ENVIRONMENTAL MANAGEMENT GROUP

Specialists in Environmental Management
Integrating Industry and Infrastructure with the Environment

Tel: +27 51 412 6350
Fax: +27 51 412 6351
Email: ckruger@envmgp.com
Postal Address:
P.O.Box 37473,
Langenhoven Park 9330

Impact Assessment of:

Kimberley Nursing College and Student Accommodation

For:

Northern Cape Department: Roads and Public Works

Kimberley, Northern Cape Province

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Prepared for:

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Client:	Northern Cape Department: Roads and Public Works
Contact Information:	Mr Jewis September: 079 038 3057 / 053 839 2100
E-mail:	jseptember@ncpg.gov.za
Address:	9 - 11 Stokroos street, Squarehill Park, Kimberley

Prepared by:

Environmental Management Group (Pty) Ltd

Specialist:	CW Vermeulen Registered EAP, Ornithologist and Environmental specialist Environmental Management Group
E-mail:	cwv@envmgp.com
Postal Address:	P.O Box 37473 Langenhovenpark 9330

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1. Introduction

The assessment of social and environmental risks associated with **the proposed development of the Kimberley Nursing College Phase two and Student Accommodation** is presented as the risk assessment methodology and associated results. This entails the project risks in the absence of mitigation as well as project risks after mitigation measures were applied. The objective of this process is to identify significant risks and evaluate them to ensure appropriate treatment is applied to mitigate such risks.

2. Methodology

2.1 Introduction

Management and risk assessment plays a key role in the proponent's business. Managing the risks must be integrated into day-to-day business-related processes to ensure that both operational and strategic decisions are risk-based. The risk management system provides a framework to identify both threats and opportunities. The system then compensates and initiates resources that are allocated to treat the risks. It is required to review the risks as an ongoing process and then proceed to review the effectiveness of the controls.

The environmental significance assessment methodology is based on the following determination:

Environmental Significance = Overall Consequence x Overall Likelihood.

2.1.1 Determination of Consequences

Consequence analysis is a mixture of quantitative and qualitative information and the outcome can be positive or negative. Several factors can be used to determine consequence. For the purpose of determining the environmental significance in terms of consequence, the following factors were chosen: Severity/Intensity, Duration and Extent/Spatial Scale. Each factor is assigned a rating of 1 to 5, as described in the tables below.

Determination of Severity

Severity relates to the nature of the event, aspect or impact to the environment and describes how severe the aspects impact is on the biophysical and socio-economic environment.

Table 1: Rating Criteria for the determination of severity of the impact

Type of criteria	Rating				
	1	2	3	4	5
Quantitative	0-20%	21-40%	41-60%	61-80%	81-100%
Qualitative	Insignificant / Non-harmful	Small / Potentially harmful	Significant / Harmful	Great / Very harmful	Disastrous Extremely harmful
Social/ Community response	Acceptable / I&AP satisfied	Slightly tolerable / Possible objections	Intolerable/ Sporadic complaints	Unacceptable / Widespread complaints	Totally unacceptable / Possible legal action
Irreversibility	Very low cost to mitigate/ High potential to mitigate impacts to level of insignificance / Easily reversible	Low cost to mitigate	Substantial cost to mitigate / Potential to mitigate impacts / Potential to reverse impact	High cost to mitigate	Prohibitive cost to mitigate / Little or no mechanism to mitigate impact Irreversible
Biophysical (Air quality, water quantity and quality, waste production, fauna and flora)	Insignificant change / deterioration or disturbance	Medium change / deterioration or disturbance	Significant change / deterioration or disturbance	Very significant change / deterioration or disturbance	Disastrous change / deterioration or disturbance

Determination of Duration

Duration refers to the amount of time that the environment will be affected by the event, risk or impact, if no intervention e.g. remedial action takes place.

Table 2: Rating criteria for determination of duration

Rating	Description
1: Low	1 Month
2: Low-Medium	1 – 3 Months
3: Medium	More than 3 Months
4: Medium-High	5 – 10 Years
5: High	More than 10 Years

Determination of Extent/Spatial Scale

Extent refers to the spatial influence of an impact, be it contained to the immediate surroundings (site), extending to the surrounding area, regional (will have an impact on the region), national (will have an impact on a national scale) or international (impact across international borders).

