<b>Mitigation considered</b>
<b>Extent</b>	2	-
<b>Duration</b>	1	-
<b>Magnitude</b>	8	-
<b>Probability</b>	3	-
<b>Significance</b>	<b>33 M</b>	-
<b>Status (positive or negative)</b>	Negative	-

**Mitigation**

Seeing as the construction of the developments has already occurred (i.e. buildings are complete and operational), many of the mitigation measures that could have been implemented cannot be.

Specific

- Quality tests on the treated waste water discharged from the existing WWTWs must be undertaken on a 4 monthly basis to ensure that the output quality of the effluent complies with the minimum standards as prescribed by DWS. These records will be kept up to date and made available upon request.
- Ensure that all hazardous substances (chemicals, oils, fuel etc.) are stored in appropriate, tamper proof containers in locked stores.
- Petroleum, chemicals must be stored in enclosed, bunded areas. The bunded areas shall be clearly marked.
- The bund must have a volume of 10% of the volume of the largest tank in the storage area plus 10% of the volume of all other tanks.
- The slab must be sloped towards a sump to enable any spilled fuel and water to be removed.
- Any wastewater collected at the sump shall be disposed of as hazardous waste.
- Ensure that no oil, petrol, diesel etc. is discharged onto the ground.
- All hazardous products to be dispensed from 200 litre drums shall be transferred by pump, and not dispensed by tipping of the drum.
- Tanks containing fuel must have lids, which are to remain firmly shut.
- Gas and liquid fuel may not be stored in the same storage area.
- Ensure that the maintenance of all vehicles and equipment, including oil and lubricant changes, takes place only within properly equipped, bunded maintenance areas or workshops.
- Pumps and other machinery requiring oil, diesel etc., which are to remain in one position for longer than two days shall be placed on drip trays. The drip trays shall be watertight and shall be emptied regularly and the contaminated water disposed off-site at a facility capable of handling such waste

liquid. Drip trays shall be cleaned before any possible rain events that may result in the drip trays overflowing

General

- Ground water protection as per the EMPr (section 7.2.1)

**Time Frames**

- Throughout the operational phase
- Quality tests on the treated waste water discharged from the existing WWTWs must be undertaken on a 4 monthly basis to ensure that the output quality of the effluent complies with the minimum standards as prescribed by DWS. These records will be kept up to date and made available upon request. The first test is to be undertaken within 2 months of the S24G being approved.

**Direct Impact: Hydrology**

**Nature of Impact:**

Disturbance and loss of ecological function of the habitat (physical structure) of the Mvubu Dam and drainage lines due to:

- Clearing and destruction of riparian vegetation
- Loss of fringing vegetation and erosion of denuded areas
- Invasion by alien invasive trees and plants
- Alteration in natural fire regimes
- Shading of natural vegetation
- Destabilization of banks

Majority of the Letamo Expansion, the WWTW and a portion of the Letamo helipad is located within Riparian wood land which is rated as having a very high sensitivity. No infrastructure is located within 32 m from any watercourse.

The ten river crossings are constructed within the watercourse.

Buildings and structures should ideally not be located or built within very high sensitivity areas, such as riparian zones, where vegetation clearing should not be undertaken.

	No mitigation	Mitigation considered
<b>Extent</b>	1	-
<b>Duration</b>	1	-
<b>Magnitude</b>	10	-
<b>Probability</b>	5	-
<b>Significance</b>	<b>60 H</b>	-
<b>Status (positive or negative)</b>	Negative	-

**Mitigation**

Seeing as the construction of the developments has already occurred (i.e. buildings are complete and operational), many of the mitigation measures that could have been implemented cannot be. Riparian vegetation has already been cleared and lost.

Specific

- No additional vegetation should be cleared within Qwabi Reserve without prior assessment and environmental authorization.
- No new developments/infrastructure should be located within Riparian Woodland vegetation rated as having a very high sensitivity.
- Natural vegetation adjacent to existing infrastructure should be deemed out of bounds to all but authorised staff to restrict movement of people and disturbance of the surrounding habitat.

- To compensate for the loss of sensitive riparian habitat, it is recommended that all existing erosion gullies around the application sites and along the Sandriver tributaries be rehabilitated. This may necessitate engineering works and sediment traps;
- All disturbed sites will be evaluated immediately from S24G approval for the presence of alien invasive species
- All rehabilitation should make use of indigenous plant species, and preferably of species native to the study area and immediate surroundings. The species selected should strive to represent habitat types typical of the ecological landscape prior to construction.
- Monitor all rehabilitated areas for at least a year following the completion of rehabilitation works for failure of vegetation to establish and / or erosion. Immediately implement remedial measures as required.
- Erosion of river banks should be monitored regularly. Should any erosion or destabilization of banks be noted, this should be rectified immediately utilizing gabion baskets, reno mattresses or the like.

General

- Surface water as per the EMPr (section 7.2.2)

**Time Frames**

- Throughout operational phase
- QPGR will develop a management and monitoring programme for alien and invasive species 6 months from the date of the S24G being approved. This programme will detail basic ID information, actions to prevent the establishment of invasive plants and methods of removal.
- Inspections should be made at least every 6 months around the application sites to ensure that no alien plants are establishing. If any are located, they should be removed immediately.

**Direct Impact: Hydrology (surface water)**

**Nature of Impact:**

Pollution and contamination of the dams and drainage lines due to:

- Unmanaged runoff of grey water, cement slurry and wash water.
- Unmanaged sewage discharge, leaks and spills
- Solvent, paints and chemical spills
- Litter and other inert construction waste.
- Hydrocarbon and fuel leaks and spills

During construction the pollution and contamination of the Mvubu dam (adjacent to Letamo Lodge) may have been a likely impact owing to the close vicinity of the Letamo lodge, WWTW and Helipad. The ten river crossings are constructed within the watercourse.

During construction materials and liquids such as cement, fuel, oil and paints could have been handled and stored incorrectly.

	<b>No mitigation</b>	<b>Mitigation considered</b>
<b>Extent</b>	3	-
<b>Duration</b>	1	-
<b>Magnitude</b>	10	-
<b>Probability</b>	4	-
<b>Significance</b>	<b>56 M</b>	-
<b>Status (positive or negative)</b>	Negative	-

**Mitigation**

Seeing as the construction of the developments has already occurred (i.e. buildings are complete and operational), many of the mitigation measures that could have been implemented cannot be.

Specific

- The existing septic tank and soakaway systems at the Management houses and APU should be replaced with a package plant WWTWs or these septic tanks connected to the existing sewer network that is connected to an existing WWTW. This should be undertaken within 2 years of the S24G being approved.
- Quality tests on the treated waste water discharged from the existing WWTWs must be undertaken on a 4 monthly basis to ensure that the output quality of the effluent complies with the minimum standards as prescribed by DWS. These records will be kept up to date and made available upon request. The first test is to be undertaken within 2 months of the S24G being approved.
- Ensure that all hazardous substances (chemicals, oils, fuel etc.) are stored in appropriate, tamper proof containers in locked stores.
- Petroleum, chemicals must be stored in enclosed, bunded areas. The bunded areas shall be clearly marked.
- The bund must have a volume of 10% of the volume of the largest tank in the storage area plus 10% of the volume of all other tanks.
- The slab must be sloped towards a sump to enable any spilled fuel and water to be removed.
- Any wastewater collected at the sump shall be disposed of as hazardous waste.
- Ensure that no oil, petrol, diesel etc. is discharged onto the ground.
- All hazardous products to be dispensed from 200 litre drums shall be transferred by pump, and not dispensed by tipping of the drum.
- Tanks containing fuel must have lids, which are to remain firmly shut.
- Gas and liquid fuel may not be stored in the same storage area.
- Ensure that the maintenance of all vehicles and equipment, including oil and lubricant changes, takes place only within properly equipped, bunded maintenance areas or workshops.
- Pumps and other machinery requiring oil, diesel etc., which are to remain in one position for longer than two days shall be placed on drip trays. The drip trays shall be watertight and shall be emptied regularly and the contaminated water disposed off-site at a facility capable of handling such waste liquid. Drip trays shall be cleaned before any possible rain events that may result in the drip trays overflowing
- All recyclables and non-recyclables are to be stored in waste cages to prevent spread into the natural environment

General

- Surface water: Pollution and Containment as per the EMP (section 7.2.3)

**Time Frames**

- Throughout the operational phase

**Direct Impact: Soil**

**Nature of Impact:**

Erosion, pollution and contamination of soils due to:

- Unmanaged surface runoff (grey water, cement slurry and wash water)
- Unmanaged sewage discharge, leaks and spills
- Solvent, paints and chemical spills
- Litter and other inert construction waste.
- Hydrocarbon and fuel leaks and spills
- The removal of stabilising vegetation
- Soil compaction by movement of construction vehicles, equipment and activities
- Decrease in water infiltration and an increase of water runoff in construction areas

During construction, erosion was a likely impact due to the clearance of vegetation and excavation which exposes soils, consequently making it vulnerable to destabilisation by wind and water.

Materials such as cement mixing, fuel, oil and paints may have been handled and stored incorrectly. During construction, soil contamination and pollution may have occurred due to possible mixing of cement directly on the ground, oil and fuel spills and leaks from machinery and general construction waste and rubble.

	<i>No mitigation</i>	<i>Mitigation considered</i>
<b>Extent</b>	1	-
<b>Duration</b>	4	-
<b>Magnitude</b>	8	-
<b>Probability</b>	4	-
<b>Significance</b>	<b>52 M</b>	-
<b>Status (positive or negative)</b>	Negative	-

**Mitigation**

Seeing as the construction of the developments has already occurred (i.e. buildings are complete and operational), many of the mitigation measures that could have been implemented cannot be.

**Specific**

- Every effort should be made to avoid unnecessary erosion of soil and sedimentation of downstream areas around the application sites, particularly as a result of storm water. This may include, but not be restricted to, the installation of drains and sediment traps along the roads;
- It is imperative that staff employ good housekeeping around each of the application sites, i.e. avoid spillage of tar and concrete, waste and toxic substances such as paint and diesel, store hazardous materials in designated safe areas;
- All waste generated at the site should be strictly controlled to avoid access from scavengers such as baboons and hyaenas and to avoid contamination of surrounding soils.
- All diesel, tar and other hazardous chemicals should be stored in environmentally safe areas and be used in environmentally sound practices;
- A storm water management plan is to be compiled and adopted and measures implemented to avoid erosion such as:
  - The accumulation of water on the surface should be prevented. The drainage of the surface should be done in such a way that storm water will be led away quickly and efficiently without any erosion taking place.
  - Do not allow surface water or storm water to canalize or be concentrated.
  - Runoff from roads must be managed to avoid erosion and pollution problems.
  - Dissipate concentrated storm water flows through energy dissipaters or vegetated areas.
  - Proactively protect steep access roads, cuttings against and other areas susceptible to erosion by installing all the necessary temporary and permanent drainage works as soon as possible and by taking such other measures as may be necessary to prevent surface water being concentrated in water sources and from scouring the slopes, banks or other areas.



