11. AVIFAUNA IMPACT ASSESSMENT

This avifaunal specialist study was undertaken and compiled by Jon Smallie (Endangered Wildlife Trust) in his capacity as avifaunal specialist. Jon Smallie has six years of experience in the field of wildlife – electrical infrastructure interactions and specifically bird impact assessments related to electrical infrastructure and other developments. The Endangered Wildlife Trust has had a strategic partnership with Eskom since 1996 in order to address the interactions between wildlife – in particular birds – and Eskom's infrastructure.

11.1 Introduction

11.1.1. Background to the CSP project

Eskom is investigating the feasibility of constructing a pilot 100MW Concentrating Solar Power (CSP) plant in the Northern Cape. Solar generated power is a relatively new concept to South Africa and has in fact not been utilized very much worldwide. To this authors knowledge only two plants have been constructed to date i.e. Solar One - an experimental 10MW plant built in 1979 in Barstow, California and Solar Two – an improved Solar One at the same site. A 40MW plant is also under development in Spain (Spain Solar Tres). The proposed CSP plant will therefore be significantly larger than any solar plant previously constructed.

11.1.2. Review of potential avifaunal issues

Extensive review of the available literature on the internet relating to avifaunal interactions at solar energy power plants revealed very little, particularly in comparison to the literature available on avifaunal interactions with other forms of power generation. Possible reasons for this include the following:

- Little knowledge on these impacts exists since so few solar plants have been constructed to date.
- The two plants previously constructed were experimental sites, not commercial. All information related to the experiments would therefore have been private and not released into the public domain.
- The impacts of solar power plants of this type on avifauna are in fact relatively minor.

One paper entitled "Avian mortality at a solar energy power plant" (McCrary, McKernan, Schreiber, Wagner & Sciarrotta 1986) was reviewed. This paper describes the results of their weekly monitoring over a two year period at Solar One. The main results of this study are summarized below:

- Forty visits (one week apart) to the facility over a two year period revealed 70 bird carcasses involving 26 species. It was estimated that between 10% and 30% of carcasses were removed by scavengers in between visits, so the actual number of mortalities may have been slightly higher. It is important to note that extensive agricultural lands and evaporation ponds (53ha) were situated adjacent to the facility, which probably resulted in a higher abundance of many bird species than would otherwise have been the case.
- Fifty seven (81%) of the birds died through collision with infrastructure, mostly (>75%) colliding with the heliostats. Species killed in this manner included waterbirds, small raptors, gulls, doves, sparrows and warblers.
- Thirteen (19%) of the birds died through burning in the standby points. Species killed in this manner were mostly swallows and swifts.

Briefly, some of the anticipated avifaunal issues involved with the CSP project are as follows:

Issues relating to the CSP itself:

- *Collision with the heliostats (mirrors)*
  Reflective surfaces are particularly prone to collisions in the same way as household windows. The CSP will consist of hundreds or thousands of heliostat mirrors and can be expected to result in some collisions.

- *Collision with the central receiver tower*
  Almost any infrastructure that stands proud in the landscape will result in a certain number of collisions by birds. In this case, the central receiver tower will stand approximately 200m tall, a significant height, particularly in this landscape. A mitigating factor is that it will be a solid concrete tower and should be relatively visible to birds.

- Roosting on the central receiver tower
  Birds could potentially use the top of the tower as a roosting site at night. It is likely that they would only come in to roost after the plant has been shut down in the evenings, and would leave the roost before the plant starts up in the morning.

- *Burning when in vicinity of the central receiver*
  The central receiver will glow white hot when the plant is operational which might potentially result in birds in the vicinity being burnt.

- *Burning when entering the "standby focal points"*
  During testing, maintenance and daily start up procedures, the heliostats are focused in groups onto focal or standby points in the sky, usually at roughly the same height as the central receiver (approximately 200m). In the case of

the CSP, there will be numerous standby points. McCrary *et al* found that 19% of the birds that were found dead at Solar One were burned in standby points. Avian foragers such as swifts and swallows accounted for 46% of these mortalities. The more time a bird spends in the air the more chance there is of it flying into a standby point. The height at which species fly is also critical, species likely to fly at this height include the swifts, swallows, and martins.

- *Loss of habitat*
  The CSP will take up an area of approximately 4km squared. This would obviously be habitat previously available to the birds in the area.

- *Disturbance*
  Resident bird species may be disturbed by construction, operational and maintenance activities associated with the CSP, particularly whilst breeding.