Table 3: Rating criteria for the determination of extent/spatial scale

Rating	Description
1: Low	Immediate, fully contained area (site)
2: Low-Medium	Surrounding Area
3: Medium	Regional
4: Medium-High	National
5: High	International

Determination of Overall Consequence

Overall consequence is determined by adding the factors determined above and summarised below, and then dividing the sum by 3.

Table 4: Calculation of Overall Consequence

Consequence	Rating
Severity	Example 4
Duration	Example 2
Extent	Example 4
SUBTOTAL	Example 10
TOTAL CONSEQUENCE:(Subtotal divided by 3(Severity, Duration, Extent))	**Example 3.3**

2.1.2 Determination of Likelihood

The determination of likelihood is a combination of Frequency and Probability. Each factor is assigned a rating of 1 to 5.

Determination of Frequency

Frequency refers to how often the specific activity, related to the event, aspect or impact, is undertaken.

Table 5: Rating Criteria for Determination of Frequency

Rating	Description
1: Low	Once a year / once during construction
2: Low-Medium	Once / more in 6 Months
3: Medium	Once / more a Month
4: Medium-High	Once / more a Week
5: High	Daily

Determination of Probability

Probability refers to how often the activity/event or aspect has an impact on the environment.

Table 6: Rating Criteria for Determination of Probability

Rating	Description
1: Low	Almost never / almost impossible
2: Low-Medium	Very seldom / highly unlikely
3: Medium	Infrequent / unlikely / seldom
4: Medium-High	Often / regularly / likely / possible
5: High	Daily / highly likely / definitely

Overall Likelihood

Overall likelihood is calculated by adding the factors determined above and summarised below, and then dividing the sum by 2.

Table 7: Calculation of Likelihood

Likelihood	Rating
Frequency	Example 4
Probability	Example 2
SUBTOTAL	Example 6
TOTAL LIKELIHOOD (Subtotal divided by 2 (Frequency, Probability))	Example 3

2.1.3 Determination of Overall Environmental Significance

The multiplication of overall consequence with overall likelihood will provide the environmental significance, which is a number that will then fall into a range of Low, Low-Medium, Medium, Medium-High or High.

Table 8: Rating Criteria for Impact Significance

Significance or Risk	Low	Low-Medium	Medium	Medium-High	High
Overall Consequence X Overall Likelihood	1 - 4.9	5 - 9.9	10 - 14.9	15 – 19.9	20 - 25

Qualitative description or magnitude of Environmental Significance

This description is qualitative and is an indication of the nature or magnitude of the Environmental Significance. It also guides the prioritisations and decision-making process associated with this event, aspect or impact.

Table 9: Rating Criteria for Impact

Significance	Low	Low-Medium	Medium	Medium-High	High
Impact Magnitude	Impact is of very low order and therefore likely to have very little real effect. Acceptable.	Impact is of low order and therefore likely to have little real effect. Acceptable.	Impact is real, and potentially substantial in relation to other impacts. Can pose a risk to the company	Impact is real and substantial in relation to other impacts. Pose a risk to the company and environment. Unacceptable	Impact is of the highest order possible. Unacceptable. Fatal flaw.
Action Required	Maintain current management measures. Where possible improve.	Maintain current management measures. Implement monitoring and evaluate to determine potential increase in risk. Where possible improve	Implement monitoring. Investigate mitigation measures and improve management measures to reduce risk, where possible.	Improve management measures to reduce risk.	Implement significant mitigation measures or implement alternatives.

3. Impact Assessment for the Preferred Alternative

3.1 Fauna and Flora

The flora and fauna impact assessment takes into consideration the site's natural condition and any sensitivities, i.t.o. habitat diversity, species diversity and ecological diversity. The flora impact assessment refers to the vegetative component of the assessed area and focuses on the degree of infestation by exotics, vegetation structure, endemics, and protected species. The fauna impact assessment refers to the animal component and focuses on the available habitats, resources and protected species.

