PROJECT: REDSTONE 100MW CONCENTRATED SOLAR POWER (CSP) PROJECT

COUNTRY: SOUTH AFRICA

SUMMARY OF THE ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

Date: June 2018

E&S Team
Erika AUER Social Development Specialist, SNSC/RDGS3
Yusef HATIRA Environmental Specialist, SNSC/RDGS3

Sector Department
Energy Financial Solutions and Policy & Regulations Department (PESR) & Renewable Energy and Energy Efficiency Department (PERN)

Regional Department
Regional Directorate General South (RDGS)

Resident Representative
Josephine NGURE

Division Manager
Aida NGOM (PESR.2) ; Negash Habtemichael ENGEDASEW (PERN.1)
1. Objectives of the ESMP

This Construction Environmental and Social Management Plan (CESMP) and Operational Environmental and Social Management Plan (OESMP) has been compiled for the ACWA Power SolarReserve Redstone Solar Thermal Power Plant as per the Environmental Authorisation. The Project, situated on the Remaining Extent of the Farm No 469, involves the construction and operation of a 100 MWnet Concentrated Solar Power (CSP) Plant that uses a central receiver technology with molten salts storage and its associated infrastructure. This ESMP also provides the final site layout for the project with its associated infrastructure.

The ESMP has been developed on the basis of the findings of the EIA, and must be implemented to protect on-site and off-site features through the management of construction, operation and decommissioning activities the aim is to minimize potential impacts on the environment. This ESMP is applicable to all of the Projects employees and contractors working on the pre-construction, construction, and operation & maintenance phases of the Project.

The original ESMP was compiled by WorleyParsons RSA (Pty) Ltd (WPRSA), then amendment by SolarReserve SA and reviewed by an Independent EAP (Savannah Environmental (Pty) Ltd) in order to ensure full compliance with all conditions pertained in the Environmental Authorization (EA). It also incorporates all relevant permits conditions and includes the mitigation measures as identified during the EIA phase of the Project. It also confirms the final site layout plan adheres to the requirements set out in the ESMP and relevant permits.

The Project team has in place an environmental, health, and safety management team and will furthermore require the EPC contractor to have such key personnel on site throughout the Project cycle. Social impacts and mitigation measures are managed by the Human Resource and Social Economic Development Manager. Potential capacity support may be required to ensure that social mitigation measures are managed and reported on in the same manner as the environmental mitigation measures.

An environmental and social action plan (ESAP) has been developed for the project with E&S action items to be implemented in order to be fully compliant with the AfDB ISS. The ESAP will be part of the Common Terms Agreement.

2. Context

The Project Company will construct and operate a 100 MWnet Concentrated Solar Power (CSP) Plant, known as the ACWA Power SolarReserve Redstone Solar Thermal Power Plant. The Project will be situated on the Remaining Extent of the Farm No. 469, located to the east of Postmasburg in the Northern Cape Province. The site is located on the Farm Humansrus (Farm 469, the Hay Rd), approximately 5 km southeast of the Groenwater community and 30 km east of Postmasburg and falls within the jurisdiction of the Tsantsabane Local Municipality of the ZF Mgcawu (previously known as Siyanda) District.
Municipality. A detailed site plan is contained in Table 2 – 1.1 below indicative of the proposed plant and infrastructure footprint.

**Table 2 – 1.1: Site Plan**

Within the framework of the Independent Power Producer (IPP) Bid, which only stipulates a lifespan of 20 years for the proposed project it is the intension of the applicant to decommission the plant and rehabilitate the area to resemble as far as possible the state as depicted in the baseline assessments.

### 2.1. Environmental baseline

#### 2.1.1. Geographic Characteristics

The majority of the site is flat with the gradient increasing towards the north eastern boundary of the project site. Height above sea level ranges from 1492 m.a.s.l. on the western boundary of the project area to 1636 m.a.s.l. at the eastern most point of the project boundary.

The project footprint is drained by non-perennial 1st order tributaries of the Groenwaterspruit that drain towards Postmasburg, into the Soutloop and into the Orange River. The tributaries are well defined in the north eastern portion of the project area where the gradients are steeper but become difficult to discern in the central portion of the project area. The area to the east of the proposed powerline corridors and Lime Acres drains into the Klein-Riet, a tributary of the Vaal River. The area to the north of the project area drains into the Gamagara River, and from there to the Orange River via the Kuruman and Molopo rivers.\(^1\)

#### 2.1.2. Vegetation Communities

The project area is situated in the savanna biome and overlaps with 3 vegetation types namely: (i) The lower gradients portions of the project footprint corresponds with Olifantshoek Plains Thornveld; (ii) The proposed powerline corridor alternatives overlap small areas of Southern Kalahari Salt Pans. The savanna biome represents 32.8% of South Africa’s surface area. The savanna biome occupies most of the far-northern parts of the Northern Cape, the western and north-eastern portions of the NorthWest Province, most of the Limpopo Province, northern Gauteng with isolated occurrences in the south of the province, north-eastern and north-western Mpumalanga as well as low altitude portions of the eastern seaboard. Kuruman Mountain Bushveld occurs in the Northern Cape and North-West Provinces on rolling hills with moderate slopes. This vegetation type is classified as Least Threatened (LT) due to the low level of transformation. Euphorbia

\(^1\) Biodiversity Management Plan for Redstone CSP Project. Final. May 2016. ERM.
planiceps, a plant species endemic to South Africa and the Northern Cape, occurs in this vegetation type. A medicinal bulb Boophone disticha (Bushman’s poison bulb) occurs in this vegetation type. Its status is ‘declining’ primarily due to overharvesting. Olifantshoek Plains Thornveld occurs on plains in the Northern Cape Province. This vegetation type is characterized by open tree and shrub layers, usually with a sparse grass layer. Amphiglossa tecta is a critically rare and endemic plant species that occurs within this vegetation type. The entire population of this plant species occurs within the Witsand Nature Reserve. Olifantshoek Plains Thornveld is classified as LT with approximately only 1% of this vegetation type transformed. The protected tree species Acacia erioloba (Camel thorn) and Boscia albitrunca (Shepherd’s tree) are known to occur in this vegetation type. Southern Kalahari Salt Pans occur in the Northern Cape and North-West Provinces as well as the neighboring portions of Namibia and Botswana. This vegetation type is associated with endorheic (inwards draining) pans and is characterised by low grassland with a mixture of dwarf shrubs. This vegetation type is classified as LT with 8% of its extent statutorily conserved in the Kgalagadi Transfrontier Park.