- *Nesting of Sociable Weavers and other species on the plant infrastructure*
  Experience in this arid region has shown that Sociable Weavers are quick to nest on any manmade infrastructure and they may utilize infrastructure at the CSP site.

It is important to stress that most of the above impacts – and certainly the first five listed impacts – will probably only become significant when large numbers of birds are in the vicinity of the CSP. For example one swallow being burnt in a focal point would hardly be considered a significant impact. However, if a large flock of swallows congregated – perhaps due to a nearby roost site – a large number of birds could be burnt and the significance would be greatly amplified. For this reason, the more sensitive species in terms of the above impacts are likely to be the gregarious, flocking species.

Issues relating to the associated infrastructure:

The EWT feel that the impacts of the associated infrastructure such as overhead power lines on birds may in fact outweigh the impacts of the CSP itself, depending on the length of new infrastructure that needs to be constructed. In evaluating the potential sites during the scoping phase, the proximity of each site to existing power line and road infrastructure was given a lot of weight. The closer the final site is to existing infrastructure, the less new infrastructure will need to be built. Briefly, the impacts of the associated infrastructure are as follows:

New power line:

- Collision with associated power line infrastructure
- Electrocution on associated power line infrastructure

- Nesting on associated power line infrastructure
- Disturbance through construction and maintenance activities of new power line
- Habitat destruction through construction activities of new line

New road/s:

- Disturbance of avifauna through construction and maintenance activities
- Habitat destruction through construction activities

New pipe line/s:

- Disturbance of avifauna through construction and maintenance activities
- Habitat destruction through construction activities

New visitors centre:

- Disturbance of avifauna through construction and maintenance activities
- Habitat destruction through construction activities

Issues or factors that may attract birds to the vicinity of the CSP thereby amplifying the above interactions/impacts:

In this arid, relatively uniform landscape, large congregations of birds are unlikely unless a strong attractant exists, such as water.

- *Birds attracted to open water evaporation ponds*
  In this landscape, any source of water is hugely important for all animals - including birds. If the CSP involves any open water sources such as evaporation ponds, this will attract more birds into the immediate area thus heightening the risk of the above impacts occurring. At this stage it is unclear whether these ponds would be needed for the CSP. McCrary *et al* (1986) found a number of water birds (teal, grebes, coots) that had collided with heliostats at Solar One and this is almost certainly related to the presence of large (53ha) evaporation ponds nearby. This is supported by the fact that 45% of all species recorded in 150ha around Solar One, were only recorded at the ponds. The importance of the evaporation ponds at Solar One to birds is further illustrated by the fact that 107 bird species were recorded in the vicinity of Solar One, whilst the avian community in similar habitat elsewhere is usually less than 20 species.

  It is clear then that the presence of open water ponds close to the CSP would drastically increase the potential for avifaunal impacts.

- *Birds mistakenly attracted to heliostats*
  In these arid regions the daily activity schedule of many animals and birds revolves around securing their required daily intake of water. For example,

Namaqua Sandgrouse (high report rate in the study area) fly in flocks to water sources during mid to late morning. There is a possibility that birds such as these may mistake the heliostats for water sources when flying high above and descend to investigate. In the case of the sandgrouse, they would typically circle several times once they have located a water source, before descending. If the heliostats are mistaken for water, these birds would most likely circle through one or more focal points and may well be burnt to death.

11.2. Scope and limitations

The following are some issues relating to the limitations of this study and the confidence with which this report is submitted:

- In assessing the impacts of the associated infrastructure such as the new power line – the EWT is hugely experienced. However, with regard to the impacts of the CSP itself, this is largely new territory – quite possibly the case for all consultants on this project. With the exception of the one paper already cited, very little information on avifaunal impacts at existing solar plants could be found. The level of confidence with which the various impacts are discussed is therefore relatively low. However it must also be stated that many of the impacts of the CSP itself cannot readily be mitigated for in any case. For example if birds mistake the heliostats for water sources and are burnt in the focal points, how would one mitigate for this?
- It is therefore recommended that if the CSP is built, the EWT be given opportunity to perform regular monitoring of the facility in order to gather data on avifaunal impacts. This data would make assessment of any possible future solar plants much more accurate. The fact that the CSP will be relatively new technology worldwide, means that there is an opportunity for Eskom to become globally recognized in the field of solar power generation. It follows then that there is also an opportunity for Eskom to lead in terms of establishing the significance and mechanisms involved in the impacts of the plant on avifauna.
- Unfortunately the Southern African Bird Atlas Project (Harrison *et al* 1997) did not cover this area very well at all as can be seen from the number of cards for each square shown in TABLE 2. This results in a very low confidence in the report rates of the various species in the study area. Since no other reliable source of data for abundance of species exists, a meaningful comparison of abundance of species between the three sites was not possible.
- It is clear that the presence of open water evaporation ponds at the facility could greatly amplify the impact on avifauna through changing the abundance and diversity of bird life in the vicinity. At this stage of the project, Eskom have not yet finalized this level of detail, making it difficult to make accurate assessments.