<ul style="list-style-type: none"> <li>○ Repair all erosion damage as soon as possible. Do not allow erosion to develop on a large scale before effecting repairs.</li> <li>• All disturbed and eroded areas will be rehabilitated with indigenous vegetation. Rehabilitation will commence within 3 months from the S24G approval.</li> <li>• The existing septic tank and soakaway systems at the Management houses and APU should be replaced with a package plant WWTWs or these septic tanks connected to the existing sewer network that is connected to an existing WWTW. This should be undertaken within 2 years of the of the S24G being approved.</li> <li>• Quality tests on the treated waste water discharged from the existing WWTWs must be undertaken on a 4 monthly basis to ensure that the output quality of the effluent complies with the minimum standards as prescribed by DWS. These records will be kept up to date and made available upon request. The first test is to be undertaken within 2 months of the S24G being approved.</li> </ul> <p>General</p> <ul style="list-style-type: none"> <li>• Soil erosion and soil pollution and contamination as per the EMPr (section 7.3.1 and 7.3.2)</li> </ul>
<b>Time Frames</b>
<ul style="list-style-type: none"> <li>• Throughout operational phase</li> <li>• Inspections should be performed around all of the application sites after rain events to determine if erosion and/ or blockages of culverts has occurred. Any sections of road or soil found to have eroded or blocked should be repaired as soon as possible.</li> </ul>

<b>Direct Impact: Air</b>		
<b>Nature of Impact:</b>		
Dust liberated by general construction activities and movement of construction vehicles.		
The generation of dust most likely occurred due to the clearing of vegetation, levelling and movement of construction vehicles.		
	<b><i>No mitigation</i></b>	<b><i>Mitigation considered</i></b>
<b><i>Extent</i></b>	1	-
<b><i>Duration</i></b>	1	-
<b><i>Magnitude</i></b>	6	-
<b><i>Probability</i></b>	4	-
<b><i>Significance</i></b>	<b>32 M</b>	-
<b><i>Status (positive or negative)</i></b>	Negative	-
<b>Mitigation</b>		
Seeing as the construction of the developments has already occurred (i.e. buildings are complete and operational), many of the mitigation measures that could have been implemented cannot be.		
Specific		
<ul style="list-style-type: none"> <li>• Avoid unnecessary clearing of vegetation</li> <li>• Disturbed and denuded areas should be rehabilitated with indigenous vegetation</li> <li>• Speed limits should be obeyed to reduce air pollution</li> </ul>		
General		
<ul style="list-style-type: none"> <li>• Air quality as per the EMPr (section 7.3.3)</li> </ul>		
<b>Time Frames</b>		
<ul style="list-style-type: none"> <li>• As and when necessary throughout the operational phase</li> </ul>		

<b>Direct Impact: Biodiversity (Flora)</b>		
<b>Nature of Impact:</b>		
Loss of critical biodiversity areas and sensitive habitats, specifically the riparian woodland due to:		
<ul style="list-style-type: none"> <li>• Site clearing ahead of construction</li> <li>• General construction activities and movement of construction vehicles</li> </ul>		
A total of approximately 667 000 square meters of indigenous vegetation has been cleared. Additionally, majority of QPGR is classified as CBA 1 and 2.		
Clearing of vegetation and general construction activities most likely had a negative impact on the flora in the immediate area, particularly the clearing of CBA 1 and 2.		
	<b>No mitigation</b>	<b>Mitigation considered</b>
<b>Extent</b>	1	-
<b>Duration</b>	5	-
<b>Magnitude</b>	8	-
<b>Probability</b>	5	-
<b>Significance</b>	<b>70 H</b>	-
<b>Status (positive or negative)</b>	Negative	-
<b>Mitigation</b>		
Seeing as the construction of the developments has already occurred (i.e. buildings are complete and operational), many of the mitigation measures that could have been implemented cannot be. CBA vegetation has already been cleared and lost.		
Specific		
<ul style="list-style-type: none"> <li>• No additional vegetation should be cleared within Qwabi Reserve without prior assessment and environmental authorization.</li> <li>• No new developments/infrastructure should be located within Riparian Woodland vegetation rated as having a very high sensitivity.</li> <li>• Natural vegetation adjacent to existing infrastructure should be deemed out of bounds to all but authorised staff to restrict movement of people and disturbance of the surrounding habitat.</li> <li>• Do not mark or deface any natural feature.</li> <li>• No large tree (with a trunk diameter exceeding 200mm) may be felled without the permission of the ECO.</li> <li>• Consider the selective trimming of branches before opting to remove any trees.</li> <li>• Ensure that all conserved species and specimens are suitably protected for the duration of the operational phase.</li> <li>• No protected trees or plants may be removed without the relevant permits from the local authority.</li> <li>• Guests and staff may not tamper or remove flora and neither may anyone collect seed from the plants without permission from the local authority.</li> <li>• The picking of flowers or removal of plants should be prohibited in the Guest Rules.</li> <li>• No bush clearing is allowed, either to enhance game viewing, for firewood or for any other purpose.</li> <li>• Maintenance workers and guests may not trample natural vegetation and work should be restricted to dedicated roads, paths and gardens within the development footprint.</li> <li>• No unauthorised access is permitted to buffer areas or any natural areas outside of the facility footprint.</li> <li>• No wood may be collected for firewood or any other purpose.</li> </ul>		
General		
<ul style="list-style-type: none"> <li>• Biodiversity as per the EMPr (section 7.3.5)</li> </ul>		

**Time Frames**

- Throughout operational phase

**Direct Impact: Biodiversity (Flora)****Nature of Impact:**

Destruction and damage to Conservation Important Species and protected trees due to:

- Site clearing ahead of construction
- General construction activities and movement of construction vehicles

One Red Data plant species and seven protected plant species were located around the application sites during fieldwork. Several additional plant SCC and protected plants potentially occurred. However, most of these were present in low densities and many would have been avoided to include in the landscaping of, for example, the tourist lodges.

	<b>No mitigation</b>	<b>Mitigation considered</b>
<b>Extent</b>	1	-
<b>Duration</b>	5	-
<b>Magnitude</b>	8	-
<b>Probability</b>	4	-
<b>Significance</b>	<b>56 M</b>	-
<b>Status (positive or negative)</b>	Negative	-

**Mitigation**

Seeing as the construction of the developments has already occurred (i.e. buildings are complete and operational), many of the mitigation measures that could have been implemented cannot be.

## Specific

- No additional vegetation should be cleared within the Qwabi Reserve without prior authorisation;
- Natural vegetation adjacent to existing infrastructure should be deemed out of bounds to all but authorised staff to restrict movement of people and disturbance of the surrounding habitat.
- To compensate for the loss of potentially destroyed protected trees, a plant nursery should be constructed on Qwabi in an existing modified area to propagate the following species; *Sclerocarya birrea*, *Boscia albitrunca*, *Elaeodendron transvaalense*, *Combretum imberbe*, *Spirostachys Africana*, *Vachellia erioloba* and *Phyllogeiton zeyheri*. These trees can later be planted within the application sites to prevent elephant damage.
- No large tree (with a trunk diameter exceeding 200mm) may be felled without the permission of the ECO.
- Consider the selective trimming of branches before opting to remove any trees.
- Ensure that all conserved species and specimens are suitably protected for the duration of the operational phase.
- No protected trees or plants may be removed without the relevant permits from the local authority.

## General

- Biodiversity as per the EMP (section 7.3.6)

**Time Frames**

- As and when necessary

**Direct Impact: Biodiversity (Flora)**

**Nature of Impact:**

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

A low total of eight alien plant species were located within the entire Reserve during fieldwork, two of which are declared alien invasive species. Additional invasion is likely around existing infrastructure as operating activities could introduce seeds which may thrive in bare soil resulting from construction activities. Seeds falling within the watercourses could be distributed to downstream localities along the Sandrivier and effect infestations in downstream areas.

Additionally, any areas that were not rehabilitated, or where rehabilitation measures failed, could also have resulted in alien invasives taking root.

Certain alien invasive species were recorded on site, so this impact did likely occur, however, it is difficult to say if this is solely due to the construction phase.

	<b>No mitigation</b>	<b>Mitigation considered</b>
<b>Extent</b>	3	-
<b>Duration</b>	3	-
<b>Magnitude</b>	8	-
<b>Probability</b>	4	-
<b>Significance</b>	<b>56 M</b>	-
<b>Status (positive or negative)</b>	Negative	-

**Mitigation**

Seeing as the construction of the developments has already occurred (i.e. buildings are complete and operational), many of the mitigation measures that could have been implemented cannot be.

Specific

- All declared alien plants within a 50 m radius of each construction area must be eliminated according to the DFFE's published guidelines (DEA, 2015). These are species that have been listed under the National Environmental Management: Biodiversity Act (Act No. 10 OF 2004). It is imperative that the team/s tasked with this action be suitably training in removal methods, including the identification of alien plants and safe use of herbicide.
- In particular, special attention should be paid to removing *Flaveria bidentis* (Speedyweed) and *Opuntia stricta* (prickly pear), which currently pose the greatest alien invasive plant threat to biodiversity at Qwabi.
- All disturbed sites will be evaluated immediately from S24G approval for the presence of alien invasive species
- QPGR must develop a management and monitoring programme for alien and invasive species detailing basic ID information, actions to prevent the establishment of invasive plants and methods of removal.
- All disturbed sites must be monitored for colonisation by exotics or invasive plants and control these as they emerge.
- Manual / mechanical removal is preferred to chemical control.
- Grounds staff should be trained to recognize and eradicate potential invasive plants.
- Undertake yearly removal of aliens within the area (done in summer) until equilibration is reached. This may take several years.

- The Operator must implement an alien plant control program to combat the infestation present, especially along the edges and within drainage lines and wetlands. This program should include regular inspections and follow-ups.
- All rehabilitation should make use of indigenous plant species, and preferably of species native to the study area and immediate surroundings. The species selected should strive to represent habitat types typical of the ecological landscape prior to construction.
- Monitor all rehabilitated areas for at least a year following the completion of rehabilitation works for failure of vegetation to establish and / or erosion. Immediately implement remedial measures as required.

General

- Biodiversity as per the EMPr (section 7.3.7)

**Time Frames**

- Inspections should be made at least every six months around the application sites to ensure that no alien plants are establishing. If any are located, they should be removed immediately
- QPGR will develop a management and monitoring programme for alien and invasive species 6 months from the date of the S24G being approved.
- All disturbed sites will be monitored every 3 months for colonisation by exotics or invasive plants and control these as they emerge.

**Direct Impact: Biodiversity (Fauna)**

**Nature of Impact:**

Habitat fragmentation and loss due to removal and alteration of the habitat and the development of structures and infrastructure.