To the east of the project area the dominant vegetation type changes to Ghaap Plateau Vaalbosveld. As the name implies this vegetation type is characterised by Tarchonanthus camphoratus (Camphor bush/ Vaalbos) and Acacia karroo (Karroo thorn). Based on the PRECIS database two (Acacia haematoxylon and Boscia albitrunca) nationally protected tree species are expected to occur in the project area.

2.1.3. Aquatic Ecosystems

The project area is situated in the Lower Vaal Water Management Area and the Southern Kalahari ecoregion. The project footprint spans 4 quaternary catchments. The Present Ecological State (PES), Ecological Importance (EI) and Ecological Sensitivity (ES) of the Klein Riet SQR have been rated largely modified (Class D), Moderate and Low.

2.1.4. Wetlands

Wetlands are only associated with the proposed powerline corridors. The wetland types associated with the powerline corridors include depression, seep, flat, floodplain and valleyhead seep wetlands. Based on the desktop delineation no wetlands are associated with or overlap within the project footprint.

2.1.5. Protected Areas

No formally protected areas exist within an area that could be impacted upon by the development. No informally protected areas are situated in the vicinity of the project footprint.

2.1.6. Important Bird Areas (IBAs)

The nearest IBA is Spitskop Dam which is situated approximately 100 km from the site. The proposed development is not expected to have any impacts on IBAs due to their distance from the site.

2.1.7. National List of Threatened Terrestrial Ecosystems

No threatened terrestrial ecosystems are located in the vicinity of the project area with the nearest, the central grasslands ecosystem, situated approximately 200 km to the east of the project area.

2.1.8. Terrestrial Ecosystem Status

The terrestrial ecosystems associated with the project are categorized as Least Threatened (LT). No threatened terrestrial ecosystems are situated in close proximity or likely to be impacted upon by the project.

2.1.9. National Freshwater Ecosystem Priority Area (NFEPA) Status
The project is unlikely to impact directly on river FEPA although the upper reaches of the Klein Riet should be regarded as a sensitive receptor in order to avoid impacts on the downstream FEPA.

2.2. Socio-economic baseline

2.2.1. Population size and growth

The population of any geographical area is the cornerstone of the development process, as it affects the economic growth through the provision of labour and entrepreneurial skills, and determines the demand for the production output. In 2011, South Africa’s population is expected to be above 50 million, with 1.1 million people residing in the Northern Cape area. The Siyanda DM is housing 247,611 people, or 22.5% of the provincial population while the Tsantsabane LM has a population of 29,150 people, i.e. just above 10% of the DM’s population. Whilst the population of the Siyanda DM, Northern Cape and South Africa experienced a slowdown in their growth rates, the primary study area’s population growth rate has been increasing. This could be explained due to the fact that mines constitute a prominent land use in the area, which is home to the Assmang Iron Ore Mine at Beeshoek and the newly established Kolomela under Kumba.

2.2.2. Household numbers and size

South Africa has 13,385,517 households, which means that the average household size in the country is 3.8. The Northern Cape is estimated to have above 281,015 households and a bigger average household size than in the country. The Siyanda DM has 61,453 households and the biggest average household size in all of the study areas (4.1). The primary study area is expected to have 7,485 households and almost the same average household size (3.9) as the rest of the Province and country. In the Northern Cape and the Siyanda DM, household growth rates was found to be significantly lower than their population growth rates, which means that the average household size in these areas has been slightly increasing.

The main factors that affect the household growth include, besides the population increase, the change in age structure and incidence rate, or the likelihood of people of a certain age to start a new household. The significant difference between a household growth rate and a population growth rate, though, is usually attributed to the change in age structure. Household size is also influenced by many other factors such as culture, traditions, education levels, income levels, etc. Over the years, it has been observed that the size of an average household in the country has been declining.

2.2.3. Income and expenditure pattern

The percentage of households earning less than R3,200 per month (R38,400 per annum) in the Tsantsabane LM area was slightly higher than in the ZF Mgcawu DM and the Province, but lower than in the rest of the country in 2007\(^2\). Overall, more than half of households earned less than R3,200 per month in all the study areas and the country in 2007. At the same time, though the percentage of households without any income at all was significantly higher in the primary study area than in any other study area analysed. From an average household income perspective, an average household in the primary study area earned more or less the same as an average household in the ZF Mgcawu DM, what means that there are more households in the Tsantsabane LM with a higher income, but this average household income is significantly less than households in the Northern Cape and South Africa.

\(^2\) Income distribution in study areas as captured in the Community Survey 2007. More recent data, unfortunately, is not available.
In the primary study area, households tend to spend the same share of their disposable income on services and non-durable goods, whilst in the Siyanda DM and the Northern Cape households tend to spend more on services than on non-durable goods. The share of disposable income spent by the Tsantsabane LM households on non-durable goods is also greater than the share of expenditure on these goods by households residing in the ZF Mgcawu DM, the Northern Cape and the rest of the country. The share of expenditure on durable goods and semi-durable goods is almost similar for all the study areas.

Expenditure on food, beverages, and tobacco products is the largest expenditure item amongst households in all areas, although households in the Tsantsabane LM tend to allocate a slightly bigger share of their income for these expenses than households in the rest of the province and country. Larger portions of the Northern Cape, Siyanda DM and the Tsantsabane LM households’ income has to be allocated towards paying rent than is the case of households in the rest of South Africa. The Tsantsabane LM households also tend to spend a smaller share of their income on transportation than households in the ZF Mgcawu DM and the rest of the study areas. Expenditure on personal transport equipment in the primary area is lower than in the secondary and tertiary areas and spending on clothing and footwear is smaller than in South Africa, but the same as in the Northern Cape.

2.2.4. The labor market

The Northern Cape accounted for 2.3% of the national working age population, or 704 615 people. In 2009, just over 53% of the provincial working age population participated in the economy or were economically active. These people encompassed a labor force, which was divided into 271 688 employed and 103 541 unemployed people, indicating a 27.6% unemployment rate in the province. ZF Mgcawu DM had a bigger percentage of the working age population participating in the economic activities than that of the province and the country. In Siyanda, 56.0% of the working age population were economically active, with 25.3% of these people being unemployed.