- Likewise, the exact position and nature of the associated infrastructure such as pipelines, power lines and roads cannot be finalized until an exact site is chosen, and Eskom reach this level of detail in their planning. At this stage it appears likely that there will be a new access road built from the site on Olyvenhouts Drift to the existing district road. All other new infrastructure such as power lines and pipe line will most likely follow the same route.

11.3. Methodology

11.3.1. Ranking of the three sites during scoping phase

The following section describes the methodology used during the scoping phase to rank the three sites or farms in terms of avifaunal impact.

Although only five criteria were used to conduct the formal ranking below, a number of other criteria were considered but not used formally for various reasons. These are listed briefly below:

- Species diversity - the area was not counted thoroughly enough during the bird atlas project (Harrison *et al* 1997) to allow meaningful comparison.
- Abundance of the species most sensitive to this project – again lack of quality data prevented meaningful comparison.
- Proximity to water – this is an extremely important factor and was considered when determining “no go” areas within the three farms. The areas close to (<5km) the Orange River were identified as “no go” areas. The only other reliable source of water in this landscape is livestock water troughs that are supplied by windmills. There are no reliable data sources for the exact positions of wind mills on each farm available (Cobbing pers. comm.). Whilst several wind mills were seen during the scoping site visits, the position of these windmills cannot be used in the following analysis because whole farms were not covered. It seems safe to assume that windmills would be more or less evenly scattered across the farms. Once a site has been finalized, it may be necessary to identify exact positions of wind mills close to that site and suggest some way of managing or mitigating for this.

The following are the criteria used to rank the sites in terms of anticipated impacts on avifauna:

Presence of Red Data bird species: Numerous species with high report rates for the square, and they are likely to occur on the farm itself – 3; species have medium report rates for the square, or have high report rates but may only possibly occur on the farm itself – 2; species are absent or have low report rates for the square, or are highly unlikely to occur on the farm itself – 1.

Note: Table 11.1 below shows report rates for the Red Data species in the study area (Harrison *et al* 1997), however as discussed above this data needs to be used with caution due to the low number of counts conducted. For this reason, when assessing each farm for this particular factor, more emphasis has been placed on the potential for Red Data species to occur on a particular farm (as judged by the author), than on the actual report rates shown below. Report rates are an expression of the number of times a species is counted in a particular square expressed as a percentage of the number of times that square was counted.

Table 11.1: Report rates for the Red Data species recorded in the study area (Harrison *et al* 1997)

Species	**Cons status**	**2821AC**	**2821CA**	**2822CC**	**2821DB**	**2821DD**	**2822CA**
Site name		**Site 1**		**Site 3**	**Site 2**		
Number of cards		35	17	10	8	13	10
Total species		144	122	99	101	106	61
Martial Eagle	V	3	-	10	13	-	
White-backed Vulture	V	-	-	-	-	-	10
Lappet-faced Vulture	V	-	-	-	-	-	10
Kori Bustard	V		-	20	-	-	-
Lanner Falcon	NT	9	12	-	-	15	30
Black Stork	NT	-	6	-	-	-	-
Abdims' Stork	Bonn	9	-	-	-	-	-

V = Vulnerable

NT = Near threatened

Bonn = Protected Internationally under the Bonn Convention on Migratory Species

Barnes (2000)

Habitat uniqueness: The farm provides a unique habitat that is not repeated elsewhere in this landscape and it is in good condition – 3; the farm provides habitat that is present elsewhere in the landscape but is not common – 2; the habitat on the farm is common and represents the broader area - 1

Existing disturbance levels: The farm is currently relatively undisturbed with little development or infrastructure adjacent – 3; the farm is moderately disturbed already – 2; the farm is already highly disturbed by various factors – 1

Proximity to existing power line infrastructure No power lines of any size present within 5km of farm, or small 11/22kv lines present but not close – 3; 132kV or larger power lines present 1 to 5km from farm – 2; 132kV or larger power line present less than 1km from farm - 1

Proximity to existing roads: Only small farm tracks present, extensive new road will be necessary – 3; district gravel roads or larger present nearby – 2; district gravel roads or larger roads present immediately adjacent to farm - 1

11.3.2. Site Preference Rating (SPR)

In order to obtain a Site Preference Rating, the Site Specific Rating scores were summed for each farm/site. These were then ranked in order. The site with the lowest Site Specific Rating total indicates the most preferred site. The results are shown in Table 11.2 below:

Table 11.2: Preference rating for the three sites during scoping phase.

