APPENDIX A

ENVIRONMENTAL IMPACT ASSESSMENT (EIA), WATER USE LISENCE APPLICATION (WULA) AND ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr) FOR THE PROPOSED SOLAR CSP INTEGRATION PROJECT: Project 1 - Solar substation, 2x400kV Power Lines from the Existing Aries Substation and 1x400kV Power Line from the Existing Nieuwehoop Substation (DEA Reference: 12/12/20/2606 and NEAS Reference: DEA/EIA/0000785/2011)

SUMMARY OF ADDITIONS TO THE AMENDED FINAL ENVIRONMENTAL IMPACT ASSESSMENT REPORT

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- **2.2 National Environmental Management: Biodiversity Act 10 of 2004**

  The Act, amongst others, provides the framework for biodiversity management and planning. Section 52 provides for the listing of threatened (critically endangered, endangered or vulnerable) and protected ecosystems (of high conservation value or of high national or provincial importance although not listed as threatened) and for activities or processes within those ecosystems to be listed as 'threatening processes', thus triggering the need to comply with the NEMA EIA regulations. The Act establishes the South African National Biodiversity Institute (SANBI), with a range of functions and powers (Chapter 2 Part 1). It also provides for the listing, control and eradication of invasive species (currently the responsibility of the Conservation of Agricultural Resources Act, 1983).

  The development of the ash disposal facility will impact on the riparian and wetland areas next to existing streams and rivers. This may trigger requirements and regulations of the National Environmental management: Biodiversity Act.

- **5.1 Project Motivation**

  • The sources of electricity generation need to be diversified to ensure security of supply, and reduction in carbon footprint created by the current heavy reliance on coal produced electricity in South Africa.

  • In the light of the growing electricity demands in South Africa, the need to develop and implement renewable energy initiatives has become a national priority. Solar energy is one of the identified technologies for development and implementation.

  • Studies on solar irradiance have indicated that the Upington area is one of the highest areas of irradiance in the world and would thus be a good location to develop a solar power generating facility.

- **6.1.4 Orientation of feasible corridor alternatives**

  The Solar Park to Aries substation alternatives were presented as Aries_Alternatives 1, 1B, 2 and 3, and represent the 2 km wide corridor that will contain the 110 m wide servitude (2 x 55 m) in which the proposed 2 x 400 kV powerlines will be constructed.

The Solar Park to Nieuwehoop substation alternatives were presented as Nieuwehoop_Alternatives 1, 2, 3 and 3B, and represent the 2 km wide corridor that will contain the 55 m wide servitude in which the proposed 400 kV powerline between the Solar Park CSP site and the Nieuwehoop substation will be constructed.

Aries_Alternative 1

The disadvantage of this alternative is that the proposed corridor enters an earmarked Square Kilometre Array (SKA) buffer zone north of the Orange River before it crosses the N14. This flaws the proposed corridor as no high voltage powerlines may be erected within 7 km of a proposed SKA area, and has thus not been considered further by the project and specialist team.

Aries_Alternative 1B

Aries_Alternative 1B commences at the CSP outside of Upington traverses south-westward along the Orange River and N14 Highway next to an existing 132 kV distribution line for approximately 25 km before turning west. From here the corridor traverses westward for approximately 14 km before turning in a southwesterly direction again for approximately 10 km. At the approximate 10 km mark the corridor turns south to join the river crossing over the Orange River as was proposed by Aries_Alternative 1.

The advantage of this corridor is that it avoids the proposed future SKA area while still crossing at the preferred river crossing across the Orange River, as identified by the aquatic specialist. The proposed powerline will thus have the least environmental impact on the sensitive Orange River environment, compared to the other identified alternatives from Solar Park to Aries substation.

The disadvantage of this corridor is that it is the longest proposed corridor (approx. 139 km) of all of the corridors considered. It is also anticipated that this corridor will require the most turning strain towers, which makes this corridor more expensive to construct.

Aries_Alternative 2

Aries_Alternative 2 commences at the CSP outside Upington, then traverses west-south-westward along the Orange River and N14 Highway next to an existing 132 kV distribution line for approximately 28 km before turning south-westward for approximately 10 km before crossing the Orange River. After crossing the Orange River the corridor heads south for 75 km to the Aries substation, crossing over the Hartbees River.