A total of approximately 667 000 square meters of indigenous vegetation has been cleared. Additionally, majority of QPGR is classified as CBA 1 and 2.

Unauthorised construction activities at Qwabi have resulted in the loss of 66 ha of important faunal habitat, although they would not have directly harmed any of the confirmed SCC. Some faunal SCC were only recently re-introduced into the reserve and construction activities would therefore not have affected them. Construction activities may also have displaced SCC through noise and human presence, albeit over a relatively short temporal period.

While fauna habitat was most likely destroyed due to the removal of indigenous vegetation, it is unlikely that this resulted in a large impact owing to the fact that QPGR is 15 000 Ha in extent and only 66 Ha has been transformed.

	<b>No mitigation</b>	<b>Mitigation considered</b>
<b>Extent</b>	1	-
<b>Duration</b>	4	-
<b>Magnitude</b>	6	-
<b>Probability</b>	5	-
<b>Significance</b>	<b>55 M</b>	-
<b>Status (positive or negative)</b>	Negative	-

**Mitigation**

Seeing as the construction of the developments has already occurred (i.e. buildings are complete and operational), many of the mitigation measures that could have been implemented cannot be.

Specific

- No additional vegetation should be cleared within the Qwabi Reserve without prior authorisation.

<ul style="list-style-type: none"> <li>Natural vegetation adjacent to existing infrastructure should be deemed out of bounds to all but authorised staff to restrict movement of people and disturbance of the surrounding habitat.</li> <li>To compensate for the loss of faunal habitat, it is recommended that current conservation efforts, including tracking of SCC and security infrastructure, be maintained.</li> <li>The development should maintain connectivity between ecologically important habitats by retaining natural corridors for the movement of fauna.</li> <li>No unauthorised access is permitted to buffer areas or any natural areas outside of the facility footprint.</li> <li>Maintain a game / security fence or suitable equivalent around the perimeter of the lodges and staff village. These fences should allow access by small mammals, tortoises etc.</li> </ul>
<p>General</p> <ul style="list-style-type: none"> <li>Biodiversity as per the EMPr (section 7.3.8)</li> </ul>
<p><b>Time Frames</b></p>
<ul style="list-style-type: none"> <li>Throughout operational phase</li> </ul>

<b>Direct Impact: Biodiversity (Fauna)</b>		
<p><b>Nature of Impact:</b> Poaching and snaring of fauna on site by construction staff.</p> <p>Unsupervised construction workers may have participated in small-scale poaching through setting snares or traps for bushmeat. While this is a serious impact and not to be taken lightly, it is difficult to determine if this impact occurred.</p>		
	<b>No mitigation</b>	<b>Mitigation considered</b>
<b>Extent</b>	2	-
<b>Duration</b>	1	-
<b>Magnitude</b>	8	-
<b>Probability</b>	3	-
<b>Significance</b>	<b>33 M</b>	-
<b>Status (positive or negative)</b>	Negative	-
<b>Mitigation</b>		
<p>Specific</p> <ul style="list-style-type: none"> <li>No poaching or snaring of any game is permitted. Reserve Management must implement fines in this regard.</li> <li>QPGR will undertake bimonthly checks of the surrounding natural vegetation and along game paths to ensure no traps have been set. Remove and dispose of any snares or traps found on or adjacent to the site. Must implement fines in this regard.</li> </ul>		
<p>General</p> <ul style="list-style-type: none"> <li>Biodiversity as per the EMPr (section 7.3.10)</li> </ul>		
<b>Time Frames</b>		
<ul style="list-style-type: none"> <li>As and when necessary throughout the operational phase</li> </ul>		

<b>Direct Impact: Heritage</b>		
<b>Nature of Impact:</b> Damage to and / or destruction of archaeological, paleontological or historical artefacts unearthed during construction due to:		
<ul style="list-style-type: none"> <li>• Site clearing ahead of construction</li> <li>• General construction activities and movement of construction vehicles</li> </ul>		
It is unlikely that any impacts on heritage resources occurred during the construction phase. A retroactive heritage impact assessment was conducted and no evidence of any heritage artefacts were found within the sites.		
	<b>No mitigation</b>	<b>Mitigation considered</b>
<b>Extent</b>	1	-
<b>Duration</b>	5	-
<b>Magnitude</b>	6	-
<b>Probability</b>	2	-
<b>Significance</b>	<b>24 L</b>	-
<b>Status (positive or negative)</b>	Negative	-
<b>Mitigation</b>		
Specific <ul style="list-style-type: none"> <li>• If archaeological or historical 'chance finds' are encountered, then work in the area must be halted, and a heritage specialist must be called to assess the situation and make recommendations.</li> <li>• If any fossils are discovered then a palaeontologist must be called to assess their importance and rescue them if necessary.</li> <li>• In areas where the vegetation is threatening the heritage sites, e.g. growing trees pushing walls over, it should be removed, but only after permission for the methods proposed has been granted by SAHRA. A heritage official should be part of the team executing these measures.</li> </ul>		
General <ul style="list-style-type: none"> <li>• Heritage management as per the EMPr (section 7.4.1)</li> </ul>		
<b>Time Frames</b>		
<ul style="list-style-type: none"> <li>• Throughout operational phase</li> </ul>		

<b>Direct Impact: Visual</b>		
<b>Nature of Impact:</b> Visual impact of construction, lighting and dust on sensitive visual receptors owing to the presence of construction equipment, camps and workers.		
Majority of the visual impact was confined within the boundaries of QPGR.		
	<b>No mitigation</b>	<b>Mitigation considered</b>
<b>Extent</b>	2	-
<b>Duration</b>	1	-
<b>Magnitude</b>	8	-
<b>Probability</b>	3	-
<b>Significance</b>	<b>33 M</b>	-
<b>Status (positive or negative)</b>	Negative	-
<b>Mitigation</b>		
Seeing as the construction of the developments has already occurred (i.e. buildings are complete and operational), many of the mitigation measures that could have been implemented cannot be.		
Specific <ul style="list-style-type: none"> <li>• Rehabilitate all disturbed areas, construction areas, roads, slopes etc.</li> </ul>		

<ul style="list-style-type: none"> <li>Retain and maintain natural vegetation in all areas outside of the development footprints.</li> <li>Maintain the general appearance of all of the sites as a whole, including roads and servitudes.</li> </ul>
General <ul style="list-style-type: none"> <li>Visual Impact management as per the EMPr (section 7.5.1)</li> </ul>
<b>Time Frames</b>
<ul style="list-style-type: none"> <li>Rehabilitation of disturbed sites to be undertaken in the next growing season</li> </ul>

<b>Direct Impact: Visual</b>		
<b>Nature of Impact:</b>		
Impact on visual quality of the surrounding area and sense of place due to the development of structures and infrastructure at the property within an otherwise natural environment.		
	<b>No mitigation</b>	<b>Mitigation considered</b>
<b>Extent</b>	2	-
<b>Duration</b>	4	-
<b>Magnitude</b>	4	-
<b>Probability</b>	4	-
<b>Significance</b>	<b>40 M</b>	-
<b>Status (positive or negative)</b>	Negative	-
<b>Mitigation</b>		
Seeing as the construction of the developments has already occurred (i.e. buildings are complete and operational), many of the mitigation measures that could have been implemented cannot be.		
Specific		
<ul style="list-style-type: none"> <li>Rehabilitate all disturbed areas, construction areas, roads, slopes etc.</li> <li>Retain and maintain natural vegetation in all areas outside of the development footprints.</li> <li>Maintain the general appearance of all of the sites as a whole, including roads and servitudes.</li> </ul>		
General		
<ul style="list-style-type: none"> <li>Visual impact management as per the EMPr (section 7.5.1)</li> </ul>		
<b>Time Frames</b>		
<ul style="list-style-type: none"> <li>Throughout operational phase</li> </ul>		

<b>Direct Impact: Socio-economics</b>		
<b>Nature of Impact:</b>		
<i>Stimulation of the local economy, especially the local service delivery industry (i.e. accommodation, catering, cleaning, transport and security, etc.) and creation of short term employment.</i>		
The construction of the infrastructure allowed for the creation of job opportunities within the region.		
	<b>No mitigation</b>	<b>Mitigation considered</b>
<b>Extent</b>	3	-
<b>Duration</b>	1	-
<b>Magnitude</b>	4	-
<b>Probability</b>	3	-
<b>Significance</b>	<b>24 L</b>	-
<b>Status (positive or negative)</b>	Positive	-
<b>Mitigation</b>		
Specific		
<ul style="list-style-type: none"> <li></li> </ul>		
General		



<ul style="list-style-type: none"> <li>Socio economic management as per the EMPr (section 7.5.2)</li> </ul>
<b>Time Frames</b>
N/A

<b>Direct Impact: Socio-economics</b>		
<b>Nature of Impact:</b>		
Noise, dust and safety impacts and disturbance to adjacent landowners due to general construction activities and movement of construction vehicles.		
There are no immediate neighbours around the camps located within QPGR, and majority of the impacts was confined within the boundaries of QPGR. Noise sources would have been from construction vehicles and machinery.		
	<b>No mitigation</b>	<b>Mitigation considered</b>
<b>Extent</b>	1	-
<b>Duration</b>	1	-
<b>Magnitude</b>	4	-
<b>Probability</b>	4	-
<b>Significance</b>	<b>24 L</b>	-
<b>Status (positive or negative)</b>	Negative	-
<b>Mitigation</b>		
Specific		
<ul style="list-style-type: none"> <li>Noisy activities should be conducted during daylight hours only.</li> <li>All neighbours should be notified ahead of time of any noisy activities that are to take place.</li> <li>Speed limits on all roads are to be strictly adhered to at all times. Fines are to be implemented in this regard.</li> </ul>		
General		
<ul style="list-style-type: none"> <li>Socio economic management as per the EMPr (section 7.5.2)</li> </ul>		
<b>Time Frames</b>		
<ul style="list-style-type: none"> <li>As and when necessary throughout the operational phase</li> </ul>		

<b>Cumulative Impacts: Biodiversity (Flora)</b>		
<b>Nature of Impact:</b>		
Cumulative loss of critical biodiversity areas and sensitive habitats		
	<b>No mitigation</b>	<b>Mitigation considered</b>
<b>Extent</b>	2	-
<b>Duration</b>	4	-
<b>Magnitude</b>	6	-
<b>Probability</b>	3	-
<b>Significance</b>	<b>48 M</b>	-
<b>Status (positive or negative)</b>	Negative	-
<b>Mitigation</b>		
Specific		
<ul style="list-style-type: none"> <li>No additional vegetation should be cleared within Qwabi Reserve without prior assessment and environmental authorization.</li> <li>No new developments/infrastructure should be located within Riparian Woodland vegetation rated as having a very high sensitivity.</li> <li>Natural vegetation adjacent to existing infrastructure should be deemed out of bounds to all but authorised staff to restrict movement of people and disturbance of the surrounding habitat.</li> <li>Do not mark or deface any natural feature.</li> </ul>		

- No large tree (with a trunk diameter exceeding 200mm) may be felled without the permission of the ECO.
- Consider the selective trimming of branches before opting to remove any trees.
- Ensure that all conserved species and specimens are suitably protected for the duration of the operational phase.
- No protected trees or plants may be removed without the relevant permits from the local authority.
- Guests and staff may not tamper or remove flora and neither may anyone collect seed from the plants without permission from the local authority.
- The picking of flowers or removal of plants should be prohibited in the Guest Rules.
- No bush clearing is allowed, either to enhance game viewing, for firewood or for any other purpose.
- Maintenance workers and guests may not trample natural vegetation and work should be restricted to dedicated roads, paths and gardens within the development footprint.
- No unauthorised access is permitted to buffer areas or any natural areas outside of the facility footprint.
- No wood may be collected for firewood or any other purpose.