Site / Farm	Site Score	Site Preference Rating	Site sensitivity score
1 – Olyvenhouts Drift	7	2	4
2 – Bokpoort	5	1	5
3 - Tampansrus	12	3	1

It is clear that the most preferred site from an avifaunal perspective was Bokpoort, closely followed by Olyvehoutsdrift. After the scoping phase, specialists were informed that the final chosen site for the project is Olyvenhoutsdrift. The following report is then a specific assessment of that site.

11.4. Regional Overview

The Northern Cape region is one of the most arid in southern Africa. In examining the region as a whole in terms of avifauna, it is important to relate the avifauna to the biomes and vegetation types present in the area. Harrison *et al* (1997) in "The Atlas of Southern African Birds" provide an excellent description of the various vegetation types represented in the region and the associated bird species. The following overview has drawn extensively from this source.

It is widely accepted within the ornithological community that vegetation structure, rather than the actual plant species, influences bird species distribution and abundance (in Harrison *et al* 1997). Therefore, this vegetation description focuses on factors which are relevant to bird distribution and is not a complete account of plant species.

Table 11.3: Percentage vegetation composition of the quarter degree squares that cover the proposed site for the CSP i.e. Olyvenhouts Drift (Harrison *et al* 1997)

Biome	**Vegetation type**	**2821AC**	**2821CA**
Site name		1-Olyvenhouts Drift	
Nama karoo	Nama karoo	52	100
Woodland	Southern Kalahari	48	-
	Central kalahari	-	-

Table 11.3 shows that the predominant vegetation types in the study area are "Nama karoo" and "Southern Kalahari". These two vegetation types and their associated avifauna are described in more detail below.

Nama karoo biome: This biome comprises mainly low shrubs and grasses, trees such as *Acacia karoo* and exotic species such as *Prosopis glandulosa* are restricted to watercourses. Compared to "succulent karoo", "nama karoo" has a much higher proportion of grass and tree cover.

The "karoo" used loosely to mean both "nama" and "succulent karoo", supports a particularly high diversity of species endemic to southern Africa. Avifauna characteristically comprises ground dwelling species of open habitats. The tree lined watercourses allow penetration of several species typical of arid woodland such as the Kori Bustard and Karoo Korhaan. Several species are almost entirely confined to the "Nama karoo" such as the Red Lark and Sclaters Lark. Because rainfall in the "Nama karoo" is in summer and the neighbouring "Succulent karoo" has winter rainfall, there is opportunity for species to migrate seasonally between the two. Two species suspected to do so (on the basis of atlas data) are the Ludwig's Bustard and Larklike Bunting.

Woodland biome: Woodland covers much of the northern and eastern parts of the country and is defined as having a distinct grassy under story and a woody upper story of trees and shrubs. Tree cover can range from sparse such as in the southern Kalahari, to almost closed. The more arid woodland types such as the Kalahari vegetation types are typically fine leaved and dominated by acacias and typically occur on nutrient rich, often alluvial soils in the western regions.

Central Kalahari is characterized by sparse to dense shrubland on deep Kalahari soils, grass cover is variable and dependant on rainfall. Southern Kalahari consists of open shrubland on deep Kalahari sands and again, grass cover is variable and dependant on rainfall.

Avifauna of the Kalahari vegetation types is characteristic, with many species that occur in the moister woodlands avoiding the Kalahari, probably due to the absence of surface water. At the same time there are no species truly endemic to

the Kalahari, most of them also spread to other woodland types. Two species which have their ranges centred on the Kalahari however, are the Fawn-coloured Lark and Kalahari Robin, representing possibly the closest to endemic species of the Kalahari.

Table 11.4 below shows the report rates for selected species that have been recorded in the quarter degree squares covering the study area (Harrison *et al* 1997). All Red Data species have been included, as well as a selection of non Red Data species which are considered to have particular relevance to this study such as raptors, doves, pigeons and aerial foragers such as swallows and swifts.