This alternative is the second shortest route across the Orange River, and the required servitude can be straight without many strain towers required for most of the corridor. The major disadvantage of this corridor is that it crosses the Orange River at a less suitable location where impacts on the riparian vegetation may result.

Aries_Alternative 3

Alternative 3 commences at the CSP outside Upington where it traverses south-westward along the Orange River and N14 Highway next to an existing 132 kV distribution line for approximately 18 km (approximately 5 km north of Keimoes). From here the corridor turns south and crosses the Orange River along the eastern boundary of Keimoes. From Keimoes the corridor traverses the landscape for approximately 18 km before turning south-south-west for a further 24 km. From this point the corridor makes its last turn and travels for approximately 47 km to the Aries substation.

The advantage of this corridor is that it is the shortest corridor from the CSP substation to the Aries substation (approximately 114 km) of the identified feasible alternatives. The major disadvantage of this corridor is that it crosses the Orange River at a less suitable location where impacts on the riparian vegetation may result.

Nieuwehoop_Alternative 1

Nieuwehoop_Alternative 1 commences at the CSP outside of Upington traverses north-eastward along the Orange River for approximately 5 km. The corridor crosses the Orange River at the approximate coordinates: 28°30’16.87” S; 21°11’15.96” E. After crossing the Orange River, the corridor turns south-east and travels approx. 12 km before turning south-south-east for approximately 52 km to the Nieuwehoop Substation, crossing over the Kareeboom River.

The advantage of this corridor is that it crosses at the most feasible crossing point over the Orange River, as identified by the aquatic specialist, with the least impact on riparian habitat, cultivated land and river course. The most notable disadvantage of this corridor alternative is that it largely cuts though the properties of landowners in largely a straight line, which would also require the establishment of numerous access roads in the very sensitive landscape.

Nieuwehoop_Alternative 2

Alternative 2 commences at the CSP outside of Upington, traverses south-westward for a very short distance (<2 km) before turning south-east, crossing over the Orange River at the approximate coordinates: 28°36’30.09” S; 21°08’14.94” E. After crossing the Orange River the corridor traverses the landscape in largely a straight line for approximately 54 km to the Nieuwehoop Substation, crossing over the Kareeboom River.

The advantage of this corridor is that the length between the CSP substation and the Nieuwehoop substation is the shortest distance (approximately 63 km). The most notable disadvantages of this corridor alternative is that it crosses the Orange River at a location that is not the most suitable location and may thus have potential impacts on the riparian habitat, cultivated land and river. Further, the corridor largely cuts though the properties of landowners in largely a straight line, which would also require the establishment of numerous access roads in the sensitive landscape.

Nieuwehoop_Alternative 3 (Stakeholder suggested Alternative)

In addition to the Nieuwehoop alternatives mentioned above stakeholders at the public meeting requested that an additional alternative be investigated during the EIA phase that is aligned along the local dirt road rather than traversing through farming land.

Nieuwehoop_Alternative 3 commences at the CSP outside of Upington, traverses north-eastward for approximately 3 km before turning south-east to cross the Orange River at the approximate coordinates: 28°33'17.74" S; 21°10'37.20" E. The proposed corridor passes Louisvale to the north after which the corridor follows the existing dirt road for approximately 30 km before joining the proposed corridor for Nieuwehoop_Alternative 1 for the last 27 km.

The advantage of this corridor it that it follows an existing dirt road for the most part of the corridor, besides the last 27 km to the Nieuwehoop substation. A notable disadvantage of this corridor alternative is that it crosses the Orange River at a location where intensive agriculture practices, including the riparian zone, next to the Orange River is very wide (approximately 3.5 km from edge of the western bank agriculture fields to the edge of the east bank fields). At the point of the river crossing over the Orange River the riparian zone plus water course width is approximately 430 meters which would mean that the riparian zone would be impacted by more than one tower foundation and structure. Due to the cumulative nature of these impacts the river crossing was flawed and not further investigated by the specialist.

