Appendix F – Impact Assessment

This section provides excerpts of the impact assessments from the following specialist studies:

- Ecological Impact Assessment, Mr Simon Bundy, 2020
- Heritage Impact Assessment, Dr Jayson Orton, 2020
- Palaeontology Impact Assessment, Dr John Almond, 2020
- Traffic Impact Assessment, Ms Iris Wink (JG Afrika), 2020

Assessment of Ecological Impacts

Methodology

The impact assessment rating method utilized, below identifies 8 criteria for utilisation in the assessment of the level or degree of impact associated with the activity. These 8 criteria are:

1.Intensity / severity – the level of change or disturbance that arises from the activities envisaged. Intensity is determined to arise from "very low" (negligible change) to "high" (prominent change where dysfunctional states arise on the status quo).

2.Extent/ spatial scale – the area affected by the activity. This is determined to vary from "local" (impact is confined to the area where the activity is undertaken) to "international" (where the impact extends beyond geopolitical boundaries).

3.Duration. The timeframe over which the impact is experienced, varying from "short term" (>5 years) to permanent (where temporal scale will not ameliorate the impact).

4.Probability ; The likelihood of the impact arising, which extends from "improbable" to "definite". This is a qualitative determination of probability.

5.Confidence: A measure of the level of surety that the impacts or the parameters identified, will occur. (low = <0.35; moderate = 0.35 – 0.75 ; high >0.75).

6.Reversal : An indication of the ability to reverse the impact or re-establish the status quo. (irreversible ; partially reversible and fully reversible)

7.Resource Loss : The degree to which the impact may cause irreplaceable loss of resources (low, medium and high)

8.Mitigation : The level to which a negative impact can be ameliorated (none ; very low ; low ; medium; high)

The consequence of the impacts that have been identified is determined by the "intensity, extent and duration" criteria identified above. These consequences are determined using criteria stated as *very high; high; medium ; low* and *very low*. The significance of the impact is finally determined using a function of "consequence" and "probability"

Assessment

IMPACT	Intensity	Extent	Duration	Probability	Confidence	Reversibility	Resource Loss	Mitigation	Consequence	Significance
Alteration of the local hydrological regime.	Low	Local	Short term	Definite	High	Partially reversible	Low	Medium	Very low	Very low
Sediment transport	Low	Local	Short term	Definite	High	Partially reversible	Low	Medium	Vert low	Very low
Alteration of habitat	Moderate	Local	Long term	Definite	High	Irreversible	Low	Low	Low	Low
Alteration of faunal ethos	Low	Local	Long term	Definite	High	Reversible	Medium	Low	Very low	Very low
Spillages and general run off	Low	Local	Short term	Definite	Moderate	Reversible	Low	High	Very low	Very low
Road mortalities	Low	Local	Long term	Definite	Moderate	Irreversible	Low	High	Very low	Very low
Electrical light pollution	Low	Local	Long term	Definite	Moderate	Reversible	Low	Low	Very low	Very low
Noise and related "nuisance" factors	Low	Local	Long term	Definite	Moderate	Reversible	Low	Low	Very low	Very low

Mitigation

- Alteration of hydrological regime:

Measures to moderate surface run off from the roadway and control stormwater discharge from the hardpan surface should be employed. This can include dissipation measures and attenuation systems to be employed in an overall stormwater management system.

- Sediment transport

Measures to address the transport and accumulation of sediments along the roadway, particularly where surfaces may promote increased run off, should be established. This would include the stabilisation of sands and soils accumulated during the construction phases, as well as addressing the accumulation of aeolian sands during the operational phase.

- Alteration of habitat.

Alteration of habitat will arise as a consequence of the establishment of the roadway. Measures to be employed should however be left to the discretion of the environmental control officer depending upon the management outcome desired for the broader area in general. Such measures may include the clearance of vegetation, or alternatively the maintenance and enhancement of vegetation to encourage and promote growth of specific specimens or species.

- Alteration of faunal ethos

There are limited measures to be employed in addressing change in faunal behaviours at community or species level.

- Spillages and general run off.

Avoidance and redress of spills can best be achieved by ensuring the utilsation of well maintained vehicles, the sound containment of liquids being transported across the route and the redress of spills through appropriate clean up operations if and when spillage arises.

- Road mortalities

The reduction in road mortalities is best achieved by ensuring vehicles travel at low speed along the road way and drivers and aware of fauna that may be crossing the road i.e. signage.