Impact	**1. Clearance of vegetation**							
Description of Impact	The removal of natural occurring plant species due to the proposed development.							
Constructional Phase								
Before Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	3,0	3,0	1,0	2,3	4,0	4,0	4,0	9,3
Mitigation	The number of a active construction sites should be kept to a reasonable minimum. Vegetation clearance should be bound to within the boundaries of the proposed development and only where necessary.							
After Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	1,0	2,0	1,0	1,3	3,0	3,0	3,0	4,0
Operational Phase								
Before Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	2,0	2,0	1,0	1,7	2,0	2,0	2,0	3,3

Mitigation	Rehabilitation is necessary for all open spaces following construction. Rehabilitated areas should be vegetated with indigenous flora.							
After Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	1,0	2,0	1,0	1,3	2,0	1,0	1,5	2,0
Cumulative Impacts	Clearance of vegetation during construction and operational phase.							
Additional Notes:	Contain the natural environment and ensure the Environmental Management Plan is adhered to.							

The environmental impact on the clearance of vegetation during constructional phase will be **Low-Medium (9.3)** without mitigation and **Low (4.0)** when mitigation measures are applied. This risk assessment for the operational phase will be **Low (3.3)** prior to mitigation and **Low (2.0)** after mitigation and is described as having a low order impact. It is necessary to implement monitoring and evaluation procedures for continual evaluation of the environmental impact during the construction phase.

Impact	**2. Invasive plant species**							
Description of Impact	Alien vegetation infestation on topsoil causing. These exotic species often outcompete native flora and lowers biodiversity.							
Constructional Phase								
Before Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	3.0	3.0	2.0	2.7	3.0	3.0	3.0	8.0
Mitigation	Topsoil must be stockpiled and kept clean from alien vegetation. Equipment used should be regularly washed to avoid transporting invasive species. Quarterly removal of all alien invasive species should occur.							
After Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	1.0	1.0	1.0	1.0	2.0	2.0	2.0	2.0
Operational Phase								
Before Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	3.0	3.0	2.0	2.7	3.0	2.0	2.5	6.7
Mitigation	No exotic flora may be introduced for landscaping purposes. Native species, and preferably species naturally occurring in the area should be used.							
After Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	2.0	2.0	1.0	1.7	2.0	2.0	2.0	3.3
Cumulative Impacts	Transportation of alien/invasive plant species							
Additional Notes:	Contain the natural environment and ensure the Environmental Management Plan is adhered to.							

The impact on invasion of plant species during constructional phase will be **Low-Medium (8.0)** without mitigation and **Low (2.0)** when mitigation measures are applied. This risk assessment for the operational phase will be **Low-Medium (6.7)** prior to mitigation, and **Low (3.3)** after mitigation and is described as having a low order impact.. It is necessary to implement monitoring and evaluation procedures to determine the potential of increase in risk.

Impact	3. Habitat loss							
Description of Impact	Habitat destruction and fragmentation due to the proposed development will lead to an overall reduction in biodiversity.							
Constructional Phase								
Before Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	3.0	3.0	1.0	2.3	4.0	4.0	4.0	9.3
Mitigation	Limit the amount of construction sites that are worked on simultaneously and consult an ecologist with regards to sustainable rehabilitation of the disturbed areas. Construction should be limited to the site boundary and may not encroach into sensitive habitats.							
After Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	2.0	2.0	1.0	1.7	2.0	3.0	2.5	4.2
Operational Phase								
Before Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	2.0	2.0	1.0	1.7	2.0	2.0	2.0	3.3
Mitigation	Rehabilitation measures must be implemented in areas where the soil surface was disturbed							
After Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Cumulative Impacts	Local reduction in biodiversity due to habitat loss and the physical removal of natural elements.							
Additional Notes:	The removal of large Camel thorn trees should be avoided as these trees sustain a larger abundance of biodiversity. (Nesting place for birds, habitat for insects, reptiles etc.).							

The impact assessment related to habitat loss during the constructional phase prior to mitigation is considered to be **Low-Medium (9.3)** and **Low (4.2)** after mitigation. Habitat loss during the operational phase prior to mitigation is considered **Low (3.3)** and **Low(1.0)** after mitigation. The impact assessment considers the related habitat loss as a low order impact due to the already degraded condition of the site.