Nieuwehoop_Alternative 3B (Stakeholder suggested Alternative)

Nieuwehoop_Alternative 3B was proposed because the feasibility of placing the proposed corridor next to an existing road, as in Nieuwehoop_Alternative 3, was neutralized by the unfeasible nature of the proposed river crossing for the alternative. This alternative proposes that the corridor follow the Nieuwehoop_Alternative 1 route from the CSP north-eastward and cross the Orange River at the most favourable river crossing for the Nieuwehoop line as concluded by the aquatic specialist. When the corridor reaches the R359 it turns southwards, leaving the proposed Nieuwehoop_Alternative 1 route, up to the existing dirt road where it joins the Nieuwehoop_Alternative 3 corridor route. From here Nieuwehoop_Alternative 3B follows the Nieuwehoop_Alternative 3 route all the way to the Nieuwehoop substation. The receiving environment surrounding this deviation is not discernibly different to that of Alternative 1 and Alternative 3.

The disadvantage of this proposed corridor is that it is the longest corridor route between the CSP substation and the Nieuwehoop substation, and would thus be notably more costly to implement due to the length of the required powerlines and the number of strain towers required. The advantage of this corridor is that it crosses the Orange River at the most favourable location where the least impact on agricultural practices, riparian vegetation and the water course itself will be felt. Furthermore the corridor optimises the use of existing roads as far as possible by aligning with the existing dirt road. This further means that the impact of dissecting landowners

properties are minimised as far as possible while notably fewer access roads will have to be constructed into the natural environment.

- **6.1.5 Solar Park Substation Alternatives**

The receiving environment between the three substation alternative sites is very uniform. The terrestrial biodiversity and soil and geotechnical conditions between the three sites were found to be comparably similar. It was therefore the CSP site requirements that ultimately distinguished between the proposed and preferred site.

Substation_Alternative 1

Substation_Alternative 1 is located north-east of the proposed CSP plant near the northern extent of the CSP site (Olyvenhoutsdrift) at the approximate coordinates: 28°25'11.83" S; 21°02'30.22" E. The disadvantages of this substation site alternative are that a portion of the substation would need to be situated on the adjacent property, which is privately owned, while the proposed substation location and transmission lines leading from it would impede on the space required for the development of a subsequent CSP plant north of the proposed phase 1 CSP plant. Substation_Alternative 1 cannot be reached via existing dirt tracks or farm roads and approximately 800 m of access road will need to be established to reach the site.

Substation_Alternative 5

Substation_Alternative 5 is located south-east of the proposed phase 1 CSP plant, but just north of the existing Gorona 132 kV powerline at the approximate coordinates: 28°30'37.50" S; 21°08'16.18" E. This substation site alternative is closer to the N14 road than Substation_Alternative 1, but the proposed substation location and transmission lines leading from it to the Independent Power Producers earmarked for development west of Olyvenhoutsdrift would impede on the space required for the development of a subsequent third CSP plant south of the proposed phase 1 CSP plant. This is an unfavourable option considering the size constrains of Olyvenhoutsdrift when two further CSP plants are envisaged for the site.

Substation_Alternative 6

Substation_Alternative 6 is proposed to be situated the furthest south-east of the proposed CSP plant. It is to be located close to the N14 national road at the approximate coordinates: 28°32'50.39" S; 21°08'16.09" E. The fact that this proposed site alternative is located close to the N14 road makes it a favourable alternative for easy construction and future maintenance. This alternative would also have the least or no impact on the space requirements for future CSP developments north and south of the proposed phase 1 CSP site.

- **6.1.6 Road relocation alternatives**

The relocation of the existing gravel road D3279 leading from east to west through the proposed CSP site is required to allow for future expansion of the CSP facility northwards and southwards of the present proposed CSP facility location. Road D3279 belongs to the Provincial Roads Department and it is maintained by the roads department. For CSP to have full utilisation of the site area mentioned above the existing gravel road needs to be relocated and upgraded for ease of use for the

transportation of equipment's. Road D3279 is to be upgraded, widened and surfaced and will be used as the main access to the Eskom CSP site and used by the public and other future projects in the area. Therefore a design speed of 100 km/h is proposed.

A feasibility study undertaken by Eskom investigated four relocation options, however Options 3 which proposed the relocation of the proposed road around the northern extent of the proposed phase 1 CSP plant was excluded due to space requirement impacts for both the future phase 2 and 3 CSP facilities.