Table 11.4: Report rates for Red Data species and a selection of other species that are considered particularly relevant to the study (Harrison *et al* 1997)

Species	**Cons status**	**2821AC**	**2821CA**
Site name		Olyvenhouts Drift	
Number of cards		35	17
Total species		144	122
Martial Eagle	V	3	
Lanner Falcon	NT	9	12
Black Stork	NT		6
Abdims' Stork	Bonn	9	
African Fish Eagle		14	18
Black-shouldered Kite			24
Jackal Buzzard		6	6
Pale Chanting Goshawk		23	29
Rock Kestrel		14	12
Greater Kestrel		3	6
Pygmy Falcon		6	
Helmeted Guineafowl		3	12
Karoo Korhaan		6	18
Black Korhaan		11	18
Spotted Dikkop		9	6
Double-banded Courser		11	6
Namaqua Sandgrouse		11	47
Rock Pigeon		83	47
Red-eyed Dove		46	24
Cape Turtle Dove		77	71
Laughing Dove		86	88
Namaqua Dove		57	65
Barn Owl		3	
Pearl-spotted Owl		14	
Spotted Eagle Owl		9	6
White-rumped Swift		3	6
Little Swift		63	59
European Swallow		17	18
White-throated Swallow		26	29
Greater Striped Swallow		23	29
Rock Martin		24	53
Brown-throated Martin		57	47
Sociable Weaver		40	35

V = Vulnerable
NT = Near threatened
Bonn = Protected Internationally under the Bonn Convention on Migratory Species
Barnes (2000)

Report rates are essentially an expression of the abundance of the species. The number of times a species is counted in a particular square is expressed as a percentage of the number of times that square was counted.

11.5. Site specific assessment of the impacts

Site 1 - Olyvenhouts Drift

The farm Olyvenhouts Drift (FIGURE 1) is situated approximately 10km west of Upington, along the R64. A small portion of the farm lies below the R64 on the Orange River side, and the remainder is situated above the R64 and stretches "inland" in a long thin shape. A gravel district road bisects the farm diagonally. Approximately 2km north-west of the R64 is an existing 132kV power line which runs parallel to the R64 into Upington. A number of small drainage lines exist on the farm, but there appears to be no permanent surface water.

Table 11.5: Site specific rating of Olyvenhouts Drift according to the criteria described above under methodology

Criteria	**Score**
Presence of Red Data bird species	2
Habitat uniqueness	1
Existing disturbance levels	2
Proximity to existing power line infrastructure	1
Proximity to existing roads	1
Total score	**7**

Evaluation of avifaunal impacts at this farm:

Issues relating to the CSP itself:

- *Collision with the heliostats (mirrors):*
  This is likely to impact on birds, but the extent to which it will occur is unknown at this stage. The impact on bird populations worldwide through them colliding with windows of buildings has been well documented (see www.flap.org). At Solar One, 81% of bird mortalities were through collision with structures, with >75% of these collisions having occurred with the heliostat mirrors themselves (McCrary *et al* 1986).

- *Collision with the central receiver tower*
  Bird collisions with tall infrastructure have also been well documented world wide. However, this typically occurs with migratory species in flocking behaviour and has usually involved low visibility conditions such as fog. There are unlikely to be sufficient numbers of any particular bird species at the site of the CSP to constitute flocking behaviour thereby resulting in this risk. It is however likely that the occasional bird will collide with the tower.

- *Roosting on the central receiver tower*
  The tower will be a prominent structure in the landscape and may be an attractive roost for certain bird species. Although it will be too hot during operation, as it cools down during the evenings it may be a very attractive (particularly during winter) if it retains some warmth (although the temperature it retains remains to be seen). It will also be extremely well lit at night which may attract insects, thereby attracting birds. If birds do roost on the tower, this is likely to simply be a nuisance for plant staff, as bird pollution will build up on any available surfaces.

- *Burning when in vicinity of the central receiver*
  It seems unlikely to be a significant impact as birds would presumably be repelled by the heat before they get within burning range. Certain particularly fast flying species may be impacted on. Research at Solar One did not detect any mortalities through this mechanism (McCrary *et al* 1986).

- *Burning when entering the "standby focal points"*
  This impact is likely to occur at the CSP. The significance of the impact will depend on a number of factors which are unclear at this stage, for example: exactly how many focal points will exist; what size will they be; how long will they be in operation for each day. At this stage it is safe to say that some birds will in all likelihood be killed in the focal points. The significance of the impact will depend on just how many birds, and what species are killed. Furthermore, it seems unlikely that any mitigation for this impact will be possible. Monitoring at Solar One recorded that 19% of all bird mortalities were through burning in standby or focal points – mostly swifts and swallows (McCrary *et al* 1986).

