SIGNIFICANCE ASSESSMENT METHODOLOGY

The significance assessment methodology that will be used to assess the abovementioned impacts without and with mitigation is outlined below:

Impact Rating Matrix

NATURE: The character of the impact			
EXTENT	**DURATION**	**PROBABILITY**	**MAGNITUDE**
Area	Time Frame	Likelihood	Intensity of impact to destroy or alter the environment.
SIGNIFICANCE: Implication of the impact both with or without mitigation			
TYPE: Description as to whether the impact is negative or positive or neutral.			
MITIGATION: Possible impact management, minimization and mitigation of the identified impacts.			

1.1.1 Nature of Impact

Nature of impact describes the character of the impact in terms of the effect on the relevant environmental aspect.

1.1.2 Spatial Extent of Impact

Measures the area extent, physical and spatial scale over which the impact will occur. This implies the scale limited to the Project Site (footprint) - including adjacent areas (localized), or the Local Municipality area (regional) or the entire Province (Provincial), or the entire country (National) or beyond the borders of South Africa.

Criteria	Footprint (F)	Site/Local (S-L)	Regional (R)	National (N)	International (I)
Rating	**1**	**2**	**3**	**4**	**5**

1.1.3 Duration of Impact

Duration measures the timeframe of the impact in relation to the lifetime of the Project activities under application. It gives an assessment of whether the impact will disappear with mitigation immediately (0-1) after a short time (1-5 years), medium term (5-10 years), long term (11- 30 years of the Project activities), or permanent (persists beyond life) due to the Project activities.

Criteria	Temporary (T)	Short Term (ST)	Medium Term (MT)	Long Term (LT)	Permanent (P)
Rating	**1**	**2**	**3**	**4**	**5**

1.1.4 Probability of Impact

Probability measures the probability or likelihood of the impact actually occurring, as either probable, possible, likely, highly likely or definite (impact will occur regardless of preventative measures).

Criteria	Probable (PR) (0-10%)	Possible (PO) (10-25%)	Likely (L) (25-50%)	Highly Likely (HL) (50-75%)	Definite (D) (100%)
Rating	**1**	**2**	**3**	**4**	**5**

1.1.5 Magnitude/Intensity of Impact

Magnitude or intensity of the impact measures whether the impact is destructive or benign, whether it destroys, alters the functioning of the environment, or alters the environment itself. It is rated as insignificant, low, medium, high or very high.

Criteria	Insignificant (I)	Low (L)	Medium (M)	High (H)	Very High (VH)
Rating	**2**	**4**	**6**	**8**	**10**

1.1.6 Significance of Impact

Significance measures the foreseeable significance of the impacts of the Project both with and without mitigation measures. The significance on the aspects of the environment is classified as:

Significance Rating (SR) =	(Extent + Intensity + Duration) x Probability

Extent		Duration		Intensity		Probability		Significance Rating	
Footprint	**1**	Temporary	**1**	Insignificant	**2**	Probable	**1**	**Insignificant**	**0-19**
Site	**2**	Short	**2**	Low	**4**	Possible	**2**	**Low**	**20-39**
Regional	**3**	Medium	**3**	Medium	**6**	Likely	**3**	**Medium**	**40-59**
National	**4**	Long	**4**	High	**8**	Highly Likely	**4**	**High**	**60-89**
Inter-national	**5**	Permanent	**5**	Very High	**10**	Definite	**5**	**Very High**	**90 <**

The following is a guide to interpreting the final scores of impact:

INSIGNIFICANT: the impact should cause no real damage to the environment, except where it has the opportunity to contribute to cumulative impacts.

LOW: the impact will be noticeable but should be localised or occur over a limited time period and not cause permanent or unacceptable changes; it should be addressed in the environmental management plan (EMP) and managed appropriately.

MEDIUM: the impact is significant and will affect the integrity of the environment; effort must be made to mitigate and reverse this impact; in addition the project benefits must be shown to outweigh the impact.

HIGH: the impact will affect the environment to such an extent that permanent damage is likely and recovery will be slow and difficult; the impact is unacceptable without real mitigation or reversal plans; project benefits must be proven to be very substantial; the approval of the project will be in jeopardy if this impact cannot be addressed.

VERY HIGH the impact will result in large, permanent and severe impacts, such as local species extinction, minor human migrations or local economic collapses; even projects with major benefits may not go ahead with this level of impact; project alternatives which are substantially different should be looked at, otherwise the project should not be approved.