Impact	4. Land Transformation/ Veld fire							
Description of Impact	Construction workers setting unauthorized veld fires during the construction period							
Constructional Phase								
Before Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	5.0	4.0	3.0	4.0	2.0	3.0	2.5	10.0
Mitigation	Construction workers will not be permitted to start open fires, firefighting equipment must be on site and activities generating heat or an open flame must be monitored.							
After Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	3.0	2.0	2.0	2.3	2.0	2.0	2.0	4.7
Operational Phase								
Before Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	3.0	2.0	2.0	2.3	1.0	2.0	1.5	3.5
Mitigation	Fire Management Plan must be present on site							
After Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	2.0	2.0	2.0	2.0	1.0	2.0	1.5	3.0
Cumulative Impacts	Uncontrolled veld fires could destroy the natural habitat and lead to loss of species diversity.							
Additional Notes:	The local fire station, landowner and neighbouring landowners must be alerted about the potential of causing a fire.							

The impact assessment related to land transformation/ veld fire during the constructional phase prior to mitigation is considered to be **Medium (10.0)** and **Low (4.7)** after mitigation. Habitat loss during the operational phase prior to mitigation is considered **Low (3.5)** and **Low(3.0)** after mitigation. The impact assessment considers the related impacts associated with the potential of land transformation/ veldfire as a medium order impact due to the destructive nature of veldfires. It's important to implement industry standards concerning the prevention of veldfires.

Impact	5. Loss of protected fauna and flora							
Description of Impact	The removal of protected flora and fauna due to the proposed development							
Constructional Phase								
Before Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	3.0	3.0	1.0	2.3	3.0	4.0	3.5	8.2
Mitigation	Notice boards should be erected displaying information on the potential occurrence of protected species. During construction, if a protected species is observed, a relevant specialist should be consulted. No protected species may be removed without the acquisition of the relevant permits.							
After Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	2.0	2.0	1.0	1.7	2.0	2.0	2.0	3.3

Operational Phase								
Before Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	2.0	2.0	1.0	1.7	2.0	2.0	2.0	3.3
Mitigation	Relocation of potential protected species such as *Nerine laticoma*. The incorporation of such species in the landscaping design of the facility. The use of indigenous species for landscaping.							
After Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Cumulative Impacts	The local removal of protected species and possibly rare endemics.							
Additional Notes:								

The environmental impact on the loss of protected fauna and flora during the constructional phase is calculated as a **Low-Medium (8.2)** impact prior to mitigation and **Low (3.3)** after mitigation. Several protected species naturally occur on site (*Vachellia erioloba* and *Nerine laticoma*) these species may not be removed/harmed prior to the acquisition of relevant permits.

Flora and Fauna Impacts						
	Constructional Phase		Operational Phase		Total Before Mitigation	Total After Mitigation
Impacts	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation		
1. Clearance of vegetation	9,3	4,0	3,3	2,0	6,3	3,0
2. Invasive plant species	8,0	2,0	6,7	3,3	7,3	2,7
3. Habitat loss	9,3	4,2	3,3	1,0	6,3	2,6
4. Land Transformation/ Veld fire	10,0	4,7	3,5	3,0	6,8	3,8
5. Loss of protected fauna and flora	8,2	3,3	3,3	1,0	5,8	2,2
				Total:	6,5	2,9

The overall environmental impact arising from the proposed development on the floral and faunal community is considered **Low-medium (6.5)** prior to mitigation and **Low (2.9)** after mitigation. The widespread infestation of exotic plant species as well as the environmental disturbance accompanied by the ongoing construction has contributed to the overall low score.

3.2 Heritage

Heritage involves culturally significant finds including, but not limited to fossils, artefacts and certain culturally relevant infrastructure. These items will be identified by a Heritage Specialist throughout the construction phase of this project.