General

- Biodiversity as per the EMPr (section 7.3.5)

**Time Frames**

- Throughout operational phase

**Cumulative Impacts: Biodiversity (Flora)**

**Nature of Impact:**

Cumulative reduction and damage to Conservation Important Species and protected trees.

	<b>No mitigation</b>	<b>Mitigation considered</b>
<b>Extent</b>	2	-
<b>Duration</b>	2	-
<b>Magnitude</b>	6	-
<b>Probability</b>	5	-
<b>Significance</b>	<b>50 M</b>	-
<b>Status (positive or negative)</b>	Negative	-

**Mitigation**

Specific

- No additional vegetation should be cleared within the Qwabi Reserve without prior authorisation;
- Natural vegetation adjacent to existing infrastructure should be deemed out of bounds to all but authorised staff to restrict movement of people and disturbance of the surrounding habitat.
- To compensate for the loss of potentially destroyed protected trees, a plant nursery should be constructed on Qwabi in an existing modified area to propagate the species listed in Table 12 in the Ecology Report. These trees can later be planted within the application sites to prevent elephant damage;
- No large tree (with a trunk diameter exceeding 200mm) may be felled without the permission of the ECO.
- Consider the selective trimming of branches before opting to remove any trees.
- Ensure that all conserved species and specimens are suitably protected for the duration of the operational phase.
- No protected trees or plants may be removed without the relevant permits from the local authority.

General

- Biodiversity as per the EMPr (section 7.3.6)

**Time Frames**

- Throughout operational phase

<b>Cumulative Impacts: Biodiversity (Fauna)</b>		
<b>Nature of Impact:</b> Cumulative loss of faunal habitat.		
	<b><i>No mitigation</i></b>	<b><i>Mitigation considered</i></b>
<b><i>Extent</i></b>	2	-
<b><i>Duration</i></b>	4	-
<b><i>Magnitude</i></b>	8	-
<b><i>Probability</i></b>	3	-
<b><i>Significance</i></b>	<b>42 M</b>	-
<b><i>Status (positive or negative)</i></b>	Negative	-
<b>Mitigation</b>		
Specific <ul style="list-style-type: none"> <li>• The development should maintain connectivity between ecologically important habitats by retaining natural corridors for the movement of fauna.</li> <li>• No unauthorised access is permitted to buffer areas or any natural areas outside of the facility footprint.</li> <li>• Maintain a game / security fence or suitable equivalent around the perimeter of the lodges and staff village. These fences should allow access by small mammals, tortoises etc.</li> </ul>		
General <ul style="list-style-type: none"> <li>• Biodiversity as per the EMPr (section 7.3.8)</li> </ul>		
<b>Time Frames</b>		
<ul style="list-style-type: none"> <li>• Throughout operational phase</li> </ul>		

## 2.3 Impacts resulting from the Operational Phase

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

<b>Direct Impacts: Ground water</b>		
<b>Nature of Impact:</b> Depletion of ground water resources due to over use and waste during operation.		
Water saving measures should be put into place in the lodges and staff accommodation to prevent unnecessary waste of water.		
	<b>No mitigation</b>	<b>Mitigation considered</b>
<b>Extent</b>	3	3
<b>Duration</b>	4	4
<b>Magnitude</b>	4	2
<b>Probability</b>	3	2
<b>Significance</b>	<b>33 M</b>	<b>18 L</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Mitigation</b>		
Specific		
<ul style="list-style-type: none"> <li>• Water saving devices such as low flow shower heads and taps, and the use of grey water for on potable activities such as road wetting and irrigation should be considered at all lodges and staff accommodation.</li> <li>• Leak detection systems should be considered, and any leaks promptly attended to.</li> <li>• Undertake monthly potable water monitoring to ensure that the output quality of the water complies with the minimum standards as prescribed by DWS. Ensure that these records are kept up to date and are available upon request.</li> <li>• Water saving measures should be implemented where possible. This may include the use of low-flow shower heads, the use of draught resistant species in landscaping around the lodges, limiting irrigation to the volumes that can be obtained from wastewater treatment and embarking on a staff and guest awareness programme around responsible use of water.</li> <li>• Installation of water consumption monitoring meters to be undertaken at each borehole abstraction point.</li> <li>• Ensure that all facility staff is trained in water wise principles, and that they practise prudent use of water at all times.</li> <li>• Post a Code of Conduct in guest rooms and other relevant advising guests of relevant Reserve rules and regulations.</li> </ul>		
General		
<ul style="list-style-type: none"> <li>• Ground water protection as per the EMPr (section 7.2.1)</li> </ul>		
<b>Time Frames</b>		
<ul style="list-style-type: none"> <li>• Monthly water quality tests to be undertaken</li> <li>• Installation of water saving devices in lodges as maintenance and upgrades occur</li> <li>• Installation of water consumption monitoring meters to be undertaken at each borehole abstraction point. The installation of these meter must be undertaken within 6 months of the S24G being approved.</li> </ul>		

<b>Direct Impacts: Ground water</b>		
<b>Nature of Impact:</b>		
Pollution and contamination of ground water due to:		
<ul style="list-style-type: none"> <li>• Unmanaged storm water runoff</li> <li>• Unmanaged sewage discharge from WWTW</li> <li>• Sewage leaks and spills from WWTW</li> <li>• Herbicides, pesticides and fertilisers</li> <li>• Discharge and spill of solvents, paints, chemicals and cleaning products</li> <li>• Discharge and spill of hydrocarbons and fuel</li> </ul>		
Majority of the waste water treatment works employed are Bio-Mite package plants, which are enclosed container systems and in good working order. The quality of the treated effluent is has been tested and meets the requirement of DWS.		
Septic tank systems are utilized however at Management houses, and these systems have a higher risk of leaking.		
	<b>No mitigation</b>	<b>Mitigation considered</b>
<b>Extent</b>	3	3
<b>Duration</b>	4	4
<b>Magnitude</b>	10	6
<b>Probability</b>	5	2
<b>Significance</b>	<b>85 H</b>	<b>26 L</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Mitigation</b>		
Specific		
<ul style="list-style-type: none"> <li>• The existing septic tank and soakaway systems at the Management houses and APU should be replaced with a package plant WWTWs or these septic tanks connected to the existing sewer network that is connected to an existing WWTW. This should be undertaken within 2 years of the of the S24G being approved.</li> <li>• Quality tests on the treated waste water discharged from the existing WWTWs must be undertaken on a 4 monthly basis to ensure that the output quality of the effluent complies with the minimum standards as prescribed by DWS. These records will be kept up to date and made available upon request.</li> <li>• Ensure that all hazardous substances (chemicals, oils, etc.) are stored in appropriate, tamper proof containers in locked stores.</li> <li>• Petroleum, chemical, harmful and hazardous materials must be stored in enclosed, bunded areas. The bunded areas shall be clearly marked.</li> <li>• The bund must have a volume of 10% of the volume of the largest tank in the storage area plus 10% of the volume of all other tanks.</li> <li>• The slab must be sloped towards a sump to enable any spilled fuel and water to be removed.</li> <li>• Any wastewater collected at the sump shall be disposed of as hazardous waste.</li> <li>• Ensure that no oil, petrol, diesel etc. is discharged onto the ground.</li> <li>• Any machinery or vehicles standing in place for more than 2 days must utilize drip trays.</li> <li>• A storm water management plan must be complied and adopted.</li> </ul>		
General		
<ul style="list-style-type: none"> <li>• Ground water protection as per the EMPr (section 7.2.1)</li> </ul>		
<b>Time Frames</b>		

- Quality tests on the treated waste water discharged from the existing WWTWs must be undertaken on a 4 monthly basis to ensure that the output quality of the effluent complies with the minimum standards as prescribed by DWS. These records will be kept up to date and made available upon request. The first test is to be undertaken within 2 months of the S24G being approved. Storm water management plan to be compiled within the next 6 months

### Direct Impacts: Hydrology (Surface water)

#### Nature of Impact:

Disturbance, alteration and loss of ecological function of the habitat of the various dams and drainage lines due to the construction of river crossings, encroachment of alien invasive species, uncontrolled vegetation clearing and access by staff and visitors and habitat destruction.

	<i>No mitigation</i>	<i>Mitigation considered</i>
<b>Extent</b>	2	2
<b>Duration</b>	4	4
<b>Magnitude</b>	8	4
<b>Probability</b>	4	3
<b>Significance</b>	<b>56 M</b>	<b>33 M</b>
<b>Status (positive or negative)</b>	Negative	Negative

#### Mitigation

##### Specific

- No additional vegetation should be cleared within Qwabi Reserve without prior assessment and environmental authorization.
- No new developments/infrastructure should be located within Riparian Woodland vegetation rated as having a very high sensitivity.
- Natural vegetation adjacent to existing infrastructure should be deemed out of bounds to all but authorised staff to restrict movement of people and disturbance of the surrounding habitat.
- To compensate for the loss of sensitive riparian habitat, it is recommended that all existing erosion gullies around the application sites and along the Sandriver tributaries be rehabilitated. This may necessitate engineering works and sediment traps
- Existing watercourse crossings should have regular maintenance undertaken to prevent degradation, siltation and blockages.
- All dam walls should be inspected after rain events to assess whether any structural damage has taken place. If found, these should be repaired promptly
- All disturbed sites should be evaluated for the presence of alien invasive species
- QPGR must develop a management and monitoring programme for alien and invasive species detailing basic ID information, actions to prevent the establishment of invasive plants and methods of removal.
- All rehabilitation should make use of indigenous plant species, and preferably of species native to the study area and immediate surroundings. The species selected should strive to represent habitat types typical of the ecological landscape prior to construction.
- Manual / mechanical removal is preferred to chemical control.
- Grounds staff should be trained to recognize and eradicate potential invasive plants.
- Undertake yearly removal of aliens within the area (done in summer) until equilibration is reached. This may take several years.
- The Operator must implement an alien plant control program to combat the infestation present, especially along the edges and within drainage lines and wetlands. This program should include regular inspections and follow-ups.
- Disturbed areas to be rehabilitated with indigenous vegetation and the areas monitored.