- *Loss of habitat*
  Approximately four square kilometres will be taken up by the CSP plant in total. The vegetation in this area will not be fully cleared automatically. Rather, only the areas where infrastructure has to be constructed will be cleared. Obviously construction activities on site will flatten and impact on certain areas of vegetation even if it is not cleared.

- *Disturbance*
  Construction activities will no doubt disturb the birds in the area, particularly breeding birds – however due to the uniformity of the broader area, these birds can quite easily move off and find similar habitat nearby. This impact is considered significant for birds.

- *Nesting of Sociable Weavers and other species on the plant infrastructure*
  The extent to which this occurs will need to be monitored closely. This is an impact of the birds on the plant rather than the plant on the birds. It is hoped that the constant moving and cleaning of the heliostats will make them unattractive nesting substrate for the birds.

Table 11.6: Rating of significance of impacts associated with CSP itself.

Impact	Temporal scale	Spatial scale	Severity scale	Significance scale	Risk or likelihood	Degree of certainty
Collision with heliostats	Permanent	Localized	Severe – mitigation not possible	Moderate	Will definitely occur	Probable
Collision with central receiver tower	Permanent	Localized	Severe – mitigation not possible	Low	May occur	Probable
Roosting on central receiver tower	Permanent	Localized	Don't know	Low	May occur	Unsure
Burning in vicinity of central receiver tower	Permanent – operational phase	Localized	Slight	Low	May occur	Unsure
Burning in focal points	Permanent – operational phase	Localized	Severe – mitigation not possible	Moderate	Will definitely occur	Probable
Habitat loss	Permanent	Localized	Moderately severe	Moderate	Will definitely occur	Definite
Disturbance	Short term	Localized	Moderately severe	Moderate	Will definitely occur	Probable
Nesting	Permanent	Localized	Moderately severe	Low	May occur	Unsure

Issues relating to associated infrastructure:

- *New power lines:*
  Collision of large terrestrial birds with overhead power lines is likely to occur and is anticipated to be the most significant threat posed by associated infrastructure. Species most likely to be affected are korhaans and other large terrestrial species. The significance of this impact depends on the length of new line to be built. In this case it appears that new line will be required from the CSP to the district road (approximately 1km) and then along the district road to link up with the existing 132kV line (see Figure 11.2 – red line). This means that the new line will be adjacent to other infrastructure in the form of roads, which is favourable in terms of bird collisions as these roads are sources of disturbance to some extent.

  Electrocution of birds on pylons will depend entirely upon the exact pylon structure that Eskom decide to use for the new line – which has not yet been decided. Electrocution risk is determined by the phase-phase and phase-earth clearances on a pole structure which differ greatly between different structures. Again, if the structure used is dangerous to birds, the significance of this impact will vary with the length of the line.