Impact	**1. Artefacts and Fossils**							
Description of Impact	Loss of valuable human history as a result of soil disturbance							
Constructional Phase								
Before Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	2.0	5.0	1.0	2.7	3.0	2.0	2.5	6.7
Mitigation	A relevant specialist should be consulted if any significant artefacts or fossils are identified during the construction phase. If any such artefacts or fossils are located during construction, all activities should stop and the SA heritage council, SAHRIS should be contacted.							
After Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	1.0	2.0	1.0	1.3	2.0	2.0	2.0	2.7
Operational Phase								
Before Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	1.0	5.0	1.0	2.3	2.0	2.0	2.0	4.7
Mitigation	Depending on the nature of the find an archaeologist must be contacted who will decide on further action.							
After Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	1.0	5.0	1.0	2.3	2.0	1.0	1.5	3.5
Cumulative Impacts	The local destruction and/or loss of material with significant human history and/or heritage relation							
Additional Notes:	Necessary permits must be applied for with SAHRA if any material of interest is found. It's important to note that the heritage specialist indicated that the site is considered as a low sensitivity site due to the unlikely occurrence of any such significant resources.							

There exists no surface evidence of historically significant buildings, Stone Age archaeological remains, Iron Age structures, graves or any cultural significant structures within the site boundary. The likely hood of finding any significant historical artefacts or fossils is considered to be low. Therefore, the overall impact significance is considered to be of a **Low** order.

Heritage Impacts						
	Constructional Phase		Operational Phase		Total Before Mitigation	Total After Mitigation
Impacts	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation		
1. Artefacts and Fossils	6,7	2,7	4,7	3,5	5,7	3,1
Total:					5,7	3,1

The overall impacts on archaeological components will be of **Low-medium (5.7)** order prior to any mitigation and **Low (3.1)** after mitigation. Appropriate mitigation measures should be implemented when any historical significant artefacts or fossils are uncovered during the construction phase.

3.3 Water Resources

Water resources include every aspect of water including surface and ground water, as well as assessments on their quality and quantity.

Impact	1. Surface and Ground Water Quality							
Description of Impact	Sewage effluent and fuel/oil spillages can cause contamination of surface and ground water							
Constructional Phase								
Before Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	2,0	2,0	2,0	2,0	2,0	3,0	2,5	5,0
Mitigation	Chemical toilets must be available during construction and trap containers containing any oil, grease or other industrial substance must be treated and discharged at a recognised facility.							
After Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	2,0	2,0	1,0	1,7	2,0	2,0	2,0	3,3
Operational Phase								
Before Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	3,0	2,0	2,0	2,3	2,0	2,0	2,0	4,7
Mitigation	Adequate toilets must be available on site and maintained to avoid spillage, workshop areas must be concrete. A proper storm water management plan should be implemented.							
After Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	2,0	2,0	1,0	1,7	2,0	1,0	1,5	2,5
Cumulative Impacts	Sewage/sanitary and chemical effluent spills causing pollution of both surface and ground water. Impermeable surfaces due to parking area increases runoff.							
Additional Notes:	To eliminate the risk of contamination, above mentioned measures need to be implemented.							

The major risk to groundwater quality will be associated with activities on the surface such as spillages of hazardous substance, which will infiltrate over a period of time into the aquifer, which, depending on the size of the spill, can contaminate the whole aquifer. It is thus crucial to exercise mitigation measures during such incidents to avoid other groundwater users in the area being negatively affected by poor quality water. During the construction phase of the development, it estimated that the impact on surface and groundwater quality is of **Low-Medium (5.0)** order prior to mitigation and **Low (3.3)** after mitigation. During the operational phase it is calculated that the impact on water resources will be of **Low (4.7)** prior to mitigation and **Low (2.5)** after mitigation.

Water Resources Impacts						
	Constructional Phase		Operational Phase		Total Before Mitigation	Total After Mitigation
Impacts	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation		
1. Surface and Ground Water Quality	5,0	3,3	4,7	2,5	4,8	2,9
				Total:	4,8	2,9

The impact on water resources will be **Low (4.8)** prior to mitigation and **Low (2.9)** after mitigation. All other mitigation measures as indicated should be implemented.

3.4 Aesthetics

This risk to the visual character of the environment will be based on a cumulative contribution of all the specialists and physical site visits done by the Environmental Assessment Practitioner.