- Erosion of river banks should be monitored regularly. Should any erosion or destabilization of banks be noted, this should be rectified immediately utilizing gabion baskets, reno mattresses or the like.

General

- Surface water as per the EMPr (section 7.2.2)

**Time Frames**

- Alien vegetation to be removed immediately and the sites monitored for re-emerging
- QPGR will develop a management and monitoring programme for alien and invasive species 6 months from the date of the S24G being approved. This programme will detail basic ID information, actions to prevent the establishment of invasive plants and methods of removal.
- Inspections should be made at least every 6 months around the application sites to ensure that no alien plants are establishing. If any are located, they should be removed immediately.

**Direct Impacts: Hydrology (Surface water)**

**Nature of Impact:**

Pollution and contamination of surface water due to:

- Unmanaged storm water runoff
- Litter and uncontrolled waste
- Sewage leaks and spills from WWTW
- Herbicides, pesticides and fertilisers
- Discharge and spill of solvents, paints, chemicals and cleaning products
- Discharge and spill of hydrocarbons and fuel

Waste water treatment is undertaken via Bio-mite package plants, with the exception of two septic tanks that are in place at the Management houses and APU. The WWTWs at Letamo and Babohi Lodges are located in close proximity to a dam and drainage line respectively.

The current WWTW are in good working order and effluent meets the requirements of DWS.

	<b>No mitigation</b>	<b>Mitigation considered</b>
<b>Extent</b>	2	2
<b>Duration</b>	4	4
<b>Magnitude</b>	10	4
<b>Probability</b>	2	1
<b>Significance</b>	<b>32 M</b>	<b>10 N</b>
<b>Status (positive or negative)</b>	Negative	Negative

**Mitigation**

Specific

- The existing septic tank and soakaway systems at the Management houses and APU should be replaced with a package plant WWTWs or these septic tanks connected to the existing sewer network that is connected to an existing WWTW. This should be undertaken within 2 years of the S24G being approved.
- Quality tests on the treated waste water discharged from the existing WWTWs must be undertaken on a 4 monthly basis to ensure that the output quality of the effluent complies with the minimum standards as prescribed by DWS. These records will be kept up to date and made available upon request. The first test is to be undertaken within 2 months of the S24G being approved.
- Leak detection systems should be considered, and any leaks promptly attended to.
- Undertake regular routine maintenance on all WWTW to keep them in good working order.

- Ensure that all hazardous substances (chemicals, oils, fuel etc.) are stored in appropriate, tamper proof containers in locked stores.
- Petroleum, chemicals must be stored in enclosed, bunded areas. The bunded areas shall be clearly marked.
- The bund must have a volume of 10% of the volume of the largest tank in the storage area plus 10% of the volume of all other tanks.
- The slab must be sloped towards a sump to enable any spilled fuel and water to be removed.
- Any wastewater collected at the sump shall be disposed of as hazardous waste.
- Ensure that no oil, petrol, diesel etc. is discharged onto the ground.
- All hazardous products to be dispensed from 200 litre drums shall be transferred by pump, and not dispensed by tipping of the drum.
- Tanks containing fuel must have lids, which are to remain firmly shut.
- Gas and liquid fuel may not be stored in the same storage area.
- Ensure that the maintenance of all vehicles and equipment, including oil and lubricant changes, takes place only within properly equipped, bunded maintenance areas or workshops.
- Pumps and other machinery requiring oil, diesel etc., which are to remain in one position for longer than two days shall be placed on drip trays. The drip trays shall be watertight and shall be emptied regularly and the contaminated water disposed off-site at a facility capable of handling such waste liquid. Drip trays shall be cleaned before any possible rain events that may result in the drip trays overflowing
- All recyclables and non-recyclables are to be stored in waste cages to prevent spread into the natural environment
- A storm water management plan must be compiled and adopted.

General

- Surface water: Pollution and Containment as per the EMPr (section 7.2.3)

**Time Frames**

- Undertake daily visual inspections of WWTW to ensure all electrical components are in working order.
- Check the level of chlorine in the WWTW weekly.
- On a monthly basis check the air lines and water pipes for leaks, air filters on the blower units and float switch on the pump.
- Service the septic tank/bio-reactors on a yearly basis.
- Storm water management plan to be compiled within the next 6 months

**Direct Impacts: Soil**

**Nature of Impact:**

Soil contamination and pollution due to:

- Unmanaged storm water runoff
- Litter and uncontrolled waste
- Sewage leaks and spills from WWTW
- Herbicides, pesticides and fertilisers
- Discharge and spill of solvents, paints, chemicals and cleaning products
- Discharge and spill of hydrocarbons and fuel

Waste water treatment is undertaken via Bio-mite package plants, with the exception of two septic tanks that are in place at the Management houses and APU. The WWTWs at Letamo and Babohi Lodges are located in close proximity to a dam and drainage line respectively.

The current WWTW are in good working order and effluent meets the requirements of DWS.

	<b>No mitigation</b>	<b>Mitigation considered</b>
<b>Extent</b>	1	1



<b>Duration</b>	1	1
<b>Magnitude</b>	8	4
<b>Probability</b>	2	1
<b>Significance</b>	<b>20 L</b>	<b>6 N</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Mitigation</b>		
Specific		
<ul style="list-style-type: none"> <li>• The existing septic tank and soakaway systems at the Management houses and APU should be replaced with a package plant WWTWs or these septic tanks connected to the existing sewer network that is connected to an existing WWTW. This should be undertaken within 2 years of the of the S24G being approved.</li> <li>• Quality tests on the treated waste water discharged from the existing WWTWs must be undertaken on a 4 monthly basis to ensure that the output quality of the effluent complies with the minimum standards as prescribed by DWS. These records will be kept up to date and made available upon request. The first test is to be undertaken within 2 months of the S24G being approved.</li> <li>• Leak detection systems should be considered, and any leaks promptly attended to.</li> <li>• Undertake regular routine maintenance on all WWTW to keep them in good working order.</li> <li>• Ensure that all hazardous substances (chemicals, oils, fuel etc.) are stored in appropriate, tamper proof containers in locked stores.</li> <li>• Petroleum, chemicals must be stored in enclosed, bunded areas. The bunded areas shall be clearly marked.</li> <li>• The bund must have a volume of 10% of the volume of the largest tank in the storage area plus 10% of the volume of all other tanks.</li> <li>• The slab must be sloped towards a sump to enable any spilled fuel and water to be removed.</li> <li>• Any wastewater collected at the sump shall be disposed of as hazardous waste.</li> <li>• Ensure that no oil, petrol, diesel etc. is discharged onto the ground.</li> <li>• All hazardous products to be dispensed from 200 litre drums shall be transferred by pump, and not dispensed by tipping of the drum.</li> <li>• Tanks containing fuel must have lids, which are to remain firmly shut.</li> <li>• Gas and liquid fuel may not be stored in the same storage area.</li> <li>• Ensure that the maintenance of all vehicles and equipment, including oil and lubricant changes, takes place only within properly equipped, bunded maintenance areas or workshops.</li> <li>• Pumps and other machinery requiring oil, diesel etc., which are to remain in one position for longer than two days shall be placed on drip trays. The drip trays shall be watertight and shall be emptied regularly and the contaminated water disposed off-site at a facility capable of handling such waste liquid. Drip trays shall be cleaned before any possible rain events that may result in the drip trays overflowing</li> <li>• All recyclables and non-recyclables are to be stored in waste cages to prevent spread into the natural environment</li> <li>• A storm water management plan must be compiled and adopted.</li> <li>• The old quarry pit site is to be rehabilitated within 2 months from the date of filling and closure and fully rehabilitated within 3 months thereof. All waste will be removed and disposed of at a licenced landfill site.</li> </ul>		
General		
<ul style="list-style-type: none"> <li>• Soil erosion and soil pollution and contamination as per the EMPr (section 7.3.1 and 7.3.2)</li> </ul>		
<b>Time Frames</b>		

- Undertake daily visual inspections of WWTW to ensure all electrical components are in working order.
- Check the level of chlorine in the WWTW weekly.
- On a monthly basis check the air lines and water pipes for leaks, air filters on the blower units and float switch on the pump.
- Service the septic tank/bio-reactors on a yearly basis.
- Storm water management plan to be compiled within the next 6 months

#### Direct Impacts: Soil

##### Nature of Impact:

Soil erosion due to:

- Soil compaction by uncontrolled movement of staff and visitors (especially vehicles)
- Runoff over exposed or cleared areas that have failed to rehabilitate.
- Disturbance of sensitive soils by uncontrolled movement of staff and visitors (especially vehicles)

Small amounts of erosion were noted on site.

	<i>No mitigation</i>	<i>Mitigation considered</i>
<b>Extent</b>	1	1
<b>Duration</b>	4	4
<b>Magnitude</b>	8	4
<b>Probability</b>	3	2
<b>Significance</b>	<b>39 M</b>	<b>18 L</b>
<b>Status (positive or negative)</b>	Negative	Negative

##### Mitigation

Specific

- No additional vegetation should be cleared within the Qwabi Reserve without prior authorisation.
- It is recommended that natural vegetation adjacent to existing infrastructure should be deemed out of bounds to all but authorised staff to restrict movement of people and disturbance of the surrounding habitat.
- Every effort should be made to avoid unnecessary erosion of soil and sedimentation of downstream areas around the application sites, particularly as a result of storm water. This may include, but not be restricted to, the installation of drains and sediment traps along the roads;
- A storm water management plan is to be compiled and adopted and measures implemented to avoid erosion such as:
  - The accumulation of water on the surface should be prevented. The drainage of the surface should be done in such a way that storm water will be led away quickly and efficiently without any erosion taking place.
  - Do not allow surface water or storm water to canalize or be concentrated.
  - Runoff from roads must be managed to avoid erosion and pollution problems.
  - Dissipate concentrated storm water flows through energy dissipaters or vegetated areas.
  - Proactively protect steep access roads, cuttings against and other areas susceptible to erosion by installing all the necessary temporary and permanent drainage works as soon as possible and by taking such other measures as may be necessary to prevent surface water being concentrated in water sources and from scouring the slopes, banks or other areas.
  - Repair all erosion damage as soon as possible. Do not allow erosion to develop on a large scale before effecting repairs.
- All disturbed areas are to be rehabilitated with indigenous vegetation.