The primary study area had a working age population of 18 707 people and a labor force of 10 896 people, of who only 6 851 were employed. This means that in light of the labor force figure, the unemployment rate in the Local Municipality was 37.1% - significantly higher than in the ZF Mgcawu DM, the Northern Cape and South Africa. The high labor force participation rate, however, means that a significantly higher percentage of people in the Tsantsabane LM than in all the other study areas were looking for jobs.

2.2.5. Employment composition

In the Postmasburg area, the main employment driver at present is mining - specifically mining of iron ore, manganese, lime and various semi-precious stones and minerals. The mining houses mostly employ people from Groenwater, Postmasburg, Kuruman, and other surrounding towns for unskilled and semiskilled positions, whereas the contractors and the skilled labour is sourced outside the region. Another main activity in the area is agriculture; mainly livestock farming due to the crop farming that is hindered by the poor soil in the area.

2.2.6. Basic Service Delivery

Households living in the primary study area have poorer access to formal dwellings and electricity than households living in the rest of the province and the country. The situation with respect to the access to water and sanitation, however, is different. Compared to the percentage of households with access to water and sanitation in South Africa and in the province, a greater share of households in the Tsantsabane LM has access to water and sanitation services in their dwellings or in a yard.

3. Beneficial and Adverse Impacts
During the Scoping Phase of the project, discussions were held with Department of Environmental Affairs (DEA) on the specialist studies that would need to be conducted during the EIAR Phase. The potentially significant impacts that were highlighted during Scoping are as follow:

- Loss to archaeological and cultural heritage;
- Visual and landscape impacts;
- Impact on natural vegetation and ecology;
- Avifaunal;
- Waste impacts;
- Surface hydrology;
- Wetland impacts; and
- Socio-economic impacts.

In addition to the potentially significant impacts, specialist assessments were also conducted for a number of the potentially less significant impacts. This was done in order to discount any possibility of a potentially significant impact occurring as a result of the proposed project and it being left unaccounted and unmitigated causing potentially serious harm to the environment.

These specialist assessments included the following:

- Air quality;
- Geotechnical;
- Soils and Agriculture Potential;
- Noise;
- Geohydrology; and
- Tourism

### 3.1. Heritage and Archaeological Impact Assessment

#### 3.1.1. Construction Phase

#### 3.1.1.1. Impact Description and Assessment

In terms of the findings from the Scoping Phase Heritage Impact Assessment, it was determined that no further Palaeontological Assessment is required for the EIAR phase. With regards to impacts on heritage and archaeological resources during the construction phase it is expected that the predominant impact would arise as a result of the total destruction of the heritage resources that were identified and assessed. The earthworks and construction of the proposed plant and associated infrastructure will impact significantly on the identified heritage resources.

The Heritage Scoping Report, that forms part of the Heritage Impact Assessment (HIA), has shown that the area between Postmasburg and Daniëlskuil generally referred to as the Ghaap plato has a rich history of occupation from the Stone Age with hunter gatherers to the Thlaping and Thlaro during the Iron Age period. The 1800’s saw the rise of the Griqua people in the area and their loss of sovereignty after 1880 to Cape rule. The field work that feeds into the HIA has utilised the findings of the Scoping report to guide this work. The field work identified a total of 25 heritage sites. All of the sites were assessed and of the 25 sites 14 sites will require further mitigation.

The overall impact of the development on heritage resources is seen as **acceptably low** and impacts can be mitigated to acceptable levels. The residual impacts after the implementation of the proposed mitigation measures are calculated as **medium negative**.
3.1.1.2. **Operational Phase**

In the original project site assessed in the EIA (2012), there were graves identified in the southwestern corner of the site. The project site area has been revised since 2012 to avoid any impacts on the graves. As such, the current project site does not affect any graves, the graves form now part of the Lesedi project. Please refer to the drawing below which has been approved as part of the ESMP environmental authorization in December 2015.

**Table 3.1.1.2. Updated site plan**

![Updated site plan diagram]

3.1.1.3. **Decommissioning Phase**

In the instance where sites were preserved instead of being relocated it is recommended that the proposed mitigation of fencing the cemeteries off with a 10 meter buffer during the decommissioning activities be implemented or maintained as implemented during the preceding construction and operational phases.

3.2. **Visual and Aesthetic Landscape Impact Assessment**

Visual resource impacts would result from the construction, operation, and maintenance of the proposed CSP project. Specifically, impacts would result from project components being seen from sensitive viewpoints and from effects to the scenic values of the landscape. Impacts to views would be the highest when viewers are identified as being sensitive to change in the landscape, and when their views are focused on and dominated by the change. The predominant sensitive viewing areas that have been assessed are the views from R356 and Humansrus Farm and the views from Groenwater, Sunnyside farmstead and the dirt road west of the site.

It is envisaged that the residual impact after the successful implementation of the proposed mitigation measures would result in a Moderate Negative impact on the views from the R356 and Humansrus Farm during both the construction and operational phases and High Negative during the construction phase and
3.3. Assessment of Impacts on Avifauna Species and Habitats

3.3.1. Construction Phase
3.3.2. Impact Description and Assessment

**Loss of habitat:** The CSP plant in total will take up approximately 800ha. The vegetation in this area should not be fully cleared automatically. Rather, only the areas where infrastructure has to be constructed should be cleared. Obviously, construction activities on site will flatten and affect certain areas of vegetation even if it is not cleared. Similar habitat is abundant in the greater area and it is anticipated that the bird species will move to surrounding areas. The impact significance is rated as **Medium/Moderate Negative prior to mitigation**.

**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. The impact significance is rated as **Medium/Moderate Negative prior to mitigation**.

The specialist Avifaunal Assessment does not make a pertinent rating of the residual impacts but the conclusion that is derived from the specialist report is that the residual impact for the loss of habitat and the disturbance caused by the construction does not improve a great deal post mitigation and it is hence inferred that the impact would remain at a significance rating of **Medium/Moderate Negative**.