Impact	1. Construction of Infrastructure							
Description of Impact	Negative aesthetics due to open trenches, soil heaps, construction signs and still standing vehicles							
Constructional Phase								
Before Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	2,0	3,0	1,0	2,0	3,0	2,0	2,5	5,0
Mitigation	Use of minimum number of construction sites, levelling off the excavated areas and closing of trenches after 30 days. Construction should finish as soon as possible. All waste must be collected in a central place and removed from site to a registered landfill site on a regular basis.							
After Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	1,0	2,0	1,0	1,3	3,0	4,0	3,5	4,7
Operational Phase								
Before Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	2,0	5,0	2,0	3,0	2,0	3,0	2,5	7,5
Mitigation	Revegetation and rehabilitation of open spaces after construction.							
After Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	1,0	5,0	1,0	2,3	1,0	2,0	1,5	3,5
Cumulative Impacts	Negative visual impact on the surrounding community.							
Additional Notes:	Construction should occur as quickly as possible to improve the aesthetic value.							

The risk to the aesthetic value of the surrounding environment during the constructional phase of the development is rated to be **Low-Medium (5.0)** before mitigation and **Low (4.7)** after mitigation. Operational phase however is rated **Low-medium (7.5)** before mitigation and **Low (3.5)** after mitigation. This impact is rated significant but with the proper mitigation measures applied will be insignificant to the aesthetic value of the surrounding environment.

Aesthetics Impacts						
	Constructional Phase		Operational Phase		Total Before Mitigation	Total After Mitigation
Impacts	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation		
1. Construction of Infrastructure	5,0	4,7	7,5	3,5	6,3	4,1
0	0	0	0	0	0	0
				Total:	6,3	4,1

The overall impact on the area's Aesthetic value is considered **Low-medium (6.3)** prior to mitigation and **Low (4.1)** after mitigation. It is therefore recommended that construction finish as early as possible and that all disturbed open spaces are rehabilitated with indigenous vegetation.

3.5 Noise and Air Quality

Noise and air quality assessments are based upon what equipment will be used during a specific activity and the type of disturbance that will occur.

Impact	1. Air Quality							
Description of Impact	Increased traffic will cause excessive dust in the area and construction vehicles expelling smoke emissions							
Constructional Phase								
Before Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	3,0	3,0	2,0	2,7	5,0	5,0	5,0	13,3
Mitigation	Watering bare surfaces and excavations to promote dust suppression, enforce speed limit of 30km/h and optimization of working schedule to reduce vehicle mobilization. Veld fires should be prevented by preventing the use of open fires on site.							
After Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	1,0	3,0	1,0	1,7	3,0	3,0	3,0	5,0
Operational Phase								
Before Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
Mitigation	It is considered highly unlikely that the operational phase will significantly influence air quality considering that the proposed development is an educational facility.							
After Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
Cumulative Impacts	Combined vehicle movement on the surrounding dirt roads and inadequate maintenance of equipment							
Additional Notes:	To ensure air quality are maintained near baseline conditions the above mentioned measures needs to be implemented							

Air quality will temporarily be impacted due to the movement and activities of construction vehicles. Due to the temporary nature of these activities, it is not foreseen that these impacts will significantly alter the air quality of the environment. Air quality and the risks involved will have an insignificant impact on the environment.

Impact	2. Noise and Vibrations							
Description of Impact	Construction equipment (bulldozers, graders and general purpose vehicles) will create noise and vibrations							
Constructional Phase								
Before Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	2,0	3,0	2,0	2,3	4,0	4,0	4,0	9,3
Mitigation	Working schedule for activities with high noise levels will be limited to 08:00 AM to 17:00 PM, machinery should be serviced regularly during the construction stage.							
After Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	1,0	3,0	1,0	1,7	2,0	2,0	2,0	3,3

Operational Phase								
Before Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	2,0	4,0	2,0	2,7	3,0	3,0	3,0	8,0
Mitigation	Adequate signage must be provided around the proposed development, limiting fast vehicle movement and avoid simultaneous noisy activities.							
After Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	1	5,0	1,0	2,3	1,0	2,0	1,5	3,5
Cumulative Impacts	Movement of vehicles, utilization of equipment and crowd control during popular events.							
Additional Notes:	It is considered unlikely that the proposed development will impose any significant environmental impacts due to the fact that it is an educational facility.							