1.1.7 Status of Impact

Status of impact describes whether the impact is positive (beneficial) on the affected environment (social) or negative (detrimental) or neutral.

1.1.8 Reversibility

Is the impact **Quickly Reversible** or **Reversible over a Long Time** or **Irreversible**?

IMPACT ASSESSMENT

The identified environmental issues are assessed in *Table 1* below in terms of the outlined Significance Assessment Methodology above.

TABLE 1: ASSESSMENT OF IDENTIFIED ENVIRONMENTAL IMPACTS

ASPECT: SOCIO-ECONOMIC		
NATURE OF IMPACT: Employment opportunities for the local community during construction phase due to the current unemployment rate (socio-economic impact)		
	Without Mitigation	**With Mitigation**
Extent	Regional (3)	Local (2)
Duration	Short term (2)	Short term (2)
Magnitude	Low (4)	Medium (6)
Probability	Probable (1)	Highly Likely (4)
Significance	Insignificant (9)	Medium (40)
Status (positive or negative)	Positive	
Reversibility	N/A	
Irreplaceable loss of resources?	No	
Can impacts be ~~mitigated or~~ augmented	Yes	
Mitigation: No mitigation is required because it is a positive impact, however, it can be augmented by the following: ◊ Local labourers, especially from the Ward 8, local sub-contractors and SMMEs should be utilized to a greater extent and recruitment should consider gender equality in mind. ◊ Work force should include youth, women and disabled. Expanded Public Works Programme targets in terms of recruitment must be met. ◊ Labour intensive construction methods should be adopted. ◊ Appropriate training should be provided based on the skills audit to be undertaken within the area. ◊ Community Liaison Officer should be appointed, and Project Steering Committee established prior to construction to ensure that all social issues are resolved, and the project doesn't result in any delays due to unresolved issues, e.g. recruitment of local labourers.		
Cumulative impacts: The unemployed individual will increase the opportunity of being employed in a similar work, therefore level of unemployment could be reduced		

within the area and its surroundings.
Residual Impacts: The general workers would have gained experience and skill to work in similar projects in the future and CIBD grading of sub-contractors would improve.
Discussion: It is important to involve the councillor and ward committee of Ward 8 during labour recruitment. A skills audit should also be undertaken to determine training that could be offered to the general workers. If it important that the contractor only uses skilled labourers from other areas if they aren't available in the Jan Kempdorp area. There should be a database of local sub-contractors that will be empowered from this project. Construction material must be sourced locally before other areas are considered.

ASPECT: TRAFFIC		
NATURE OF IMPACT: Increase in movement of construction vehicles that could result in traffic congestion		
	Without Mitigation	**With Mitigation**
Extent	Local (2)	Local (2)
Duration	Short term (2)	Short term (2)
Magnitude	High (8)	Low (4)
Probability	Probable (5)	Possible (2)
Significance	High (60)	Insignificant (16)
Status (positive or negative)	Negative	
Reversibility	Quickly reversible	
Irreplaceable loss of resources?	No	
Can impacts be mitigated ~~or augmented~~	Yes	
Mitigation: ◊ There should be limited movement of construction vehicles during peak traffic hours. ◊ Flag mans and traffic controllers should be appointed to regulate traffic flow of construction vehicles. ◊ Speed limits of construction vehicle should be limited to 40km/h and drivers should be observant at all times.		

◊ Signage should be place at the entrance of the construction site indicating construction is in progress. ◊ Construction vehicles should be parked at designated locations so that the neighbouring residents will not be inconvenienced.
Cumulative impacts: None expected
Residual Impacts: No residential impact
Discussion: The contractor should take note of the neighbouring residents, so that they don't experience unnecessary traffic delays and congestion as a result of the construction activities. During peak hours, e.g. morning and afternoon, there should be minimal movement of construction vehicles on the road.