3.3.3. Operational Phase
3.3.4. Impact Description and Assessment

**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 significance rating for this impact is **Medium/Moderate Negative prior to mitigation**.

**Collision with the central receiver tower:** Bird collisions with tall infrastructure have also been well documented worldwide. However, this typically occurs with migratory species in flocking behavior 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 plant to constitute flocking behavior thereby resulting in this risk. It is however likely that the occasional bird will collide with the tower. The impact significance is rated as **Medium/Moderate Negative prior to mitigation**.

**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). If it is well lit at night, this 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. The impact significance is rated as **Medium/Moderate Neutral and requires no mitigation**.

**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, such as the doves, swifts, martins and swallows. The impact significance is rated as **Medium/Moderate Negative prior to mitigation**.
Burning when entering the “standby focal points”: This impact is likely to occur at the CSP plant. 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. The significance rating for this impact is Medium/Moderate Negative prior to mitigation.

Nesting of Sociable Weavers and other species on the CSP tower: 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. No nests were observed within the site boundaries, however, some nests were observed in the surrounding areas. The significance rating for this impact is Medium/Moderate Positive prior to mitigation.

New power line collisions: 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 Plant to a substation connecting with the High Voltage Line running to the South West of the site. The exact routing of this new line was not available at the time of the site visit, and the impact therefore cannot be fully assessed at this stage. The significance rating for this impact is Medium/Moderate Negative prior to mitigation.

Electrocution: Electrocution of birds on pylons will depend entirely upon the exact pylon structure that for the new line – detail of which was not available at the time of this study. 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. 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. The significance rating for this impact is Medium/Moderate Negative prior to mitigation.

Nesting of Sociable Weavers and other species on the new power line 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. This impact has a significance rating of Medium/Moderate Neutral and requires no mitigation with no cost or benefit to the receiving environment.

Residual Impact: The impacts anticipated during the operational phase of the proposed project have a predominantly moderate negative impact on the avifauna. The implementation of the proposed mitigation measures will not have any significant effect in reducing the assessed impacts but it will ensure that the impacts remain at a Medium/Moderate Negative significance.

3.3.5. Decommissioning Phase

The impact of construction activities during the decommissioning phase of the proposed project have not been assessed during the specialist assessment but are likely to have a short term impact on avifauna. The
predominant impact during this phase is anticipated to be the disturbance caused by the demolishing, decommissioning and rehabilitation activities similar to the construction phase but only to a lesser degree as a result of the loss of habitat caused during the construction phase. Although not assessed and quantified an overall positive impact is expected as a result of the reinstatement of the natural habitat after the demolishing of the infrastructure and during the rehabilitation of the site. The reinstatement of the natural habitat would cause avifauna and other fauna to gradually return to the area post-rehabilitation.

3.4. Impacts on Fauna and Flora (Biodiversity)

No impacts were identified that could lead to a beneficial impact on the ecological environment of the study area since the proposed development is largely destructive as it involves the alteration of natural habitat or further degradation of habitat that is currently in a sub-climax status. Eleven impacts were identified that are relevant to the proposed development and are placed in three categories, namely: direct, indirect and cumulative. This summary will present the direct impacts, the remaining impacts can be viewed in the full ESIA/ESMP document.

3.4.1. Description and Assessment of Direct Impacts

3.4.1.1. Direct Impacts on Threatened Flora Species

The likelihood of Red Data flora species occurring within the study area is regarded relatively low. Available data did not indicate the known presence of Red Data plants in the region. However, habitat types present on the property is in an optimum condition and Red Data plant species might be present. Since this survey was conducted during the winter, no definitive comments could be made about the absence of Red Data plants on the study area.

3.4.1.2. Direct Impacts on Protected Tree Species

A number of protected tree species will be removed during construction. While Acacia erioloba and Boscia albitrunca occur in low numbers on the property, Olea europaea is present as shrubs in most of the woodland and shrubveld habitat types and as relatively dense stands of trees in the Olea Woodland. Impacts within this area in particular will result in direct and significant impacts on this protected tree. It is not regarded as a cause to stop the proposed development, since the species occurs in commonly across most of the region. In addition, most of the habitat where this species occurs is captured within areas where human related impacts are unlikely to happen, thereby ensuring adequate protection for the species. However, this species is under increasing threat that causes a continuous decline in numbers and it has been placed in a Declining Category; it is a legal requirement to report the presence of this species to relevant authorities in order to monitor their numbers as well as impacts on the status of the species. The presence of protected tree species on the property has been established and impacts on a number of these trees will occur.

3.4.1.3. Direct Impacts on Threatened Fauna Species

The presence of three Red Data fauna species on this property has been confirmed and any surface disturbance therefore represents a direct and significant impact on these species. While some of them are highly mobile and will ultimately be able to avoid impacts that result from the proposed development, some like the Lesser Dwarf Shrew will not be able to avoid effects of microhabitat destruction, such as the termite mounds, which they occupy. A direct approach can be implemented in order to relocate these animals to adjacent suitable habitat. Similar to Red Data plants, the presence of Red Data animal species is seen as a significant attribute to the biodiversity of an area. Any impact is therefore viewed as significant. Additional aspects that will be affected include migration patterns and suitable habitat for breeding and foraging purposes. The presence of Red Data fauna species within the study area is confirmed.
3.4.1.4. **Loss, or Disruption of Migration Routes**

While most of the larger mammal species (ungulates) are restricted in their movement by fences, small and medium sized animals, that include predators, burrowing species, small mammals, invertebrate species, reptiles, amphibians, etc. utilizes all available natural habitat as either corridors or habitat. The loss of an area as large, as this property, will affect the migration pattern of a number of species that are present in the immediate region. While larger animals are able to avoid unsuitable habitat, smaller animals might not be able to cross or avoid these areas. The size of the proposed development implies that much of the natural habitat that is present on the study area will become unsuitable for a number of species that might utilize this area on a frequent or infrequent nature.

3.4.1.5. **Direct Impacts on Sensitive/ Pristine Habitat Types**

The loss/ change of pristine habitat types or habitat that are regarded sensitive as a result of restricted presence in the larger region (atypical habitat) represents a potential loss of habitat and biodiversity on a local and regional scale. These areas represent centres of atypical habitat and contain biological attributes that are not frequently encountered in the greater surrounds. A high conservation value is generally ascribed to floristic communities and faunal assemblages that occupy these areas as they contribute significantly to the biodiversity of a region. Parts of the study area are regarded as highly sensitive.