- Electrical light pollution:

Little mitigation can be offered in redress of ELP.

- Noise and Related Nuisance Factors

The presence of persons along the roadway and factors such as noise should be managed as part of the overall environmental management protocols of the farm and site in general. Increased pedestrian and vehicular movement along the route can be expected and with the implementation of the above measures, the overall "nuisance" factor on site should diminish

Assessment of Heritage Impacts

Methodology

Literature survey and information sources

A survey of available literature was carried out to assess the general heritage context into which the development would be set. This literature included published material, unpublished commercial reports and online material, including reports sourced from the South African Heritage Resources Information System (SAHRIS). The 1:50 000 maps were sourced from the Chief Directorate: National Geo-Spatial Information. Data were also collected via a field survey.

Field survey

The site was subjected to a detailed foot survey on 7th December 2020. This was during summer but, in this very dry area, the season makes no meaningful difference to vegetation covering and hence the ground visibility for the archaeological survey. Other heritage resources are not affected by seasonality. During the survey the positions of finds and survey tracks were recorded on a hand-held Global Positioning System (GPS) receiver set to the WGS84 datum. Photographs were taken at times in order to capture representative samples of both the affected heritage and the landscape setting of the proposed development.

It should be noted that amount of time between the dates of the field inspection and final report do not materially affect the outcome of the report.

Grading

S.7(1) of the NHRA provides for the grading of heritage resources into those of National (Grade I), Provincial (Grade II) and Local (Grade III) significance. Grading is intended to allow for the identification of the appropriate level of management for any given heritage resource. Grade I and II resources are intended to be managed by the national and provincial heritage resources authorities respectively, while Grade III resources would be managed by the relevant local planning authority. These bodies are responsible for grading, but anyone may make recommendations for grading.

It is intended under S.7(2) that the various provincial authorities formulate a system for the further detailed grading of heritage resources of local significance but this is generally yet to happen. SAHRA (2007) has formulated its own system for use in provinces where it has commenting authority. In this system sites of high local significance are given Grade IIIA (with the implication that the site should be preserved in its entirety) and Grade IIIB (with the implication that part of the site could be mitigated and part preserved as appropriate) while sites of lesser significance are referred to as having 'General Protection' (GP) and rated as GP A (high/medium significance, requires mitigation), GP B (medium significance, requires recording) or GP C (low significance, requires no further action).

Assumptions and limitations

The field study was carried out at the surface only and hence any completely buried archaeological sites would not be readily located. Similarly, it is not always possible to determine the depth of archaeological material visible at the surface. Given the generally eroding nature of the surface, however, it is assumed that almost all archaeological materials would, in fact, be lying on the present surface.

Assessment

Impacts to archaeological resources

Direct impacts to archaeological resources would occur during the construction phase only. The materials identified are of low cultural significance which means that the impacts are expected to be of low intensity. As yet undiscovered sites of higher cultural significance are not expected to occur within the proposed alignments. The significance of the impacts is considered to be **low negative** before mitigation and, because of the low cultural significance, no mitigation measures are proposed. It would, however, be required of the contractor to stop work and report any potential heritage finds made during development. Because of the nature of the landscape, the chances of buried archaeology being present are considered to be virtually zero. Although only background scatter artefacts were seen along the margins of the existing farm track that is Option B, all impacts for Options B and C are of low intensity so the assessment in Table 2 applies equally to both options B and C. There are no fatal flaws.

Assessment of archaeological impacts for Options B and C.

	Before mitigation	**After mitigation**
Extent of impact	Local	Local
Intensity of impact	Low	Low
Duration of impact	Permanent	Permanent
Probability of impact occurring	Highly probable	Highly probable
Significance	Low	Low
Status	Negative	Negative

Reversible	No
Replaceable	No
Degree to which impact can be mitigated	High, but not required.
Residual impacts	Regardless of mitigation measures, some sites and many isolated artefacts may be damaged or destroyed by the proposed road. Their low cultural significance means that residual impacts would be of low significance.

Impacts to graves

Direct impacts to graves might occur during the construction phase only. No graves were seen during the survey but it remains possible that some graves could exist on the landscape. Graves are always of high cultural significance which means that any impacts would be of high intensity. Although there is more new ground to be disturbed by Option C, Option B lies closer to the river where graves may be more likely but there is already a small farm road in place. Nevertheless, the chances of impacts occurring on either route are improbable (in practice, negligible). The significance is thus considered to be **low negative** before mitigation. No mitigation measures are proposed but, if a grave is found during construction, it would be required of the contractor to stop work and report the find. The assessment in Table 3 applies equally to both options B and C. There are no fatal flaws.