Ambient noise will temporarily be impacted due to construction activities. It is considered unlikely that any significant environmental impact will arise due to these activities considering their temporary nature. During the construction phase the environmental impact on ambient noise is **Low-Medium (9.3)** before mitigation and **Low (3.3)** after mitigation. The environmental impacts arising from the proposed development i.t.o. noise and vibrations is considered to be unlikely considering the proposed development is an educational facility.

Noise and Air Quality Impacts						
	Constructional Phase		Operational Phase		Total Before Mitigation	Total After Mitigation
Impacts	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation		
1. Air Quality	13,3	5,0	0,0	0,0	6,7	2,5
2. Noise and Vibrations	9,3	3,3	8,0	3,5	8,7	3,4
				Total:	7,7	3,0

The impacts that the proposed development will have on the noise and air quality will be minimal and insignificant if mitigation measures are implemented. Taking all factors into consideration the risk for noise and air quality scores a **Low-medium (7.7)** rating before mitigation and **Low (3.0)** after mitigation.

3.6 Waste

Waste refers to all solid waste, including domestic waste, hazardous waste and construction debris. The Contractor are responsible for the establishment of a refuse control system (which must consider recycling wherever possible) that is acceptable to the ECO. Disposal arrangements must be made in advance and cleared with the ECO before construction starts

Impact	**1. General Solid Waste**							
Description of Impact	Littering by construction workers and constructional waste not being disposed of in adequate waste receptacles							
Constructional Phase								
Before Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	3,0	3,0	2,0	2,7	4,0	3,0	3,5	9,3
Mitigation	Reduce, reuse and recycle strategy needs to be implemented, waste receptacles must be made available and all waste shall be adequately stored. Waste that can easily be dispersed by wind should be discarded in a proper way. Waste should be regularly removed from the site.							
After Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	1,0	2,0	1,0	1,3	3,0	2,0	2,5	3,3
Operational Phase								
Before Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	2,0	4,0	2,0	2,7	3,0	3,0	3,0	8,0
Mitigation	General waste associated with the proposed development is to be disposed of through the municipal service.							
After Mitigation	Severity	Duration	Extent	Consequences	Frequency	Probability	Likelihood	Significance
	1,0	3,0	1,0	1,7	2,0	1,0	1,5	2,5
Cumulative Impacts	Waste pollution associated with both construction and operation							
Additional Notes:	In order to avoid posing a risk to the environment accessible receptacles must be readily available							

The impact on general waste during construction will be **Low-Medium (9.3)** before mitigation and **Low (3.3)** when mitigation measures are applied. The impact during operational phase **Low-Medium (8.0)** before mitigation but lowers to a **Low (2.5)** rating after mitigation. This risk assessment is described as having a medium order impact likely to have a real to significant effect. It is necessary to implement monitoring and evaluation procedures to determine the potential of increase in risk.

Waste Impacts						
	Constructional Phase		Operational Phase		Total Before Mitigation	Total After Mitigation
Impacts	Before Mitigation	After Mitigation	Before Mitigation	After Mitigation		
1. General Solid Waste	9,3	3,3	8,0	2,5	8,7	2,9
				Total:	8,7	2,9

The overall environmental impact that waste will have been considered **Low-Medium (8.7)** before mitigation and **Low (2.9)** after mitigation measures have been implemented. It remains important to implement mitigation measures throughout the duration of the construction phase.

4. Risk Assessment and Conclusion

Total Combined Impacts		
Factors	*Impact Before Mitigation*	*Impact After Mitigation*
Fauna and Flora	6,5	2,9
Heritage	5,7	3,1
Water Resources	4,8	2,9
Aesthetics	6,3	4,1
Noise and Air Quality	7,7	3,0
Waste	8,7	2,9
Overall Impact	**6,6**	**3,1**

In conclusion the development is rated to be of **Low-Medium (7.7)** impact if no mitigation is applied. This score is however, highly unlikely as environmental monitoring and supervision will be applied and an Environmental Management Plan report will also be available to the contractors. If all mitigation measures are applied the overall environmental impact is estimated to be **Low (3.2)** which is regarded as an insignificant environmental impact.