3.4.1.6. **Direct Impacts on Common Fauna Species**

The likelihood of this direct impact occurring is relatively low due to the ability of most animal species to evacuate an area that becomes unsuitable. The presence of a relative diverse faunal species composition on this property has been established. Considering the low levels of habitat transformation and degradation of the surrounding region, most animal species are likely to evacuate towards adjacent areas of natural habitat during the development. While the tolerance levels of common animal species is generally of such a nature that surrounding areas will suffice in habitat requirements of species forced to move from areas of impact, some species are not able to relocate, such as ground living and small species. The proposed development will result in severe impacts on these species. While some fauna species are able to avoid areas of disturbance, some species are simply not able to relocate such vast distances. The proposed development will therefore result in destruction of these animals. It is unlikely that their conservation status will be affected, but any direct and sever impact on animals is considered significant.

3.4.1.7. **Faunal Interactions with Structures, Servitudes & Personnel**

While the structures are visible, injuries and death of animals could potentially occur because of accidental contact. An aspect that is of concern is the presence of vehicles on access and infrastructure roads, leading to road kills, particularly amongst nocturnal animals that abound in the study area. The nature of the proposed development is expected to result in limited indirect impacts on the fauna species.

**Residual Impact:** Of the six habitat types identified, a singular impact of high significance remained after the implementation of the mitigation measures. This was the direct impacts on Protected Trees within the Olea Woodland Habitat Type.

3.5. **Waste Assessment**

3.5.1. **Waste Classification and Impact Description**

From the Basis of Design Report for the brine evaporation ponds for the proposed project it is inferred that the waste (brine) to be generated by the proposed activity is classified as a moderate hazard, with a Hazard
rating of 3. The brine is an inorganic process wastes or residues and was classified as class 6 (Poisonous (toxic) substances) according to the SABS (South African Bureau of Standards) 0228 code.

The main concern for consideration should be the protection of ground and surface waters. Impacts identified include possible impacts on human health (drinking), aquatic ecosystems, and commercial users (e.g. irrigation). The elements analyzed and found in brine were compared with the general and special limits for wastewater discharge published in terms of the National Water Act (Act no. 36 of 1998) (NWA). The Total Dissolved Solids (TDS) in the brine is estimated to exceed the maximum level allowed by 3 to 4 times, estimated at 5000 mg/l, with a specific gravity of 1.28 ton/m³.

3.6. Surface Hydrology Impact Assessment

3.6.1. Regional hydrology

Water for the construction and operation of the proposed project will be sourced from the Vaal Gamagara Pipeline, which could have an impact on the regional hydrology and other users dependent on the Vaal-Gamagara Pipeline seeing that the pipeline has a regional footprint over a large area. It is assessed as having a Negative-Medium significance rating.

3.6.2. Soil infiltration and surface flow conditions on site

Local soil disturbance has the potential to reduce infiltration capacity. The surface of the proposed CSP site is notable for its lack of surface flow features such as channels, implying a high infiltration capacity of the soils. This impact (of the CSP on surface flow over the site) is assessed as having a Negative-Medium significance rating.

3.6.3. Possible interference in local hydrological functioning

The construction and operation of the CSP may have an effect and disrupt local hydrological functioning. For example, it may interfere with the natural flow and storage of water in local channels and wetlands (on-site and off-site but nearby), to the detriment of their natural functioning. These possible impacts are assessed as having a Negative-Low significance.

Residual Impact: The significance of the assessed impacts prior to mitigation is such that it would not prevent the project to proceed. With the implementation of the proposed mitigation measures the three impact types are mitigated even further below the pre-mitigation significance levels. These significance ratings were not quantified during the specialist impact assessment but are indicated to have a positive effect on possible impacts.

3.7. Wetland Impact Assessment

The proposed infrastructure will not intrude into the riparian habitat associated with the Groenwater Spruit. Of the three evaporation pond alternatives, only alternatives 2 and 3 infringe somewhat on the 100m buffer zone but still fall well outside of the riparian habitat. As no infrastructure will be located within the delineated riparian habitat and associated water course and no construction activities will take place within these areas, no direct impacts to the riparian habitat are expected. Several indirect impacts due to the developments on site are however expected. Expected impacts are related mostly to increased sedimentation due to the earthworks that will be required on site, increased flow within the water course due to the import of large volumes of water, and the deterioration of water quality from leaks and spills of hazardous substances or dirty water.
Residual impact: The significance rating of the assessed impacts prior to mitigation is of medium to low significance. With the implementation of the proposed mitigation measures the construction and operational phase impacts will be mitigated further to below the pre-mitigation significance levels.

3.8. Socio-economic impact

The proposed project has negative and positive socio-economic effects with which it is associated. Although negative effects do exist and should be mitigated as far possible, the positive economic impacts of the project far outweigh any negative impacts brought about by the project.

The potential negative impacts of the project are as follow: influx of people seeking job opportunities; competition for employment leading to potential social disputes; unrealistic benefit expectations; spread of infectious diseases such as HIV/Aids; increase in social illnesses such as crime, drug use, prostitution already prevalent in the area; increased pressure on social infrastructure. The project site is not situated close to landscape features that attract tourism to the area (e.g., the Augrabies Falls National Park), thus the disruption on tourism will be insignificant.

3.9. Air Quality

During the construction assessment phase it is expected that, the main sources of impact will result due to the construction of access roads, and the plant area. Dust emission will vary from day to day depending on the phase of construction, the level of activity, and the prevailing meteorological conditions National Standards for South Africa, and due to the relatively short duration of the plant start-up no long term air quality concerns are expected. During the start-up phase (50 to 70 days) natural gas and diesel fuel will be used to heat and melt the salt and begin pumping the salt through the system until the plant has reached its operational temperatures and pressures. During this time the emissions from the fuels will result in an increased pollution load within the atmosphere. Once start-up is complete no fuels are required to ensure the ongoing operations of the CSP plant, therefore all emissions as identified above will no longer be produced and the plant should continue to run on solar power from then on.