General

- Soil erosion and soil pollution and contamination as per the EMP (section 7.3.1 and 7.3.2)

<b>Time Frames</b>
<ul style="list-style-type: none"> <li>Storm water management plan to be compiled within the next 6 months</li> <li>Rehabilitation of disturbed sites to be undertaken in the next growing season (August/September)</li> <li>Inspections should be performed around all of the application sites after rain events to determine if erosion and/ or blockages of culverts has occurred. Any sections of road or soil found to have eroded or blocked should be repaired as soon as possible.</li> </ul>

<b>Direct Impacts: Air</b>		
<b>Nature of Impact:</b> Air pollution by emissions from game drive vehicles and private vehicles.		
	<b>No mitigation</b>	<b>Mitigation considered</b>
<b>Extent</b>	2	2
<b>Duration</b>	4	4
<b>Magnitude</b>	4	4
<b>Probability</b>	3	3
<b>Significance</b>	<b>30 L</b>	<b>30 L</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Mitigation</b>		
Specific <ul style="list-style-type: none"> <li>Maintain site vehicles and equipment in an acceptable state of repair.</li> <li>Carpools and lift clubs must be encouraged and staff picked up at a central point. Staff must not be discouraged from travelling to site in private vehicles.</li> </ul>		
General <ul style="list-style-type: none"> <li>Air quality as per the EMPr (section 7.3.3)</li> </ul>		
<b>Time Frames</b>		
<ul style="list-style-type: none"> <li>Throughout operational phase</li> </ul>		

<b>Direct Impacts: Biodiversity (Flora)</b>		
<b>Nature of Impact:</b> <i>Rehabilitation of old cultivated fields and lands.</i>		
<i>Just under 1000 Ha of old roads, fencelines and bush encroachment areas have been rehabilitated and restored to their natural indigenous vegetation.</i>		
	<b>No mitigation</b>	<b>Mitigation considered</b>
<b>Extent</b>	1	1
<b>Duration</b>	4	4
<b>Magnitude</b>	8	8
<b>Probability</b>	5	5
<b>Significance</b>	<b>65 H</b>	<b>65 H</b>
<b>Status (positive or negative)</b>	Positive	Positive
<b>Mitigation</b>		
Specific <ul style="list-style-type: none"> <li>All rehabilitation will make use of indigenous plant species, and species native to the study area and immediate surroundings. The species selected will strive to represent habitat types typical of the ecological landscape prior to the clearing of these old lands.</li> <li>All rehabilitated areas will be monitored annually following the completion of rehabilitation works for failure of vegetation to establish and / or erosion. Immediately implement remedial measures as required.</li> </ul>		

General
<ul style="list-style-type: none"> <li>Biodiversity as per the EMPr (section 7.3.4)</li> </ul>
<b>Time Frames</b>
<ul style="list-style-type: none"> <li>Monitor for at least a year following rehabilitation</li> </ul>

<b>Direct Impacts: Biodiversity (Flora)</b>		
<b>Nature of Impact:</b>		
Loss of critical biodiversity areas and sensitive habitats, specifically the riparian woodland, due to:		
<ul style="list-style-type: none"> <li>Uncontrolled vegetation clearing and access by staff and visitors</li> <li>Encroachment of alien invasive species</li> <li>Litter and waste</li> </ul>		
Majority of QPGR is located in CBA 1 and 2, where the total disturbed footprint is approximately 66 Ha.		
	<b>No mitigation</b>	<b>Mitigation considered</b>
<b>Extent</b>	1	1
<b>Duration</b>	4	4
<b>Magnitude</b>	8	6
<b>Probability</b>	3	2
<b>Significance</b>	<b>39 M</b>	<b>22 L</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Mitigation</b>		
Specific		
<ul style="list-style-type: none"> <li>No additional vegetation should be cleared within Qwabi Reserve without prior assessment and environmental authorization.</li> <li>No new developments/infrastructure should be located within Riparian Woodland vegetation rated as having a very high sensitivity.</li> <li>Natural vegetation adjacent to existing infrastructure should be deemed out of bounds to all but authorised staff to restrict movement of people and disturbance of the surrounding habitat.</li> <li>All declared alien plants within a 50 m radius of each construction area must be eliminated according to the DFFE's published guidelines (DEA, 2015). These are species that have been listed under the National Environmental Management: Biodiversity Act (Act No. 10 OF 2004). It is imperative that the team/s tasked with this action be suitably training in removal methods, including the identification of alien plants and safe use of herbicide.</li> <li>In particular, special attention should be paid to removing <i>Flaveria bidentis</i> (Speedyweed) and <i>Opuntia stricta</i> (prickly pear), which currently pose the greatest alien invasive plant threat to biodiversity at Qwabi.</li> <li>Do not mark or deface any natural feature.</li> <li>No large tree (with a trunk diameter exceeding 200mm) may be felled without the permission of the ECO.</li> <li>Consider the selective trimming of branches before opting to remove any trees.</li> <li>Ensure that all conserved species and specimens are suitably protected for the duration of the operational phase.</li> <li>No protected trees or plants may be removed without the relevant permits from the local authority.</li> <li>Guests and staff may not tamper or remove flora and neither may anyone collect seed from the plants without permission from the local authority.</li> <li>The picking of flowers or removal of plants should be prohibited in the Guest Rules.</li> <li>No bush clearing is allowed, either to enhance game viewing, for firewood or for any other purpose.</li> </ul>		

- Maintenance workers and guests may not trample natural vegetation and work should be restricted to dedicated roads, paths and gardens within the development footprint.
- No unauthorised access is permitted to buffer areas or any natural areas outside of the facility footprint.
- No wood may be collected for firewood or any other purpose.
- All recyclables and non-recyclables are to be stored in waste cages to prevent spread into the natural environment prior to being collected by outside contractors
- The informal dumping area is to be rehabilitated and all waste removed and disposed of at a licenced landfill site.
- All disturbed sites should be evaluated for the presence of alien invasive species
- QPGR must develop a management and monitoring programme for alien and invasive species detailing basic ID information, actions to prevent the establishment of invasive plants and methods of removal.
- All disturbed sites must be monitored for colonisation by exotics or invasive plants and control these as they emerge.
- Manual / mechanical removal is preferred to chemical control.
- Grounds staff should be trained to recognize and eradicate potential invasive plants.
- Undertake yearly removal of aliens within the area (done in summer) until equilibration is reached. This may take several years.
- The Operator must implement an alien plant control program to combat the infestation present, especially along the edges and within drainage lines and wetlands. This program should include regular inspections and follow-ups.
- Disturbed areas to be rehabilitated with indigenous vegetation and the areas monitored.

General

- Biodiversity as per the EMPr (section 7.3.5)

**Time Frames**

- Inspections should be made at least every six months around the application sites to ensure that no alien plants are establishing. If any are located, they should be removed immediately;
- Alien invasive monitoring plan to be developed in the course of the next year
- Rehabilitation of disturbed sites to be undertaken in the next growing season

**Direct Impacts: Biodiversity (Flora)**

**Nature of Impact:**

Destruction and damage to Conservation Important Species and protected trees due to uncontrolled vegetation clearing and access by staff and visitors.

One Red Data plant species and seven protected plant species were located around the application sites during fieldwork. Several additional plant SCC and protected plants potentially occurred. However, most of these were present in low densities and many would have been avoided to include in the landscaping of, for example, the tourist lodges.

	<b>No mitigation</b>	<b>Mitigation considered</b>
<b>Extent</b>	1	1
<b>Duration</b>	5	5
<b>Magnitude</b>	8	4
<b>Probability</b>	3	2
<b>Significance</b>	<b>42 M</b>	<b>20 L</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Mitigation</b>		
Specific		

- No additional vegetation should be cleared within Qwabi Reserve without prior assessment and environmental authorization.
- To compensate for the loss of potentially destroyed protected trees, a plant nursery should be constructed on Qwabi in an existing modified area to propagate the following species; *Sclerocarya birrea*, *Boscia albitrunca*, *Elaeodendron transvaalense*, *Combretum imberbe*, *Spirostachys Africana*, *Vachellia erioloba* and *Phyllogeiton zeyheri*. These trees can later be planted within the application sites to prevent elephant damage.
- No large tree (with a trunk diameter exceeding 200mm) may be felled without the permission of the ECO.
- Consider the selective trimming of branches before opting to remove any trees.
- Ensure that all conserved species and specimens are suitably protected for the duration of the operational phase.
- No protected trees or plants may be removed without the relevant permits from the local authority.

General

- Biodiversity as per the EMPr (section 7.3.6)

**Time Frames**

- Throughout operational phase

**Direct Impacts: Biodiversity (Flora)**

**Nature of Impact:**

Increase in exotic vegetation/alien species and bush encroachment into disturbed soils and areas in the event that the rehabilitation process is not successful.

A low total of eight alien plant species were located within the entire Reserve during fieldwork, two of which are declared alien invasive species. Additional invasion is likely around existing infrastructure as operating activities could introduce seeds which may thrive in bare soil resulting from construction activities. Seeds falling within the watercourses could be distributed to downstream localities along the Sandrivier and effect infestations in downstream areas.

Additionally, any areas that were not rehabilitated, or where rehabilitation measures failed, could also have resulted in alien invasives taking root.

	<b>No mitigation</b>	<b>Mitigation considered</b>
<b>Extent</b>	1	1
<b>Duration</b>	4	4
<b>Magnitude</b>	8	6
<b>Probability</b>	4	2
<b>Significance</b>	<b>52 M</b>	<b>22 L</b>
<b>Status (positive or negative)</b>	Negative	Negative

**Mitigation**

Specific

- All declared alien plants within a 50 m radius of each construction area must be eliminated according to the DFFE's published guidelines (DEA, 2015). These are species that have been listed under the National Environmental Management: Biodiversity Act (Act No. 10 OF 2004). It is imperative that the team/s tasked with this action be suitably training in removal methods, including the identification of alien plants and safe use of herbicide.
- In particular, special attention should be paid to removing *Flaveria bidentis* (Speedyweed) and *Opuntia stricta* (prickly pear), which currently pose the greatest alien invasive plant threat to biodiversity at Qwabi.

- All disturbed sites will be evaluated immediately from S24G approval for the presence of alien invasive species
- QPGR must develop a management and monitoring programme for alien and invasive species detailing basic ID information, actions to prevent the establishment of invasive plants and methods of removal
- All disturbed sites must be monitored for colonisation by exotics or invasive plants and control these as they emerge.
- Manual / mechanical removal is preferred to chemical control.
- Grounds staff should be trained to recognize and eradicate potential invasive plants.
- Undertake yearly removal of aliens within the area (done in summer) until equilibration is reached. This may take several years.
- The Operator must implement an alien plant control program to combat the infestation present, especially along the edges and within drainage lines and wetlands. This program should include regular inspections and follow-ups.
- Disturbed areas to be rehabilitated with indigenous vegetation and the areas monitored.

General

- Biodiversity as per the EMPr (section 7.3.7)

**Time Frames**

- Inspections should be made at least every six months around the application sites to ensure that no alien plants are establishing. If any are located, they should be removed immediately
- QPGR will develop a management and monitoring programme for alien and invasive species 6 months from the date of the S24G being approved.
- All disturbed sites will be monitored every 3 months for colonisation by exotics or invasive plants and control these as they emerge.