Assessment of impacts to graves for Options B and C.

	Before mitigation	**After mitigation**
Extent of impact	Local	Local
Intensity of impact	High	High
Duration of impact	Permanent	Permanent
Probability of impact occurring	Improbable	Improbable
Significance	Low	Low
Status	Negative	Negative
Reversible	No	
Replaceable	No	
Degree to which impact can be mitigated	High, but not required unless graves are found during construction.	
Residual impacts	Regardless of mitigation measures, graves may be damaged or destroyed without being seen. The probability, however, is extremely small and residual impacts are thus of low significance.	

Impacts to the cultural landscape

Direct impacts to the cultural landscape would occur during the construction phase, largely because of the construction activity. Once the road is completed it would be little different to other gravel regional roads and would not present significant impacts to the landscape. Nevertheless, very minor impacts (too minor to be of any concern) would last throughout the project lifetime. The cultural landscape is considered to be of low cultural significance which means that any impacts would be of low intensity. Although there is more new ground to be disturbed by Option C, Option B lies closer to the river and may require more

extensive roadworks (e.g. culverts, drainage measures). The significance for both options is thus considered to be **low negative** before mitigation. Because of the flatness of the landscape which will result in very low visibility of the road from a distance, no construction-related mitigation measures (e.g. minimising cut-and-fill) are proposed. However, it is suggested that all gates and fencing should be in keeping with the nature of farm fences and no trees at the farmstead should be removed (Option B only). With mitigation, the impacts would still be rated **low negative**. The assessment in Table 4 applies equally to both options B and C. There are no fatal flaws.

Assessment of impacts to the cultural landscape for Options B and C.

	Before mitigation	**After mitigation**
Extent of impact	Local	Local
Intensity of impact	Low	Low
Duration of impact	Long term	Long term
Probability of impact occurring	Definite	Definite
Significance	Low	Low
Status	Negative	Negative
Reversible	Yes, with full rehabilitation of the alignment.	
Replaceable	No, but the landscape is vast with many similar-looking areas.	
Degree to which impact can be mitigated	High	
Residual impacts	None expected.	

The No-Go alternative

With implementation of the No-Go alternative, the landscape would remain exactly as it is and no changes to any heritage resource would be expected. The assessment of this option would be very low significance with neutral status.

Existing impacts to heritage resources

There are currently no obvious threats to heritage resources on the site aside from the natural degradation, weathering and erosion that will affect archaeological materials. Trampling/damage from grazing animals and/or farm vehicles may also occur.

Cumulative impacts

Because of the very low cultural significance of the archaeological materials found on site and the expected low significance of impacts, cumulative impacts are of no further concern.

Levels of acceptable change

Any impact to an archaeological or palaeontological resource or a grave is deemed unacceptable until such time as the resource has been inspected and studied further if necessary. Impacts to the landscape are difficult to quantify but in general a development that visually dominates the landscape from many vantage points is undesirable. Because of the height of the proposed development, such an impact is not envisaged.

Mitigation

- All gates and fencing along the new road are to be in keeping with the nature of farm fences;
- No mature trees may be removed from the southern end of Option B; and
- If any archaeological material or human burials are uncovered during the course of development then work in the immediate area should be halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist. Such heritage is the property of the state and may require excavation and curation in an approved institution.

Assessment of Traffic Impacts

Assessment

Construction Phase – Traffic congestion

IMPACT TABLE – CONSTRUCTION PHASE		
Environmental Parameter	*Traffic Congestion due to an increase in traffic caused by the transportation of equipment, material and staff to site*	
Issue/Impact/Environmental Effect/Nature	*Transport of equipment, material and staff to site will lead to some congestion.*	
Reversibility	*Completely reversible*	
Irreplaceable loss of resources	*No loss*	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	Local (2)	Local (1)
Probability	Highly probable (4)	Improbable (2)
Duration	Very Short (1)	Very Short (1)
Magnitude	Moderate (6)	Low (4)
Significance rating	Medium (36)	Low (12)
Mitigation measures	• *Stagger component delivery to site* • *Reduce the construction period* • *The use of mobile batch plants and quarries in close proximity to the site* • *Staff and general trips should occur outside of peak traffic periods.* • *Regular maintenance of gravel roads by the Contractor during the construction phase and by Client/Facility Manager during operation phase.*	
Residual Risks:	• *None, Traffic will return to normal levels after construction is completed.*	