3.10. GHG Emissions

Energy consumption, including vehicle operations and two single 2 MVA diesel generators used to supply construction power, will be monitored and reported in the form of carbon emissions. The operations of the project represent a reduction in carbon emissions generated by coal or other non-renewable source amounting to approximately 450 million tons per year.

3.11. Noise impact

The main noise sources at the CSP Plant will be the steam generating unit, the turbines, the cooling fans, and the pumps. The noise from the cooling fans will be the loudest and will predominate at areas outside the CSP Plant property. For daytime operations, measurements demonstrated that noise sensitive sites within 2150 meters from the Plant could be significantly impacted by the noise from the Plant. The ESIA showed that only one site is affected, namely the residence on Farm Humansrus to the north of the development site (max 45dBA). The total volume of traffic generated by the CSP Plant will be very small in comparison to the total volume of traffic on the adjacent main roads. It is estimated that there could be of the order of 60 vehicle trips (two-way) per day generated by the CSP Plant. These volumes are far too small to cause any significant noise impact.

4. Enhancement/Mitigation Measures and Complementary Initiatives

4.1. Heritage and Archaeological Impact
Archaeological Sites: The sites needs to be documented through a surface collection and test excavation to determine the extent of the site. This will include mapping of the lithic distribution as well as analysis of the lithic assemblage.

4.2. Visual and Aesthetic Landscape Impact

The proposed measures for the mitigation of the impact on the viewing areas from the R356 and Humansrus Farm views during the construction and operational phases of the proposed project are summarized as follow:

Site Development: The minimum amount of existing vegetation and topsoil should be removed. Ensure, wherever possible, all existing vegetation is retained and incorporated into the site rehabilitation. Good ‘housekeeping’ (keeping the site tidy and neat) is essential throughout all phases of the project.

Earthworks: Dust suppression techniques should be in place at all times especially during the construction phase. Only the footprint and a small ‘construction buffer zone’ around the proposed activities should be exposed. In all other areas, the existing vegetation should be retained and access prohibited during the construction phase. The final topography should be graded to merge and blend with the existing topography and to yield optimum use and value of the area in the future. The heliostat terrace is to be created at the lowest level possible to take advantage of the surrounding topography that can act as an effect visual screen (especially to views from the south and west of the site).

Rehabilitation: An ecological approach to rehabilitation measures, as opposed a horticultural approach to rehabilitation should be adopted wherever possible. For example, communities of indigenous, preferable endemic, plants enhance bio-diversity and blend well with existing vegetation. This ecological approach costs significantly less to maintain than conventional landscaping methods and is more sustainable in the long term. A registered landscape architect (SACLAP) should be consulted for this purpose.

Access Roads: During construction and operational phases, access roads will require an effective dust suppression management programme, such as regular wetting and / or the use of nonpolluting chemicals that will retain moisture in the road surface.

Lighting: Light pollution should be seriously and carefully considered and kept to a minimum wherever possible as light at night travels great distances. Security and flood lighting should only be used where absolutely necessary and carefully directed i.e. away from nearby residences and communities. Wherever possible, lights should be directed downwards so as to avoid illuminating the sky. The negative impact of night lighting, glare and spotlight effects, can be mitigated using the following methods: Install light fixtures that provide precisely directed illumination to reduce light “spillage” beyond the immediate surrounds of the CSP site. Avoid high pole top security lighting along the periphery of the site and use only lights that are activated on movement at illegal entry to the site. Use security lighting at the periphery of the site that is activated by movement and are not permanently kept on.

Visual Intrusion: The tower should remain as a concrete finish and no advertising should be allowed on it.

Visual Buffer: It is proposed that a physical visual buffer be constructed along the northern edge of project property boundary between the road reserve and the heliostat field. The buffer would form an effective screen to foreground views of the site and block from view, the heliostat field from this low perspective.

4.3. Impacts on Avifauna Species and Habitats

4.3.1. Construction
The mitigation of the loss of habitat and the disturbance caused as a result of the construction activities can be achieved in a very moderate fashion by ensuring that the construction Environmental Management Plan incorporates guidelines as to how best to minimize this impact. Due to the Medium impact significance rating of these impacts prior to mitigation it is not envisaged that the significance of the impact would drop as a result of the mitigation proposed.

4.3.2. Operation

The following mitigation measures are proposed for the assessed impacts associated with the operation of the plant and infrastructure:

 Collision of birds with heliostats is likely to be of medium 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 medium 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.

 Collision of birds with overhead power lines is likely to be of medium significance. This will be mitigated by marking the relevant sections of line with appropriate marking devices.

 Electrocution of birds is likely to be of medium significance. Any overhead power lines which are built within the site, and which are 132kV or lower, should use a “bird friendly” monopole structure, fitted with a bird perch, as per Eskom standard guidelines.

4.4. Impacts on Fauna and Flora (Biodiversity)

As described in the ESMP, a search and rescue operation will be conducted in all affected areas to remove animals from old termite mounds prior to the commencement of construction activities (vegetation clearing and ground levelling). Reptiles and small mammals that utilize these micro-habitats will be captured and released by qualified experts in suitable nearby areas.

Other mitigation measures include the following: all areas of the drainage line and floodplain habitat types to be excluded from the proposed development; exclusion of as much of the Closed Shrubveld habitat type from the proposed development as is technically feasible; demarcate a 30m buffer in order to provide some protection of sensitive areas against peripheral impacts, wetland related habitat types in particular; equally, all areas ascribed with high ecological sensitivity will be buffered against potential impacts. All individuals/stands of protected trees will be clearly and visibly marked prior to the start of construction or maintenance procedures. Any tree removals will adhere to the requirements of the National Forest Act in mitigating the impact of their removal.

The company has developed and will implement a robust, and long-term Biodiversity Monitoring Plan and evaluation program, to be integrated into the integrated environmental and social management (ESMS) system. Furthermore, a jackal fence (fence which is extended into the soil) will be erected around the evaporation ponds, sewage treatment plant, waste areas and the construction worker accommodation sites, to prevent the movement of nocturnal burrowing species into these areas where they may be injured, drowned or ingest hazardous substances. Fences will be designed in such a way as to create wildlife corridors or other measures to help ensure connectivity between the riparian habitats and ridges on the site, or connections between existing meta-populations.
The contractor shall select an area a suitable distance from any sensitive environmental feature as a construction camp, under the guidance of the ECO, and the use of branches of trees and shrubs for fire making purposes will be strictly prohibited.