**Direct Impacts: Biodiversity (Fauna)**

**Nature of Impact:**

Loss of faunal habitat and faunal disturbances, displacement of taxa and changes in distribution and abundance due to:

- Uncontrolled vegetation and bush clearing and access by staff
- Encroachment of alien invasive species
- Litter and waste
- Placement of infrastructure in habit for conservation-important species
- General operations (activities) of the facility
- Noise from staff and vehicles
- Night drives
- Perimeter safety fences

It is unlikely that the placement of the lodges and other infrastructure had a significant impact on faunal habit. QPGR covers an area of 15 000 Ha while only 66 Ha has been developed.

	<b>No mitigation</b>	<b>Mitigation considered</b>
<b>Extent</b>	1	1
<b>Duration</b>	4	4
<b>Magnitude</b>	8	4
<b>Probability</b>	3	2
<b>Significance</b>	<b>39 M</b>	<b>18 L</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Mitigation</b>		

Specific

- QPGR will maintain connectivity between ecologically important habitats by retaining natural corridors for the movement of fauna.
- No unauthorised access will be permitted to buffer areas or any natural areas outside of the facility footprint.
- A game / security fence or suitable equivalent will be maintained around the perimeter of the lodges and staff villages. These fences will allow access by small mammals, tortoises etc.
- To compensate for the loss of faunal habitat, it is recommended that current conservation efforts, including tracking of SCC and security infrastructure, be maintained.
- All disturbed sites must be monitored for colonisation by exotics or invasive plants and control these as they emerge.
- Manual / mechanical removal is preferred to chemical control.
- Grounds staff should be trained to recognize and eradicate potential invasive plants.
- Undertake yearly removal of aliens within the area (done in summer) until equilibration is reached. This may take several years.
- The Operator must implement an alien plant control program to combat the infestation present, especially along the edges and within drainage lines and wetlands. This program should include regular inspections and follow-ups.
- Disturbed areas to be rehabilitated with indigenous vegetation and the areas monitored.
- All recyclables and non-recyclables are to be stored in waste cages to prevent spread into the natural environment prior to being collected by outside contractors

General

- Biodiversity as per the EMPr (section 7.3.8)

**Time Frames**

- Alien vegetation to be removed immediately and the sites monitored for re-emerging
- Alien invasive monitoring plan to be developed in the course of the next year
- Rehabilitation of disturbed sites to be undertaken in the next growing season (August/September)

**Direct Impacts: Biodiversity (Fauna)**

**Nature of Impact:**

Injury and Mortality of fauna due to:

- Persecution and extermination
- Solvents, paints, chemicals and cleaning products (poisoning)
- Litter and waste (suffocation)

Misformed staff could potentially harm small animals found on site and their improper storage of waste could result in the injury or death of fauna.

	<b>No mitigation</b>	<b>Mitigation considered</b>
<b>Extent</b>	2	2
<b>Duration</b>	4	4
<b>Magnitude</b>	10	4
<b>Probability</b>	3	2
<b>Significance</b>	<b>48 M</b>	<b>20 L</b>
<b>Status (positive or negative)</b>	Negative	Negative

**Mitigation**

Specific

- A game / security fence or suitable equivalent will be maintained around the perimeter of the lodges and staff village. These fences will allow access by small mammals, tortoises etc.



- Personnel will be briefed on the potential occurrence of protected faunal species, what they look like, and where they are likely to be found. Personnel will be instructed that these species are not to be hurt or destroyed if encountered. This applies specifically to the snakes, lizards, chameleons and spiders, as these are often perceived to be vermin and pests.
- Personnel will be instructed to report the presence of protected species to the Operator or EO so that arrangements may be made to relocate these to adjacent bush areas.
- A procedure for dealing with animals encountered on the site, including dangerous animals and vermin will be developed within 6 months from the date of the S24G approval. Where necessary, call-in professionals to remove the animals.
- All personnel will be aware of what the procedures for dealing with animals are. It is the operator's responsibility to ensure that proper procedures are followed. In this regard, Environmental awareness training will be conducted annually
- No poaching or snaring of any game is permitted. Reserve Management must implement fines in this regard.
- Guests will be briefed on the dangers of feeding wildlife, and will be discouraged from feeding any animal. Guests will also be informed of recommended measures to secure food and food waste from animal scavengers.
- All food and waste storage areas must be properly secured against animal scavengers at all times.

General

- Biodiversity as per the EMPr (section 7.3.9)

**Time Frames**

- Throughout operational phase

<b>Direct Impacts: Biodiversity (Fauna)</b>		
<b>Nature of Impact:</b> Poaching and snaring of faunal species by staff.		
	<b>No mitigation</b>	<b>Mitigation considered</b>
<b>Extent</b>	2	2
<b>Duration</b>	4	4
<b>Magnitude</b>	6	6
<b>Probability</b>	3	2
<b>Significance</b>	<b>36 M</b>	<b>24 L</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Mitigation</b>		
Specific		
<ul style="list-style-type: none"> <li>• No poaching or snaring of any game is permitted. Reserve Management must implement fines in this regard.</li> <li>• QPGR must regularly undertake checks of the surrounding natural vegetation and along game paths to ensure no traps have been set. Remove and dispose of any snares or traps found on or adjacent to the site. Must implement fines in this regard.</li> </ul>		
General		
<ul style="list-style-type: none"> <li>• Biodiversity as per the EMPr (section 7.3.10)</li> </ul>		
<b>Time Frames</b>		
<ul style="list-style-type: none"> <li>• Throughout operational phase</li> </ul>		

<b>Direct Impact: Heritage</b>		
<b>Nature of Impact:</b>		
Damage to and / or destruction of archaeological, paleontological or historical artefacts unearthed during construction due to:		
<ul style="list-style-type: none"> <li>• Site clearing ahead of construction</li> <li>• General construction activities and movement of construction vehicles</li> </ul>		
A total of 7 cultural sites were recorded during the survey, of which four of the sites are graveyards and an individual grave and two are historical structures and one Iron Age livestock enclosure. No historical or archaeological (both Stone Age and Iron Age) artefacts, assemblages, features, structures or settlements were recorded during the survey at the locations of the various existing developments.		
	<b>No mitigation</b>	<b>Mitigation considered</b>
<b>Extent</b>	1	1
<b>Duration</b>	5	5
<b>Magnitude</b>	4	4
<b>Probability</b>	1	1
<b>Significance</b>	<b>10 N</b>	<b>10 N</b>
<b>Status (positive or negative)</b>	Negative	-
<b>Mitigation</b>		
Specific		
<ul style="list-style-type: none"> <li>• If archaeological or historical 'chance finds' are encountered, then work in the area must be halted, and a heritage specialist must be called to assess the situation and make recommendations.</li> <li>• If any fossils are discovered during the construction then a palaeontologist must be called to assess their importance and rescue them if necessary.</li> <li>• In areas where the vegetation is threatening the heritage sites, e.g. growing trees pushing walls over, it should be removed, but only after permission for the methods proposed has been granted by SAHRA. A heritage official should be part of the team executing these measures.</li> </ul>		
General		
<ul style="list-style-type: none"> <li>• Heritage management as per the EMPr (section 7.4.1)</li> </ul>		
<b>Time Frames</b>		
<ul style="list-style-type: none"> <li>• Throughout operational phase</li> </ul>		

<b>Direct Impacts: Visual</b>		
<b>Nature of Impact:</b>		
Visual impact on sensitive visual receptors in close proximity to the developments.		
There are no immediate neighbours that would be directly affected by the visual intrusion of the development. Visual impact is mainly confined to the QPGR boundaries where only guests staying the QPGR could potentially be impacted upon. However, natural materials, such as thatch and neutral colours have been utilized so as to blend into the natural environment.		
	<b>No mitigation</b>	<b>Mitigation considered</b>
<b>Extent</b>	1	1
<b>Duration</b>	4	4
<b>Magnitude</b>	4	4
<b>Probability</b>	3	2
<b>Significance</b>	<b>27 L</b>	<b>18 L</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Mitigation</b>		
Specific		
<ul style="list-style-type: none"> <li>• Natural vegetation will be retained and maintained in all areas outside of the development footprints.</li> </ul>		

<ul style="list-style-type: none"> <li>• The general appearance of all of the sites as a whole will be maintained, including roads and servitudes.</li> <li>• Down lighting will be utilized.</li> <li>• Rehabilitate all disturbed areas, construction areas, roads, slopes etc.</li> <li>• Retain and maintain natural vegetation in all areas outside of the development footprints.</li> <li>• Maintain the general appearance of all of the sites as a whole, including roads and servitudes</li> </ul>
<p>General</p> <ul style="list-style-type: none"> <li>• Visual Impact management as per the EMPr (section 7.5.1)</li> </ul>
<p><b>Time Frames</b></p>
<ul style="list-style-type: none"> <li>• Throughout operational phase</li> </ul>

<b>Direct Impacts: Visual</b>		
<p><b>Nature of Impact:</b> The potential visual impact of safety and security lighting of the developments at night on sensitive visual receptors in close proximity.</p> <p>There are no immediate neighbours that would be directly affected by the visual intrusion of the development. Visual impact is confined to the QPGR boundaries where only guests staying the QPGR could potentially be impacted upon. However, natural materials, such as thatch and neutral colours have been utilized so as to blend into the natural environment.</p>		
	<b>No mitigation</b>	<b>Mitigation considered</b>
<b>Extent</b>	2	2
<b>Duration</b>	4	4
<b>Magnitude</b>	6	4
<b>Probability</b>	3	2
<b>Significance</b>	<b>36 M</b>	<b>20 L</b>
<b>Status (positive or negative)</b>	Negative	Negative
<p><b>Mitigation</b></p> <p>Specific</p> <ul style="list-style-type: none"> <li>• Natural vegetation will be retained and maintained in all areas outside of the development footprints.</li> <li>• The general appearance of all of the sites as a whole will be maintained, including roads and servitudes.</li> <li>• Down lighting will be utilized.</li> <li>• Rehabilitate all disturbed areas, construction areas, roads, slopes etc.</li> <li>• Retain and maintain natural vegetation in all areas outside of the development footprints.</li> <li>• Maintain the general appearance of all of the sites as a whole, including roads and servitudes</li> </ul> <p>General</p> <ul style="list-style-type: none"> <li>• Visual Impact management as per the EMPr (section 7.5.1)</li> </ul>		
<p><b>Time Frames</b></p>		
<ul style="list-style-type: none"> <li>• Throughout operational phase</li> </ul>		