Road Relocation_Alternative 1

The existing D3279 will be relocated to the western direction of the property. The intersection of D3279 and the N14 is relocated approximately 5 km to the west of the N14. From the new intersection the new D3279 will proceed in the north-western direction for approximately 13 km and then slightly curve to the north-east direction where it joins the existing D3279 road inside the Eskom property. This road alignment for this option lies adjacent to the Eskom site boundary.

The advantages of this deviation of road D3279 is that the relocation of the road is envisaged to occur on the adjacent property which gives the CSP project proper utilisation of the land to develop a subsequent CSP facility south of the proposed phase 1 facility, and also keeps the public away from the works as the relocated road will fall outside the fenced perimeter of the facility. This alternative is also the shortest relocation alternative which will cost less to implement. The disadvantage of the alternative is that the intersection of the N14 and D3279 will have to be relocated, and a 45 m x 350 m long corridor needs to be purchased from the property adjacent to CSP site therefore additional cost will be uncounted.

Road Relocation_Alternative 2

The intersection of road D3279 and the N14 road is kept at its original position and the alignment of the existing road D3279 remains the same for the first 2 km. After the first 2 km road D3279 is deviated to the north-west direction for approximately 12 km before it joins the existing road D3279 just before the CSP site boundary.

The advantages of Road Relocation_Alternative 2 are it's cheaper than the other two alternatives as no additional cost will be incurred for land purchasing, and the current intersection of the N14 and D3279 also remains in the same position. However, this alternative will limit the available land utilisation potential for the development of subsequent CSP facilities south of the proposed CSP plant severely. Furthermore, road users will be forced to stop at security points when entering and exiting the CSP site which is likely to cause delays in travelling time for road users and increase frustration associated with the presence of the CSP site at the specific location. It is therefore not desirable to have the R3279 enter and exit the CSP site.

Road Relocation_Alternative 3

The existing D3279 will be relocated to the western direction. The intersection of D3279 and the N14 is relocated approximately 4 km to the western direction of the N14. From the new intersection the new D3279 will proceed in the northern direction for approximately 5 km and then slightly curve to the north-west direction and then proceed to the north direction for 9 km before it joins the existing D3279.

The deviation of road D3279 in this relocation alternative is close to the boundary of the leased portion of land and the CSP site west boundary and therefore keeps the public away from the works as the road will be relocated to outside the CSP boundary. The disadvantages of this relocation alternative is that a 45 m x 350 m long corridor needs to be purchased from the property adjacent to CSP site therefore additional cost will be incurred. The relocated road will also still interfere with the space requirements of additional CSP facilities and the intersection of the N14 and D3279 will have to be relocated.

- **7.8 Hydrology and Flooding Associated with the Orange River**

Flooding of the Orange River may potentially impact on the planned infrastructure and future operations. Zitholele Consulting (Pty) Ltd therefore determined the location of the 1 in 100 year flood lines along this section of the river. The floodlines report and map for the Solar Park integration project are provided in Appendix N.

7.81 Data Collection and Methodology

Flood hydrology

The total catchment of the Orange River extends over an area of 973 000 km^2, which is equivalent to approximately 77% of the land area of South Africa. The rainfall varies between 50 mm per annum up to 2000 mm per annum over different climatic regions of this catchment area. More than one rainfall storm event may occur at any given time within the catchment area which may contribute to combined flows within the river. It is therefore extremely complex to use a deterministic (calculation) method to predict the magnitude of a flood event in the Orange River in the vicinity of Upington.