Rehabilitation of disturbed areas: An ecological approach to rehabilitation measures will be adopted wherever possible. For example, communities of indigenous, preferably endemic, plants enhance biodiversity and blend well with existing vegetation. This ecological approach costs significantly less to maintain than conventional landscaping methods and is more sustainable in the long term. A registered landscape architect will be contracted for the purpose of rehabilitation.

4.5. Waste Impact

The design criteria considered for the concept design and positioning of the evaporation pond for the CSP plant allows for the effective mitigation of the impacts related to the waste generation activities and the ponds will be lined with a triple liner and double drainage system as required by the Department of Water Affairs (DWA). A design safety factor of 15% was used for the sizing of the evaporation ponds, with a calculated annual rainfall for the area estimated at 400 mm/annum. The evaporation ponds will fall outside the 1:50 year flood line positions of the non-perennial lines on site. As mentioned, the CSP will operate as a zero discharge site and waste water and liquid effluent will be contained in lined evaporation ponds. There will be no discharge to watercourses.

4.6. Surface Hydrology Impact

Mitigation measures for ensuring efficient use of water include alternative designs for reducing consumption of water. These have already been considered in terms of the cooling processes adopted for CSP operation. During construction, vehicular traffic on the construction site should be kept to well-defined roads or delimited zones as far as possible. Proper road drainage procedures need to be put in place and maintained to convey any surface water off the roads and into undisturbed areas. Permanent or temporary re-alignments of water courses are not envisaged by the current design of the CSP. Water for the construction and operation of the proposed project will be sourced from Sedibeng Water via the existing Vaal-Gamaaga Water Supply Scheme. All necessary water applications have been made to the Department of Water and Sanitation as per the EA requirements and water use license has been obtained.

4.7. Wetland Impact

Mitigation measures for safeguarding impacts on wetlands should be implemented and include, but are not limited to, the following measures: Major vegetation clearing activities and earthworks should be undertaken during the dry season as far as practically possible; Storm water infrastructure should include sediment traps; Storage areas for diesel, oil and other polluting substances must have adequate spillage containment measures to contain any spills within the direct area of the spill; he evaporation dam should be lined with a suitable plastic liner (or series of liners) to ensure no seepage or leakage of water out of the dam occurs. The dam should be of sufficient capacity to ensure that no overflow of the dam will occur up to and including the 1:100 year storm event. The dam should be regularly inspected and cleaned to ensure that capacity is not decreased due to sedimentation. All sediments/brine cleaned from the dam should be disposed of in a registered hazardous waste facility. No discharge of any treated or untreated water may take place on site unless authorized by the DWA.

4.8. Socio-economic Impact
The project will create employment opportunities for the local population; this will be fully managed by the Sponsors’ HR team in consultation with local authorities to ensure transparency and impartiality in the recruitment process.

Consideration should be given to the provision of housing to the workers, accommodation will be both in form of a workers camp as well as use of existing structures within the neighboring communities. Information regarding the project and the potential requirements with respect to water and electricity will also need to be provided to the local municipality and other authorities to allow for adequate planning and timely provision of services.

A Stakeholder Engagement Plan (SEP) will be developed to ensure that communication with the affected communities and interested parties is purposefully planned with clear objectives and expected outcomes.

An HIV-AIDS awareness and prevention program for all construction contractors, sub-contractors and staff consistent with national guidelines and/or “IFC’s Good Practice Note: HIV-AIDS in the Workplace” will be developed and implemented. This should also form part of the induction process and the Human Resources Manual.

A community grievance mechanism and worker grievance mechanism for all employees and contractors has been developed and will be implemented throughout the project cycle.

4.9. Air Quality

During the construction phase the following measures should be applied: Water may be combined with a surfactant as wetting agent. Dust and mud should be controlled at vehicle exit and entry points to prevent the dispersion of dust and mud beyond the site boundary. All stockpiles should be maintained for as short a time as possible and should be enclosed by wind breaking enclosures of similar height to the stockpile. During the operational phase the following mitigation measures should be applied: vegetation levels below the heliostats is maintained to ensure no exposed surfaces are present for the liberation of dust from within and surrounding the site. Larger trees should also be planted surrounding the site to act as wind breaks and reduce the wind speeds within the plant area.

4.10. Noise Impact

The noise mitigation measures to be considered during the construction phase include; Use of low-noise generation construction machinery, curtailing the uses of reverse-warning signals on site vehicles in certain areas and at certain times, truck traffic should be routed away from noise sensitive areas, etc. During operation, the design of all major plant for the plant is to incorporate all the necessary acoustic design aspects required in order that the overall generated noise level from the new installation does not exceed a maximum equivalent continuous day/night rating level (LRdn), namely a noise level of 70dBA (just inside the property projection plane, namely the property boundary of the CSP Plant) as specified for industrial districts in SANS 10103. After the implementation of the proposed mitigation measures the noise impact of the proposed CSP plant will not be extensive.

5. Environmental and Social Monitoring Program

5.1. Monitoring and Reporting

The Project Company will develop and implement a Monitoring and Measurement Plan that must include, but not be limited to:

**Waste Management Practices:** This management plan will set out the proposed monitoring plan for all waste streams generated during operations. Records held will include:
- Tonnage generated;
- Tonnage disposed of;
- Tonnage treated or reclaimed;
- Waybill from licensed landfill site; and
- Waybill from licensed hazardous waste handler/treatment or disposal facility.

**Water Management**

**Surface Water**: Surface water monitoring will be performed in accordance with the specifications as determined and agreed upon by the CA and ECO.

**Groundwater**: Water quality monitoring program for the WWTW and evaporation ponds should include the following: Timeframes for monitoring of the discharge water; Parameters to be monitored; and Receiving water quality requirements as approved by DWS. All hydrogeological monitoring data will be evaluated bi-annually by a qualified hydro-geologist and the report generated submitted as part of the annual WWTW audit.

**Fauna & Flora Management**: The Project Company will implement an environmental monitoring program, the aim of which should be ensuring long-term success of rehabilitation and prevention of environmental degradation. Environmental monitoring must be conducted at least twice per year (summer, winter) by a duly qualified ecologist.