<b>Direct Impacts: Socio-economics</b>		
<b>Nature of Impact:</b> <i>Stimulation of the local economy, especially the local service delivery industry (accommodation, catering, cleaning, transport, security etc.) and Creation of long term employment and business opportunities as well as opportunities for skills development and transfer.</i>		
QPGR currently employs just over 200 people, majority of whom are from the local communities. Majority of guests who visit QPGR are from overseas and therefore enjoy local attractions as well.		
	<b>No mitigation</b>	<b>Mitigation considered</b>
<b>Extent</b>	3	3
<b>Duration</b>	4	4
<b>Magnitude</b>	6	6
<b>Probability</b>	3	4
<b>Significance</b>	<b>39 M</b>	<b>52 M</b>
<b>Status (positive or negative)</b>	Positive	Positive
<b>Mitigation</b>		
Specific <ul style="list-style-type: none"> <li>• The Operator is responsible for making the necessary arrangements for transporting staff to and from site on a daily basis.</li> <li>• Where feasible, efforts should be made to employ local employees that are compliant with Black Economic Empowerment (BEE) criteria.</li> <li>• Where feasible, training and skills development programmes for locals should be initiated and maintained throughout the operational phase.</li> <li>• The recruitment selection process should seek to promote gender equality and the employment of women wherever possible.</li> </ul>		
General <ul style="list-style-type: none"> <li>• Socio economic management as per the EMPr (section 7.5.2)</li> </ul>		
<b>Time Frames</b>		
<ul style="list-style-type: none"> <li>• As and when necessary throughout the operational phase</li> </ul>		

<b>Direct Impacts: Services and traffic</b>		
<b>Nature of Impact:</b> Increase in traffic on the surrounding roads and Increase in the number and frequency of vehicles accessing the site, and the resultant noise, dust, and safety impacts on other road users, residents of the local community and adjacent landowners		
Seeing as the Reserve has recently become commercial and open to the public, guests travelling to the Reserve could contribute to an increase in traffic on local roads.		
	<b>No mitigation</b>	<b>Mitigation considered</b>
<b>Extent</b>	2	2
<b>Duration</b>	4	4
<b>Magnitude</b>	4	4
<b>Probability</b>	3	3
<b>Significance</b>	<b>30 L</b>	<b>30 L</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Mitigation</b>		
Specific <ul style="list-style-type: none"> <li>• Speed limits on all roads will be strictly adhered to at all times. Fines will be implemented in this regard.</li> <li>• Carpools and lift clubs must be encouraged and staff picked up at a central point. Staff must be discouraged from travelling to site in private vehicles.</li> </ul>		
General		

<ul style="list-style-type: none"> <li>Socio economic management as per the EMPr (section 7.5.3)</li> </ul>
<b>Time Frames</b>
<ul style="list-style-type: none"> <li>Throughout operational phase</li> </ul>

<b>Indirect Impacts: Visual</b>		
<b>Nature of Impact:</b>		
The visual impact of the development on the visual character of the landscape and sense of place of the region.		
The surrounding areas are characterized by farming and other tourism ventures. The QPGR is in close vicinity to the Marakele National Park and other game and nature reserves. Therefore the lodge developments will not have a significant impact on the sense of place.		
	<b>No mitigation</b>	<b>Mitigation considered</b>
<b>Extent</b>	3	3
<b>Duration</b>	4	4
<b>Magnitude</b>	2	2
<b>Probability</b>	3	2
<b>Significance</b>	<b>27 L</b>	<b>18 L</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Mitigation</b>		
Specific		
<ul style="list-style-type: none"> <li>-</li> </ul>		
General		
<ul style="list-style-type: none"> <li>Visual Impact management as per the EMPr (section 7.5.1)</li> </ul>		
<b>Time Frames</b>		
<ul style="list-style-type: none"> <li>Throughout operational phase</li> </ul>		

<b>Cumulative Impacts: Biodiversity (Flora)</b>		
<b>Nature of Impact:</b>		
Cumulative loss of critical biodiversity areas and sensitive habitats		
	<b>No mitigation</b>	<b>Mitigation considered</b>
<b>Extent</b>	3	3
<b>Duration</b>	4	4
<b>Magnitude</b>	6	4
<b>Probability</b>	3	2
<b>Significance</b>	<b>39 M</b>	<b>22 L</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Mitigation</b>		
Specific		
<ul style="list-style-type: none"> <li>No additional vegetation should be cleared within Qwabi Reserve without prior assessment and environmental authorization.</li> <li>No new developments/infrastructure should be located within Riparian Woodland vegetation rated as having a very high sensitivity.</li> <li>Natural vegetation adjacent to existing infrastructure should be deemed out of bounds to all but authorised staff to restrict movement of people and disturbance of the surrounding habitat.</li> <li>Do not mark or deface any natural feature.</li> <li>No large tree (with a trunk diameter exceeding 200mm) may be felled without the permission of the ECO.</li> <li>Consider the selective trimming of branches before opting to remove any trees.</li> </ul>		

- Ensure that all conserved species and specimens are suitably protected for the duration of the operational phase.
- No protected trees or plants may be removed without the relevant permits from the local authority.
- Guests and staff may not tamper or remove flora and neither may anyone collect seed from the plants without permission from the local authority.
- The picking of flowers or removal of plants should be prohibited in the Guest Rules.
- No bush clearing is allowed, either to enhance game viewing, for firewood or for any other purpose.
- Maintenance workers and guests may not trample natural vegetation and work should be restricted to dedicated roads, paths and gardens within the development footprint.
- No unauthorised access is permitted to buffer areas or any natural areas outside of the facility footprint.
- No wood may be collected for firewood or any other purpose.
- All recyclables and non-recyclables are to be stored in waste cages to prevent spread into the natural environment prior to being collected by outside contractors
- All disturbed sites must be monitored for colonisation by exotics or invasive plants and control these as they emerge.
- Manual / mechanical removal is preferred to chemical control.
- Grounds staff should be trained to recognize and eradicate potential invasive plants.
- Undertake yearly removal of aliens within the area (done in summer) until equilibration is reached. This may take several years.
- The Operator must implement an alien plant control program to combat the infestation present, especially along the edges and within drainage lines and wetlands. This program should include regular inspections and follow-ups.
- Disturbed areas to be rehabilitated with indigenous vegetation and the areas monitored.

General

- Biodiversity as per the EMPr (section 7.3.5)

**Time Frames**

- Throughout the operational phase.

**Cumulative Impacts: Biodiversity (Flora)**

**Nature of Impact:**

Cumulative reduction and damage to Conservation Important Species and protected trees

	<b>No mitigation</b>	<b>Mitigation considered</b>
<b>Extent</b>	3	3
<b>Duration</b>	5	5
<b>Magnitude</b>	8	6
<b>Probability</b>	3	2
<b>Significance</b>	<b>48 M</b>	<b>28 L</b>
<b>Status (positive or negative)</b>	Negative	Negative

**Mitigation**

Specific

- No additional vegetation should be cleared within the Qwabi Reserve without prior authorisation;
- Natural vegetation adjacent to existing infrastructure should be deemed out of bounds to all but authorised staff to restrict movement of people and disturbance of the surrounding habitat.
- To compensate for the loss of potentially destroyed protected trees, a plant nursery should be constructed on Qwabi in an existing modified area to propagate the species listed in Table 12 in the Ecology Report. These trees can later be planted within the application sites to prevent elephant damage;

<ul style="list-style-type: none"> <li>No large tree (with a trunk diameter exceeding 200mm) may be felled without the permission of the ECO.</li> <li>Consider the selective trimming of branches before opting to remove any trees.</li> <li>Ensure that all conserved species and specimens are suitably protected for the duration of the operational phase.</li> <li>No protected trees or plants may be removed without the relevant permits from the local authority.</li> </ul>
General
<ul style="list-style-type: none"> <li>Biodiversity as per the EMPr (section 7.3.6)</li> </ul>
<b>Time Frames</b>
<ul style="list-style-type: none"> <li>Throughout operational phase</li> </ul>

<b>Cumulative Impacts: Visual</b>		
<b>Nature of Impact:</b>		
The accumulation of built forms and within an otherwise natural environment.		
	<b>No mitigation</b>	<b>Mitigation considered</b>
<b>Extent</b>	3	3
<b>Duration</b>	4	4
<b>Magnitude</b>	4	4
<b>Probability</b>	3	2
<b>Significance</b>	<b>33 M</b>	<b>22 L</b>
<b>Status (positive or negative)</b>	Negative	Negative
<b>Mitigation</b>		
General		
<ul style="list-style-type: none"> <li>Visual impact management as per the EMPr (section 7.5.1)</li> </ul>		
<b>Time Frames</b>		
<ul style="list-style-type: none"> <li>Throughout operational phase</li> </ul>		

<b>Cumulative Impacts: Socio-economics</b>		
<b>Nature of Impact:</b>		
Creation of permanent employment and skills and development opportunities for members from the local community and creation of additional business and economic opportunities in the area.		
	<b>No mitigation</b>	<b>Mitigation considered</b>
<b>Extent</b>	3	3
<b>Duration</b>	4	4
<b>Magnitude</b>	4	4
<b>Probability</b>	3	3
<b>Significance</b>	<b>33 M</b>	<b>33 M</b>
<b>Status (positive or negative)</b>	Positive	Positive
<b>Mitigation</b>		
General		
<ul style="list-style-type: none"> <li>Socio economic management as per the EMPr (section 7.5.2)</li> </ul>		
<b>Time Frames</b>		
<ul style="list-style-type: none"> <li>Throughout operational phase</li> </ul>		

<b>Cumulative Impacts: Socio-economics</b>
<b>Nature of Impact:</b>
Promotion of social and economic development in the local communities and improvement in the overall wellbeing of the community

	<b>No mitigation</b>	<b>Mitigation considered</b>
<b>Extent</b>	3	3
<b>Duration</b>	4	4
<b>Magnitude</b>	4	2
<b>Probability</b>	2	3
<b>Significance</b>	<b>22 L</b>	<b>27 L</b>
<b>Status (positive or negative)</b>	Positive	Positive
<b>Mitigation</b>		
General <ul style="list-style-type: none"> <li>Socio economic management as per the EMPr (section 7.5.2)</li> </ul>		
<b>Time Frames</b>		
<ul style="list-style-type: none"> <li>Throughout operational phase</li> </ul>		

<b>Cumulative Impacts: Services and Traffic</b>		
<b>Nature of Impact:</b> Cumulative increase in traffic on the surrounding roads due to increased visitor numbers.		
	<b>No mitigation</b>	<b>Mitigation considered</b>
<b>Extent</b>	3	3
<b>Duration</b>	4	4
<b>Magnitude</b>	4	2
<b>Probability</b>	3	2
<b>Significance</b>	<b>33 M</b>	<b>18 L</b>
<b>Status (positive or negative)</b>	Positive	Positive
<b>Mitigation</b>		
Specific <ul style="list-style-type: none"> <li>Speed limits on all roads will be strictly adhered to at all times. Fines will be implemented in this regard.</li> <li>Carpools and lift clubs must be encouraged and staff picked up at a central point. Staff must be discouraged from travelling to site in private vehicles.</li> </ul> General <ul style="list-style-type: none"> <li>Socio economic management as per the EMPr (section 7.5.3)</li> </ul>		
<b>Time Frames</b>		
<ul style="list-style-type: none"> <li>Throughout operational phase</li> </ul>		

## 2.4 Decommissioning Phase

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