It was therefore decided to rather make use of statistical methods to analyse past flooding events and peak flows in the Orange River at Upington in order to predict the magnitude of a 1 in 100 year design flood. The national Department of Water Affairs (DWA) has been measuring flows in the Orange River at Upington from October 1936 up to the present date at Station Number D7H005. The exact co-ordinates of this station are indicated in the table below:

Table 7-14: The co-ordinates of the DWA hydrological station (D7H005)

Description	Latitude	Longitude
Hydrological Station Number D7H005	28°27'28.5" South	21°14'21.3" East

The exact size of the catchment area for station D7H005 is 364 560km^2. The annual peak flows for this station was sorted in order of increasing magnitude and a rank is assigned to each peak flow. A Plotting Position is calculated for each data point in accordance with the following formula:

$$Plotting\ Position\ (\%) = \left(\frac{m}{n+1}\right) \times 100$$

Where m = the rank serial number

n = total number of observations

The data is plotted on arithmetic- and log-probability paper. The probability scale is labelled “Percent of values equal to or less than the indicated value”. Lines are fitted through the data points to establish trends. The 1 in 100 year flood can be read off the graph at the 99% position.

Hydraulic Calculations

Two metre interval contours were obtained from the Surveyor General for the Orange River and surrounding areas, from 30 km upstream of Upington to approximately 120 km downstream of Upington.

The software Autodesk Civil3D 2013 was used to extract a longitudinal section with a length of 150 km of the Orange River basin. Cross sections were extracted at intervals of approximately 500 m. The length of typical cross sections was approximately 6 km.

The geometry was imported into the software Hec-Ras, which was developed by the United States Army Corps of Engineers. Initially a Manning n hydraulic roughness value of 0.045 was assumed for all sections, but this was later increased to a roughness of 0.07 in order to achieve water flow depths corresponding with actual water flow depths recorded at Upington. A roughness of 0.045 corresponds to a river with large rocks (with diameters of 1m) and dense vegetation. Increasing the roughness to 0.07 gives conservative results and deeper water levels in the river.

Information with regard to downstream culverts and bridges were not available and it is assumed that these culverts cause an elevated back water profile during flooding. Normal water flow depths were assumed for the upstream position and downstream position of the river section. (Normal flow depth here means the calculated water depth for a certain roughness, a certain flow and a certain longitudinal slope.) The software does the hydraulic calculations for each cross section. The output from the software are flow depths, flow velocities, cross sectional area, wetted perimeter etc. The water levels, or flood lines is an output from the hydraulic model. The flood lines were imported back for presentation into a CAD drawing.

7.8.2 Results

Flood Hydrology

The data from DWA contained annual flood peaks for 71 years between 1943 and the present. The maximum recorded flood occurred in 1974 when a flow rate of 8315 m^3/s was recorded at Upington and the corresponding water depth in the river was 9.9 m. The average annual flood peak is 1770 m^3/s. The flood in 2011 had a peak magnitude of 4802 m^3/s, which is the 4th highest annual peak flow rate in the data set.

It was found that the 1974 flood of 8315 m^3/s more or less corresponds to the 1 in 100 year flood. The 1 in 100 year flood was thus set at 8400 m^3/s.

Hydraulics

Flow velocities were found to vary between 0.6 m/s and 3 m/s. Maximum flow depths at each cross section were found to vary between 3 m and 12 m.

The closest point in plan between the 1 in 100 year flood line and the Solar Park were found to be approximately 1500 m. The 1 in 100 year flood line was found to be approximately 35 m in elevation below the edge of the Solar Park.

7.8.3 Conclusions

Unless additional more detailed information becomes available to the author of this report, like major damming downstream of the site, it is unlikely that the Solar Park is in danger of flooding during the 1 in 100 year flood event.

The flood lines are approximately 35 m lower in elevation than the edge of the Solar Park. A map indicating the extent of the 1 in 100 modelled floodlines are presented in Figure 7-21.

- **8.1.4 Surface water and wetlands**

Additional Impact

Potential impact that may be expected to result from the proposed activities include impacts on instream flow, impacts due to sedimentation, impacts on instream habitat and refugia for aquatic species, impacts on instream migratory corridors, impacts on taxa sensitive to changes in water quality, impacts due to inundation, impacts due to canalisation and erosion, and alien vegetation encroachment. All these potential impacts have been rated by the aquatic specialist as very low to low significance, given the successful implementation of suggested mitigation measures.