ASPECT: FLORA		
NATURE OF IMPACT: Destruction of or damage to Red Data Listed, Nationally-, Provincially protected species identified within the assessment area.		
	Without Mitigation	**With Mitigation**
Extent	National (4)	Local (2)
Duration	Permanent (5)	Permanent (5)
Magnitude	Very High (10)	Low (4)
Probability	Definite (5)	Possible (2)
Significance	Very High (95)	Low (22)
Status	Negative	
Reversibility	Reversible over a long time	
Irreplaceable loss of resources?	Yes	
Can impacts be mitigated~~ or augmented~~?	Yes	
Mitigation: ◊ No Red Data Listed species within the proposed site. ◊ A walkover Study must be conducted by an Ecologist/Botanist prior to commencement of vegetation clearance during site preparation		

◊ Significantly sized individuals of the nationally protected species *Vachellia erioloba,* which must be incorporated into the development design layout should be marked prior to commencement of vegetation clearance. ◊ A Plant Relocation Management Plan must be compiled by a suitable qualified and experienced ecologist. ◊ A Nationally Protected Tree License must be obtained from the Department of Agriculture, Forestry and Fisheries for the removal of small individuals of *Vachellia erioloba*, which could be relocated to the open spaces' units, to avoid total loss. ◊ A Provincial Flora Permit must be obtained from the Department of Nature Conservation and Environment for the removal of provincially protected species. ◊ The single individual of the provincially specially protected species *Harpagophytum procumbens* as well as a minimum of 5 clumps of the species *Aloe grandidentata* must be removed prior to commencement of vegetation clearance. ◊ Construction activities must be confined to the development footprint.
Cumulative impacts: Yes, this will result in an increase in the damage and/or destruction of Nationally- and Provincially protected species
Residual Impacts: Limited
Discussion: No Red Data species were recorded on the proposed site. However, there are Nationally and Provincially Protected species, which some will have to be incorporated into the design, whilst others will need to be removed. Hence, the impact is permanent even though there is mitigation. The necessary License and Permit must be obtained prior to vegetation clearance; therefore, an ecologist must be appointed for the marking of species not to be removed/damaged and the relocation process of others completed prior to the clearance of the vegetation during site preparation.

ASPECT: TRANSFORMATION OF OPEN SPACE		
NATURE OF IMPACT: Transformation of Open Space, which could result in the loss of ecosystem services		
	Without Mitigation	**With Mitigation**
Extent	Local (2)	Footprint (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	Very High (10)	Medium (6)

Probability	Definite (5)	Likely (3)
Significance	High (85)	Low (36)
Status (positive or negative)	Negative	
Reversibility	Reversible over long time	
Irreplaceable loss of resources?	Yes	
Can impacts be mitigated ~~or augmented~~	Yes	
Mitigation: ◊ The layout for the proposed infill have 2 land units for open space. ◊ Incorporating the ecological corridor into the layout for the proposed infill development. ◊ Promote greening as part of the development by planting indigenous trees and grass.		
Cumulative impacts: Yes, if the municipality doesn't avoid developments within areas zoned as open space, this infill development could set a precedent to the remaining areas, thus the ecological services within the Jan Kempdorp will be lost.		
Residual Impacts: Limited		
Discussion: There will be habitat destruction, which will result in the transformation of open space. However, the impact, will not be significant as an ecological corridor must be maintained. There are adequate number open spaces within the vicinity of the proposed site. If the development doesn't go ahead, in the long run, the open space will be transformed by the current ongoing activities, e.g. illegal dumping, overgrazing, etc.		

ASPECT: NOISE POLLUTION		
NATURE OF IMPACT: Excessive generation of noise that could be nuisance to the surrounding landusers, owners and workforce.		
	Without Mitigation	**With Mitigation**
Extent	Local (2)	Local (2)
Duration	Short term (2)	Temporary (1)
Magnitude	Very High (10)	Medium (6)
Probability	Definite (5)	Possible (2)

Significance	High (70)	Insignificant (18)
Status	Negative	Negative
Reversibility	Quickly Reversible	
Irreplaceable loss of resources?	No	No
Can impacts be mitigated ~~or augmented~~?	Yes	
Mitigation: ◊ All vehicles and equipment used on site must conform to the noise regulations standard. ◊ Construction should be limited to normal working days and office hours from 08h00 to 17h00. Should there be any deviation, then the surrounding community should be informed. ◊ Ensure that employees and staff conduct themselves in an acceptable manner while on site, both during work hours and after hours. ◊ Limit working hours of noisy equipment to daylight hours ◊ Fit silencers to construction equipment and vehicles. ◊ All operators of heavy construction equipment must wear earplugs or mufflers. ◊ Construction vehicles and machinery must be kept in good working conditions.		
Cumulative impacts: None expected		
Residual Impacts: Minimal noise is still expected from the vehicles and the equipment to be used on site during construction activities.		
Discussion: Contractor and workforce should be considerate of the neighbouring community, noise levels during construction and operation should be within the acceptable limits so that it does not cause any hearing impairment to the workforce and sleep disturbances to the surrounding land users or owners. Construction should be limited to normal working days and should there be a need to work after hours, the community should be informed. Operation of heavy machinery after hours should be prohibited.		