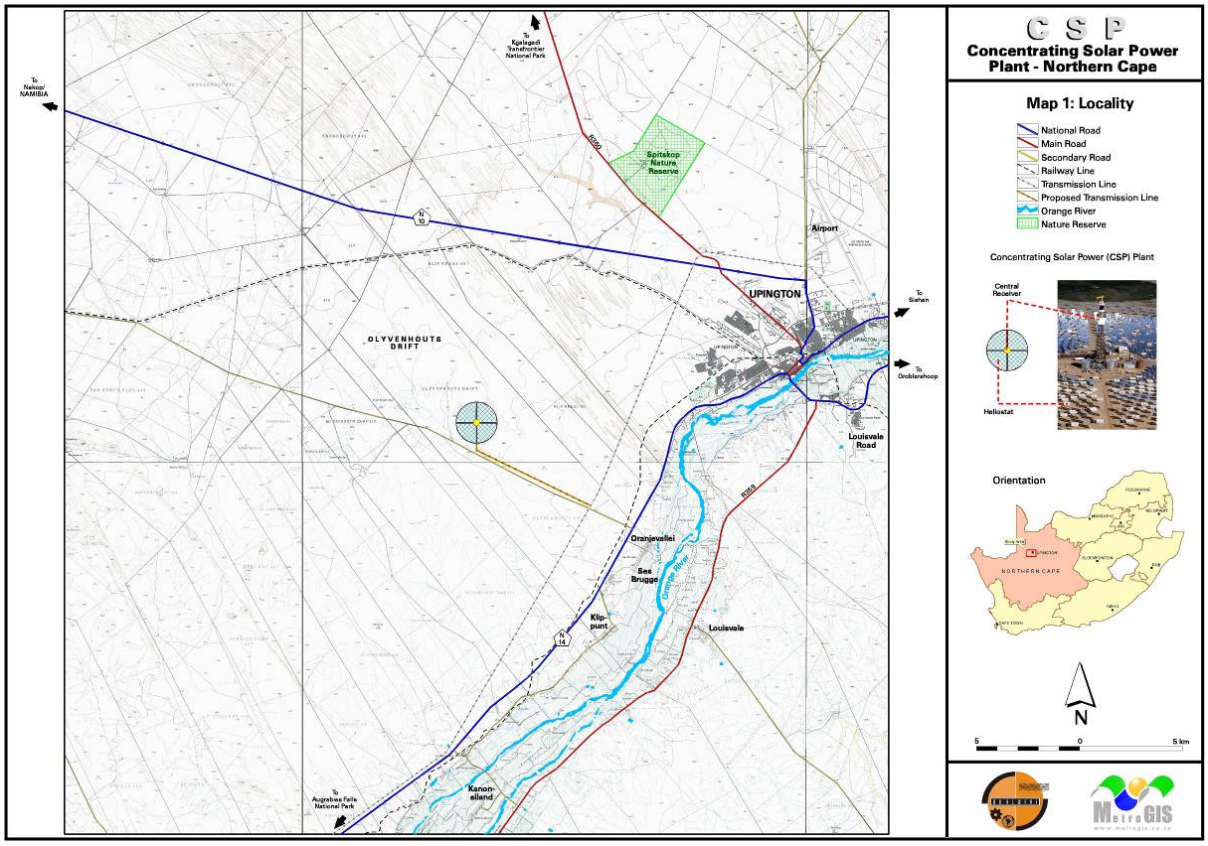

Figure 11.1: Layout and position of the CSP plant on the farm.