Preferred alternative

Using the detailed assessments in the Biophysical specialist report it was determined that the following are the most preferred alternatives for the Aries and Nieuwehoop corridors:

• **Aries to Solar Park – Aries_Alternative 1B; and**

• **Nieuwehoop to Solar Park – Nieuwehoop_Alternative 3B.**

- **8.1.6 Terrestrial Ecology and Biodiversity**

  Mitigation/management measures

  - Aries_Alternative 1B should be considered as the preferred alternative;

  - Adhere to the ESKOM vegetation management guideline, as well as other relevant Eskom standards and guidelines, as provided in Appendix L;

  Preferred alternatives

  Arries corridor

  The four Aries alternatives have varying levels of impact to the endangered habitat. Aries_Alternatives 1 and 1B have a much smaller impact than the other two alternatives. This is due to the environment downstream of the Neus-weir. Here the Orange River flows through a number of sandstone outcrops and ridges and very little riparian vegetation occurs. Due to the smaller impact on the endangered vegetation – it is recommended that the Aries_Alternative 1B corridor be utilised.

  Nieuwehoop routes

  As with the Aries corridors above, the Nieuwehoop corridors traverse over the Orange River and the surrounding endangered habitat. The Nieuwehoop_Alternative 3B has the smallest impact to the sensitive habitat and it is recommended to be utilised as the crossing point for the power line over the Orange River.

- 8.1.7

  Additional impact

  All three proposed Solar Park Substation sites are situated in low karroid shrubland which forms part of the Bushmanland bioregion, and does not contain unique features that will make it critically important for power line sensitive Red Data species. It is not envisaged that any Red Data species will be permanently displaced by the habitat transformation that will take place. The proposed construction of the new substation

should therefore have a low displacement impact on Red Data species, irrespective of which of the alternative sites is used.

The three road relocation alternatives will also be situated in low karroid shrubland which does not contain unique features that will make it critically important for power line sensitive Red Data species. It is therefore expected that the habitat destruction that will be associated with the construction of one of the road relocation alternatives will not have a notable displacement impacts as was found for the substation alternative sites discussed above.

After each of the each of the transmission line alternatives were assessed for potential bird impacts. The following alternatives emerged as the preferred alternatives as highlighted above.

- **Aries_Alternative 3**
- **Nieuwehoop_Alternative 1**
- **Substation site alternatives – no preference**
- **Road relocation alternatives – no preference**

- 8.1.8 Socio-Economic Impact Assessment

  Potential Impacts

  - If the D3279 road is relocated to within the CSP site boundary road users using this road may be faced with having to go through a security protocol every time this road is used, which may result in a very negative attitude towards the Eskom CSP plant and ultimately result in a social nuisance.

  Preferred Alternatives

  The preferred alternatives from a social perspective are:

  - **Aries_Alternative 1B**
  - **Nieuwehoop_Alternative 3**
  - **Substation site alternatives – no preference**
  - **Road_relocation_Alternative 1**

- 8.1.11: Visual Impact Assessment

  Aries – Preferred route selection

Overall considering all the relevant criteria from the impact assessment, Aries_Alternative 1B is considered to be the preferred alternative from a visual perspective.

Nieuwehoop – Preferred route selection

Overall considering all the relevant criteria from the impact assessment, Aries_Alternative 1B is considered to be the preferred alternative from a visual perspective.

Overall considering all the relevant criteria from the impact assessment, Nieuwehoop_ Alternative 3 is considered to be the preferred alternative from a visual perspective. However, considering that the crossing of the Orange River at Nieuwehoop_ Alternative 3 has flawed the corridor Nieuwehoop_Alternative 3B is recommended.

Substation site alternatives

Substation upgrades along the three Transmission Line corridors will take place within the existing substation HV yards. Therefore associated visual impacts are likely to be limited in extent to that of the existing substations. It is expected that the visual impact of the infrastructure will be absorbed by the existing visual impact to a large extent.

The construction of the 400kV and 132kV Tx substation at the CSP site and the construction of five 500MVA 400/132kV transformers and associated switchgear at the Solar Park site will fall within the viewshed of the CSP and Solar Park sites respectively. It is expected that the visual impact of the infrastructure will be absorbed by the existing visual impact to a large extent.