ASPECT: AIR QUALITY		
NATURE OF IMPACT: Excessive dust generation during the construction phase and fumes emissions from construction vehicles and/or machinery, which could impact on the health of the surrounding land users and the workforce.		
	Without Mitigation	**With Mitigation**
Extent	Local (2)	Footprint (1)
Duration	Permanent (5)	Temporary (1)
Magnitude	Very High (10)	Low (4)
Probability	Definite (5)	Probable (1)
Significance	High (85)	Insignificant (6)
Status	Negative	Negative
Reversibility	Quickly reversible	
Irreplaceable loss of resources?	No	No
Can impacts be mitigated ~~or augmented~~?	Yes	
Mitigation: ◊ Occasional wetting of access roads, hauling roads and construction site should be done by using a water tank. ◊ Speed limit of 20km/h should be adhered to and 40km/h on the access road. ◊ Restrict movement of machinery to avoid unnecessary fugitive dust emissions. ◊ Construction vehicles and machinery should be serviced regularly to minimize the exhaust fumes. ◊ Water should be obtained from the municipality or an alternative source should be considered. ◊ No water may be obtained from a stream or river without obtaining a Water Use License from the Department of Water and Sanitation. ◊ Workforce must be provided with Personal Protective Equipment, e.g. dust mask. ◊ Areas surrounding the construction footprint must be adequately rehabilitated as soon as practically possible after construction in order to prevent significant dust emissions from occurring.		
Cumulative impacts: None expected		
Residual Impacts: Limited		
Discussion Dust generation is expected during construction and it could result in respiratory of cardiovascular health problems. Dust could also irritate the		

eyes, throat and skin, however, should the outlined mitigation measures be implemented, then the impact on the quality of the air will be minimized. Therefore, considering the location of the proposed site in relation to the sensitive receptors, *i.e.* neighbouring residents, dust control should be prioritized.

ASPECT: ALIEN INVASIVE SPECIES		
NATURE OF IMPACT: Establishment and spread of alien invasive species.		
	Without Mitigation	**With Mitigation**
Extent	Site (2)	Footprint (1)
Duration	Permanent (5)	Short term (2)
Magnitude	Very High (10)	Low (4)
Probability	Definite (5)	Probable (1)
Significance	High (85)	Insignificant (7)
Status	Negative	
Reversibility	Quickly Reversible	
Irreplaceable loss of resources?	Yes	
Can impacts be mitigated ~~or augmented~~?	Yes	
Mitigation: ◊ There should be a dedicated person responsible for the control of alien vegetation species during construction phase. ◊ Implement an adequate Alien Invasive Species Establishment Management and Prevention Plan compiled by a suitably qualified and experienced ecologist during the construction and operational phases. ◊ Construction vehicles and equipment/machinery must be cleaned before entering the construction site. ◊ Areas surrounding the construction footprint must be adequately rehabilitated as soon as practically possible after construction in order to prevent significant alien invasive species establishment.		
Cumulative impacts: Yes, because alien species have been recorded on the proposed site.		
Residual Impacts: Limited		
Discussion: The alien invasive species tends to spread during construction activities, and they end up even infesting the neighbouring areas. This is due to		

the movement/removal of topsoil and introduction by construction vehicles and/or machinery/equipment. To curb this from happening, introduction of alien species must be avoided and the existing once must be removed by hand/machinery, if it fails then herbicides may be used. Should the spread not be mitigated, then the neighbouring plantations could be infested and this could affect the farmers' production because the quality of the soil will be negatively affected.

ASPECT: WASTE MANAGEMENT		
NATURE OF IMPACT: Incorrect and improper storage and disposal of solid waste during construction that could result in contamination of the environment and reduce visual aesthetics of the area.		
	Without Mitigation	**With Mitigation**
Extent	Local (2)	Footprint (1)
Duration	Short term (2)	Temporary (1)
Magnitude	Very High (10)	Medium (4)
Probability	Definite (5)	Possible (2)
Significance	Medium (70)	Insignificant (12)
Status	Negative	
Reversibility	Quickly Reversible	
Irreplaceable loss of resources?	No	
Can impacts be mitigated ~~or augmented~~?	Yes	
Mitigation: ◊ Contractor should provide a method statement for waste management prior to construction. ◊ Environmental Awareness Training and/or Toolbox Talks must include housekeeping and waste management. ◊ System for regular waste removal must be set up. ◊ Refuse receptacles with lids should be placed at the camp depot and construction site. They should be marked to avoid mixing of waste streams and easily accessible. ◊ Burning of waste should be prohibited. ◊ All excavations should be backfilled after completion of construction to prevent illegal dumping. ◊ Letter or agreement between contractor and pollution control officers or companies dealing with hazardous waste should be on site.		
Cumulative impacts:		