Construction phase – Dust pollution

IMPACT TABLE – CONSTRUCTION PHASE		
Environmental Parameter	*Air quality will be affected by dust pollution*	
Issue/Impact/Environmental Effect/Nature	*Traffic on roads will generate dust.*	
Reversibility	*Completely reversible*	
Irreplaceable loss of resources	*No loss*	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	Local (2)	Local (1)
Probability	Highly probable (4)	Improbable (2)
Duration	Very Short (1)	Very Short (1)
Magnitude	Moderate (5)	Minor (2)
Significance rating	Medium (32)	Low (8)
Mitigation measures	• *Dust Suppression of gravel roads during the construction phase, as required.* • *Regular maintenance of gravel roads by the Contractor during the construction phase and by Client/Facility Manager during operation phase.*	
Residual Risks:	• *Dust pollution during the construction phase cannot be completely mitigated but mitigation measures will significantly reduce the impact. Dust pollution is limited to the construction period.*	

Construction Phase – Noise Pollution

IMPACT TABLE – CONSTRUCTION PHASE		
Environmental Parameter	*Noise pollution due to increased traffic.*	
Issue/Impact/Environmental Effect/Nature	*Traffic on roads will generate noise.*	
Reversibility	*Completely reversible*	
Irreplaceable loss of resources	*No loss*	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	Local (2)	Local (1)
Probability	Highly probable (4)	Improbable (2)
Duration	Very Short (1)	Very Short (1)
Magnitude	Moderate (5)	Minor (2)
Significance rating	Medium (32)	Low (8)
Mitigation measures	• *Stagger component delivery to site* • *Reduce the construction period as far as possible* • *The use of mobile batch plants and quarries in close proximity to the site* • *Staff and general trips should occur outside of peak traffic periods*	
Residual Risks:	• *Noise pollution during the construction phase cannot be completely mitigated but mitigation measures will significantly reduce the impact. Noise pollution is limited to the construction period.*	

Cumullative Traffic Impacts

Nature: *Traffic generated by the proposed development and the associated noise and dust pollution in the vicinity of the proposed access point.*		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Low (2)	Moderate (3)
Duration	Very Short (1)	Short (2)
Magnitude	Moderate (6)	Moderate (6)
Probability	Highly probable (4)	Definite (5)
Significance	**Medium (36)**	**Medium (55)**
Status (positive/negative)	Negative	Negative
Reversibility	High	High
Loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Confidence in findings: High.		
Mitigation: • *Stagger component delivery to site* • *Dust suppression* • *Reduce the construction period* • *The use of mobile batch plants and quarries in close proximity to the site* • *Staff and general trips should occur outside of peak traffic periods*		

Mitigation

- The delivery of components to the site can be staggered and trips can be scheduled to occur outside of peak traffic periods.
- Dust suppression of gravel roads during the construction phase, as required.
- Regular maintenance of gravel roads by the Contractor during the construction phase and by the Owner/Facility Manager during the operation phase.
- The use of mobile batch plants and quarries near the site would decrease the traffic impact on the surrounding road network.
- Staff and general trips should occur outside of peak traffic periods as far as possible.
- If required, low hanging overhead lines (lower than 5.1m) e.g. Eskom and Telkom lines, along the proposed routes will have to be moved to accommodate the abnormal load vehicles.
- The preferred route should be surveyed to identify problem areas (e.g. intersections with limited turning radii and sections of the road with sharp horizontal curves or steep gradients, that may require modification). After the road modifications have been implemented, it is recommended to undertake a “dry-run” with the largest abnormal load vehicle, prior to the transportation of any components, to ensure that delivery will occur without disruptions. This process is to be undertaken by the haulage company transporting the components and the contractor, who will modify the road and intersections to accommodate abnormal vehicles. It needs to be ensured that the gravel sections of the haulage routes remain in good condition and will need to be maintained during the additional loading of the construction phase and reinstated after construction is completed.
- Design and maintenance of internal roads. The internal gravel roads will require grading with a grader to obtain a flat even surface and the geometric design of these gravel roads needs to be confirmed at detailed design stage. This process is to be undertaken by a civil engineering consultant or a geometric design professional