Preferred substation site alternative - no preference

Road relocation and access roads

Access roads will be required, firstly to construct the Transmission Lines, and secondly to maintain it (operational phase). These access roads have the potential of manifesting as landscape scarring, and thus a potential visual impact within the viewshed areas. This is especially relevant for steep slopes where cut and fill may be required to render access possible in high lying areas and on steep slopes. Graded slopes could be vulnerable to erosion over time. Such erosion and landscape scarring could represent a visual impact. No dedicated viewshed has been generated for the access roads, nor is a proposed layout available for each corridor. However, it is assumed, but that the area of potential visual exposure will lie within that of the power line.

Further, the relocation of the D3279 will either fall within CSP site itself, or be relocated to the boundary of the site, which is earmarked for the establishment of a number of 132 kV powerlines. Again it is assumed that the area of potential visual exposure will lie within that of the zone of visual exposure caused by the CSP plant and associated infrastructure within and along the boundary of the CSP site.

Preferred road relocation alternative - no preference

- 8.1.12: Heritage, Cultural and Historical

  Preferred route selection

  Substation alternative: No preference

  Road relocation alternative: No preference

- 9. Alternative Sensitivity Analysis

  Most of the specialist environmental conditions within the CSP site were not dissimilar enough to allow the emergence of a distinct preferred alternative based on environmental constraints on site. Technical and CSP site requirements proved to be the major determining factor for the identification of the preferred road relocation alternative. The comparative rating for the different substation alternatives are presented in Table 9 2.

- 10.2 Environmental Assessment Practitioner opinion on Preferred Alternatives

  The preferred road relocation alternative is Road relocation_Alternative 1 due to the fact that this alternative alignment does not impact on the land utilisation potential for the subsequent CSP plant south of the phase 1 CSP site, and because this alternative will relocate the road to outside the CSP property boundary, which will not compromise security through the plant and will allow free access of the public to the relocated road as per pre-development state.

2 TABLES

- Table 2-1: Relevant NEMA Listed Activities

NOTICE NUMBER AND DATE:	ACTIVITY NUMBER (ito the relevant or notice) :	DESCRIPTION OF THE LISTED ACTIVITY
Construction of a 400 kV / 132 kV substation.		
GN R. 545 of 2010	Activity 8	The construction of facilities or infrastructure for the transmission and distribution of electricity with a capacity of 275 kV or more, outside an urban area or industrial complex. *The project will entail the construction of a substation outside an urban area which will include infrastructure (transformers) for the transmission of electricity with a capacity 132 kV and 400 kV.*
GN R. 544 of 2010	Activity 10	The construction of facilities or infrastructure for the transmission or distribution of electricity (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kV. *The project will entail the construction of a substation outside an urban area which will include infrastructure (transformers) for the transmission of electricity with a capacity 132 kV.*