None expected.
Residual Impacts: Limited
Discussion: There should be a designated place with refuse bins so that there is no littering. Waste management should be included in toolbox talks and good housekeeping should always be maintained.

ASPECT: PALAEONTOLOGICAL, CULTURAL, HISTORICAL OR ARCHAEOLOGICAL ARTEFACTS		
NATURE OF IMPACT: Potential damage or destruction to undiscovered heritage sites in the area during construction.		
	Without Mitigation	**With Mitigation**
Extent	Local (2)	Local (2)
Duration	Permanent (5)	Temporary (1)
Magnitude	Very High (10)	Low (4)
Probability	Definite (5)	Possible (2)
Significance	Medium (85)	Insignificant (14)
Status	Negative	
Reversibility	Irreversible	
Irreplaceable loss of resources?	Yes	
Can impacts be mitigated ~~or augmented~~?	Yes	
Mitigation: Archaeological: The identified calcrete block must be removed and taken to McGregor Museum in Kimberley for safe keeping, until such time that the Jan Kempdorp Local Museum is in a position to accept it. This should be supervised by an Archaeologist and should be before commencement of construction activities. Palaeontological: Although the proposed site has a low palaeontological significance, in the event that fossils are discovered during any phase of construction, either on the surface or exposed by fresh excavations, the Chance Finds Protocol must be implemented by the Environmental Control Officer.		
Cumulative impacts: None expected.		
Residual Impacts:		

None
Discussion: The block of calcrete, with an embedded biface that has been identified on site must be removed and taken to the McGregor Museum in Kimberley for safekeeping, or else it will be damaged/destroyed by the construction activities. Therefore, minimal disturbance will occur during the removal of the block and transportation. Should there be any new discoveries during construction, construction work must not proceed if it will cause damage to such findings. No unauthorized persons may not remove artefacts of cultural or historical importance from the site, before Environmental Control Officer is informed and SAHRA and Northern Cape Heritage Authority are notified of the find.

ASPECT: SPREAD OF HIV/AIDS DURING CONSTRUCTION		
NATURE OF IMPACT: Risk of the increase of Human Immuno-Virus/Acquired Immuno-Deficiency Syndrome (HIV/AIDS) and other Sexually Transmitted Diseases due to the increase in income and introduction of people (employed in the project) which may cause unsafe behaviours and casual sexual relationship during construction.		
	Without Mitigation	**With Mitigation**
Extent	Regional (4)	Regional; (4)
Duration	Permanent (5)	Permanent (5)
Magnitude	Very High (10)	Medium (6)
Probability	Definite (5)	Possible (2)
Significance	Very High (95)	Medium (30)
Status	Negative	
Reversibility	Irreversible	
Irreplaceable loss of resources?	Yes	
Can impacts be mitigated ~~or augmented~~?	Yes	
Mitigation: To build an HIV resilient workforce the following must be implemented: 1. HIV/Aids awareness training from an accredited institution. 2. Ensuring condoms are made available on site. 3. Support peer education programmes within the workforce. 4. Promote local procurement, e.g. subcontracting or use of the local community through the involvement of the ward councillors or recruitment strategy that is used by the municipality.		

Cumulative impacts: Yes
Residual Impacts: Yes
Discussion: Construction sites tend to result in introduction of people into areas, seeking employment and some leaving their families behind but then end up having casual unprotected sex, especially in instances whereby there are labour camps others end up using their income, this is prevalent to first time general worker as a means to be involved in promiscuous sex. This is one of the factors that cause the spread of HIV/Aids. However, this can be managed if HIV/Awareness training is provided to the workers from an accredited institution to ensure the workforce is aware of the consequences of having casual unprotected sex and promote voluntary testing and treatment that is provided by the Healthcare institutions as well as basic financial management. A partnership may also be formed with the local Health departments, e.g. government clinics to raise awareness in the community to prevent further transmission of HIV/Aids. Local labour procurement should also be prioritized to minimize the relocation of new people into the community.