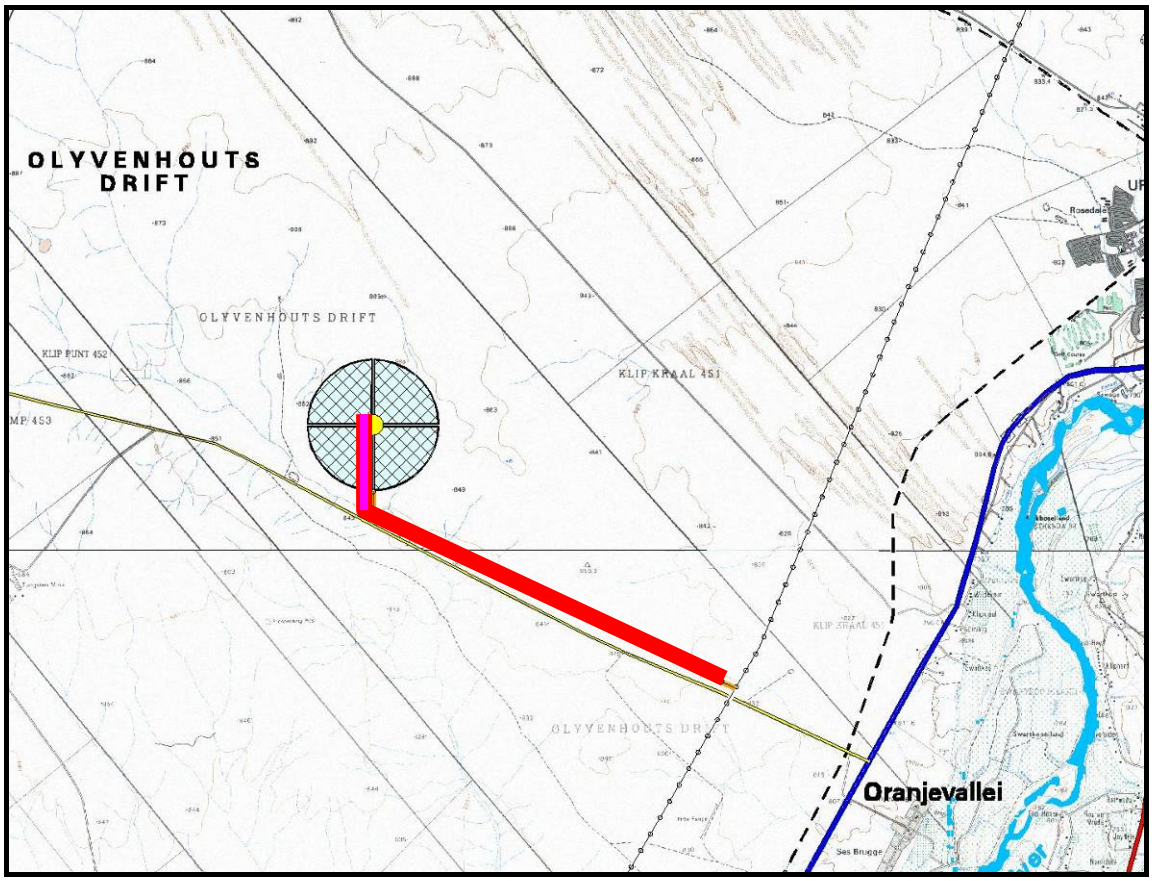

Figure 11.2: Close up of the CSP and associated infrastructure

Nesting of birds on pylons is in fact a positive impact on avifauna, but may impact negatively on the quality of electrical supply by causing electrical faults. In the case of Sociable Weaver nests, the nest material may pose problems to the pylons structural integrity through added weight, and there is an increased fire risk due to the fuel load of these massive nests.

Disturbance of avifauna through construction and maintenance activities associated with the power line is not likely to be significant.

Habitat destruction by construction activities is likely to occur, but not likely to be significant.

Table 11.7: Rating of significance of impacts associated with new power lines

Impact	Temporal scale	Spatial scale	Severity scale	Significance scale	Risk or likelihood	Degree of certainty
Collision of birds	Permanent	Localized	Moderate	Moderate	May occur	Probable
Electrocution of birds	Permanent	Localized	Don't know – depends on tower design	Don't know	Don't know	Don't know
Nesting	Permanent	Localized	Don't know – depends on tower design	Don't know	Don't know	Don't know
Habitat destruction	Permanent	Localized	Slight	Low	Will definitely occur	Definite
Disturbance	Short term	Localized	Slight	Low	Will definitely occur	Definite

Table 11.8: Rating of significance of impacts associated with new roads

Impact	Temporal scale	Spatial scale	Severity scale	Significance scale	Risk or likelihood	Degree of certainty
Disturbance	Short term	Localized	Moderate	Moderate to low	Will definitely occur	Definite
Habitat destruction	Permanent	Localized	Moderate	Moderate to low	Will definitely occur	Definite

New roads:

Disturbance of avifauna is likely to occur to some extent, but not likely to be too significant as there is already a gravel district road through the farm and it is unlikely that extensive new road would be required (see FIGURE 11.2 – purple line), again depending on the exact site of the CSP within the farm.

Habitat destruction caused by road construction will have some impact on avifauna, but as discussed elsewhere the habitat in this landscape is relatively uniform and so this impact is unlikely to be too significant.

New pipe lines:

This infrastructure is likely to have very similar impacts to the roads discussed above, except on a smaller scale. During the original site visit, Eskom stated that if the CSP is built on Olyvenhouts Drift, water will obtained from the municipal supply. There will need to be a certain length of new pipe line built to tap into this supply. The impacts of this will be minor habitat destruction and minor disturbance.

New visitors centre:

This infrastructure is likely to have similar impacts to the two sections above ie some limited habitat destruction on the site where it is built and some disturbance oin the vicinity. Relative to the construction of the entire CSP plant, the impacts associated with the visitors centre will be relatively minor in significance.

11.6 Conclusions

The comparison of the three original sites during scoping phase revealed Olyvenhouts Drift to be the second most preferred site, closely following Bokpoort. More detailed examination of the impacts of the proposed CSP on avifauna at Olyvenhouts Drift revealed the following key findings:

Impacts associated with CSP:

- Collision of birds with heliostats is likely to be of moderate significance. It is unlikely that mitigation of this impact will be possible, but this will need to be confirmed once the plant is operational and some experience is gained.
- Burning of birds in focal points will be of moderate significance. Again, it is unlikely that mitigation of this impact will be possible, but this will need to be confirmed once the plant is operational and some experience is gained.
- Habitat destruction and disturbance of birds will be of moderate significance. This can be mitigated by ensuring that the construction Environmental

Management Plan incorporates guidelines as to how best to minimize this impact.

Impacts associated with new power lines:

- Collision of birds with overhead power lines is likely to be of moderate significance. This will be mitigated for by marking the relevant sections of line with appropriate marking devices. These sections of line will be identified as part of the EMP phase.

Impacts associated with new roads, pipe lines, and visitors centre:

- Habitat destruction and disturbance of birds will be of moderate to low significance. This will be mitigated by ensuring that the construction Environmental Management Plan incorporates guidelines as to how best to minimize this impact.