NOTICE NUMBER AND DATE:	ACTIVITY NUMBER (ito the relevant or notice) :	DESCRIPTION OF THE LISTED ACTIVITY
GN R. 544 of 2010	Activity 24	The transformation of land bigger than 1000 square metres in size, to residential, retail commercial, industrial or institutional use, where at the time of coming into effect of this Schedule such land was zoned as open space, conservation or has en equivalent zoning. *The construction of the proposed substation at the CSP site is expected to result in the transformation of land larger than 1000m to commercial or industrial use where the zoning of the land (i.e. Agricultural Zoning – mostly grazing) can be considered an equivalent zoning to Open Space.*
Construction of two 400 kV power lines from the Solar Park to Aries substation; and the Construction of one 400 kV power line from the Solar Park to the Nieuwehoop substation.		
GN R. 545 of 2010	Activity 8	The construction of facilities or infrastructure for the transmission and distribution of electricity with a capacity of 275 kV or more, outside an urban area or industrial complex. *The project will entail the construction of powerlines (conductors and pylons) outside urban areas for the transmission of electricity with a capacity of 400 kV.*
GN R. 544 of 2010	Activity 24	The transformation of land bigger than 1000 square metres in size, to residential, retail commercial, industrial or institutional use, where at the time of coming into effect of this Schedule such land was zoned as open space, conservation or has en equivalent zoning. *The construction of the proposed powerlines from the proposed CSP substation to the Aries and Nieuwehoop substations is expected to result in the transformation of land larger than 1000m to commercial or industrial use where the zoning of the land (i.e. Agricultural Zoning – mostly grazing) can be considered an equivalent zoning to Open Space.*
GN R. 546 of 2010	Activity 12	The clearance of an area of 300 square metres or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation, (a) Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004; or (b) Within critical biodiversity areas identified in bioregional plans. *The construction of pylons on either side of the Orange River may result in the clearance of more than 300m^2 natural vegetation within the identified Critical Biodiversity Area identified along the Orange River. This may be relevant in the event that the span of the electrical conductors to pylons on either side of the Orange River is not long enough to place pylons outside the identified CBA.*
GN R. 546 of 2010	Activity 16	The construction of (iv) infrastructure covering 10 square metres or more, where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, (a) In Northern Cape in (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans. *The construction of pylons on either side of the Orange River may impact on the Critical Biodiversity Zone identified along the Orange River. This may be relevant in the event that the span of the electrical conductors to pylons on either side of the Orange River is not long enough to place pylons outside the identified CBA.*
The realignment and construction of the road currently running through the CSP site. The construction of access roads for the construction and or long term servicing of all planned infrastructure for the project and/or the realignment and expansion of existing roads.		
GN R. 544 of 2010	Activity 11	The construction of (iii) bridges where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction occur behind the development setback line. *The realignment of the untarred road currently running through the CSP site and establishment of new access routes may require the construction of small pipe or culvert bridges to prevent damage and erosion of the road service through submersion of the road service during heavy rains.*
GN R. 544 of 2010	Activity 22	The construction of a road outside urban areas (i) With a reserve wider than 13,5 metres or (ii) Where no reserve exists where the road is wider than 8 metres. *The realignment of the untarred road currently running through the CSP site will include the construction of a road where no road reserve currently exist, and the width of the road will be more than 8m.*

- Table 2-3: List of relevant Acts that will be considered

Act name	Act no	Notes/remarks
National Environmental Management: protected Areas Act	57 of 2003	Provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity, natural landscapes and seascapes.
Conservation of Agricultural Resources Act	43 of 1983	Control of utilisation and protection of wetlands; soil conservation; control and prevention of veld fires; control of weeds and invader plants.
Atmospheric Pollution Prevention Act	45 of 1964	Provides for control of dust control and air pollution.
Fencing Act	31 of 1963	Prohibition of damage to a property owner's gates and fences ◆ *Climbing or crawling over or through fences without permission* ◆ *Closing gates* Any person erecting a boundary fence may clean any bush along the line of the fence up to 1.5 metres on each side thereof and remove any tree standing in the immediate line of the fence. However, this provision must be read in conjunction with the environmental legal provisions relevant to protection of flora.
National Forest Act	84 of 1998	No person may cut, disturb, damage or destroy any indigenous, living tree in a natural forest, except in terms of a licence issued under section 7(4) or section 23.
Veld and Forest Fires Act	101 of 1998	Prevention of unauthorised veld and forest fires
Occupational Health and Safety Act	85 of 1993	Prescribes health and safety measures necessary to adhere to for all construction workers
Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act	36 of 1947	Control of the use of registered pesticides, herbicides (weed killers) and fertilisers. Special precautions must be taken to prevent workers from being exposed to chemical substances in this regard.
All relevant Provincial and Municipal bylaws		

- Table 9-2: Substation site and road relocation alternatives comparison

Element	Substation_ Alternative 1	Substation_ Alternative 5	Substation_ Alternative 6
Impeding CSP space requirements	3	5	1
Existing access road	5	3	1
Proximity to N14	5	3	1
Geotechnical	3	3	1
Biophysical	1	1	1
Visual	1	1	1
Social	1	1	1
Heritage	1	1	1
Avifauna	1	1	1
Total Score	**21**	**19**	**9**

Element	Road relocation_ Alternative 1	Road relocation_ Alternative 2	Road relocation_ Alternative 3
Relocation of D3279/N14 intersection	3	1	3
Land acquisition required	3	1	1
Impeding CSP space requirements	1	5	3
Biophysical	1	1	1
Visual	1	1	1
Social	1	3	3
Heritage	1	1	1
Avifauna	1	1	1
Total Score	**12**	**14**	**14**

3 FIGURES

Figure 7-21: The extent of the 1 in 100 modelled floodlines along the Orange River