**Avifaunal monitoring**: The aim of this Monitoring Protocol will be to determine displacement and document any changes in avifaunal behaviour around the Project Site, but will also include a methodical carcass search program to detect carcasses between heliostats and in the vicinity of the Project’s tower.

Post-construction monitoring will consist of a) habitat classification, b) quantifying bird numbers and movements (replicating baseline data collection), and c) quantifying bird mortalities. The duration and scope of post-construction monitoring will be informed by the outcomes of the previous year’s monitoring, and will be reviewed annually.

Post-construction monitoring of bird abundance and movements and fatality surveys will span a minimum of two years, but it may be necessary to increase parts of this depending on the risks related to the particular site and species involved.

5.2. **Internal Audits**

Internal auditing will be conducted annually by the Project Company. Official audit reports must be compiled by the relevant auditor and the findings of these audits must be available to the external auditor and the authorities, where applicable. Non-conformances raised during audits must be addressed and closed-out to ensure further compliance. All records and audit reports for the Project during operations must adhere to the conditions defined in the EA, WML, WUL and all other relevant environmental consents as provided for under the Project Site Documentation.

5.3. **External Audits**

The Project Company will appoint an independent external auditor to audit the site annually and this auditor must compile an audit report documenting the findings of the audit. Findings raised in audits must be addressed and corrective actions included for auditing in quarterly compliance audits. The external audit report must be submitted by the license holder to the CA on an annual basis, and within 30 days from the date on which the external auditor finalized the audit.
6. Consultations

The Public Participation process for the project was conducted in accordance with Chapter 6 of the EIA Regulations. The outcomes of the Public Participation Process are contained in the Issues and Response Report (IRR) of the Project ESA documentation.

During the EIAR Phase comments and issues raised by key stakeholders, identified during the preceding Scoping Phase, were addressed in the EIAR, kept informed of the process and were requested to give inputs on the Draft EIAR. These stakeholders included:

- National and Provincial Government Representatives:
  - Department of Environmental Affairs (DEA);
  - Department of Water Affairs (DWA);
  - Department of Agriculture, Forestry and Fisheries (DAFF);
  - South African Heritage Resources Agency (SAHRA); and
  - Relevant Northern Cape Provincial Authorities (e.g. Environment & Conservation, Agriculture).
- Relevant Local and District Municipalities:
  - ZF Mgcawu District Municipality;
  - Tsantsabane Local Municipality; and
  - Kgetelopele Local Municipality.
- Parastatals – Eskom, Civil Aviation Authority;
- Affected and surrounding landowners;
- Environmental Non-Governmental Organizations (e.g. Wildlife Society of South Africa, BirdLifeSA);
- Community based organizations; and
- Other (i.e. Sedibeng Water, Air Traffic and Navigation Systems, Lime Acres Mine)

All I&AP information, together with dates and details of consultations and a record of all issues raised is recorded within a comprehensive project database. This database will be updated on an on-going basis throughout the project, and will act as a record of the communication/public consultation process.

The Draft Environmental Impact Assessment Report was available for public review at the following locations in close proximity to the study area, which were identified as readily accessible to I&APs:

- Tsantsabane Local Municipal offices;
- Postmasburg Public Library – Bo Street, Postmasburg;
- Kgetelopele Local Municipal offices;
- Daniëlskuil Public Library – 222 Barker Street, Daniëlskuil;
- Mobile Public Library in Groenwater;

In summary, no project or environmental related concerns have been raised by registered I&AP’s nor have any objections been received in this regard. Additionally, the project has been received very well by all relevant commenting authorities and no objections or opposition has been received.

The Project has reneged with the I&APs since May 2018 and will continue consultations throughout the Project cycle. Consultations will be guided by the Projects Stakeholder Engagement Plan (SEP).

7. Responsibilities and Institutional Arrangements

7.1. Project Company & Project Manager (PM)
The Project Company will appoint a PM, who will be responsible for overall management of the Project, overseeing all tasks proposed during construction and operations & maintenance. The Project Company will notify the Competent Authority (CA), of the appointment of the Environmental Control Officer (ECO) and the start date proposed for the commencement of construction activities. This task will be undertaken by the Project Manager. Tasks that are allocated to the PM will include but is not limited to; Ensuring the contractors are aware of the conditions in the EA and the EMPr; Ensuring that the prospective Contractors adequately provide for the provisions of the EMPr; Appointing an independent suitable qualified ECO to objectively monitor implementation of relevant environmental legislation and requirements of the EMPr for the project; Support and provide mandate to enable the ECO and Contractor Environmental Representative (CER) to perform their responsibilities; Ensuring that the ECO is integrated as part of the project team and as access to the project site; Establishing and maintaining proactive communications with the Contractor and ECO; Undertaking periodic site visits and inspections to ensure that the environmental requirements are implemented, etc.

7.2. Environmental Manager (EM)

In addition to the ECO, the Project Company will appoint its own Environmental Manager (EM). The EM will be the primary person responsible for overseeing the monitoring and implementation EMPr provisions and all conditions contained within the Site Documentation. The EM will report directly to the PM and will oversee the permitting process during the construction and operation & maintenance phases, ultimately ensuring that the respective Contractors’ are in the possession of the necessary authorisations/permits/licenses as required throughout the Construction and Operational phases of the Project. This action will be guided by the stipulations in the Engineering, Procurement and Construction (EPC) and Operation & Maintenance (O&M) contracts. He will be responsible for full compliance of the conditions in the permits, EMPr and the EA.

7.3. Environmental Control Officer (ECO)

The EA states that Project Company will appoint an independent Environmental Control Officer (ECO) with relevant and appropriate experience or expertise for the construction phase of the development prior to the commencement of the construction phase. The ECO will be responsible to ensure that the conditions referred to in the EA, all other relevant environmental consents and the Site Documentation, are implemented to ensure compliance with the provision of this EMPr. The ECO will operate independently to objectively monitor the implementation of the conditions and stipulations contained within the Site Documentation.

It is the responsibility of the ECO to monitor the degree of compliance to environmental legislation and the conditions stipulated in the Site Documentation. A daily site diary will be kept (Condition and compliance inspections will take place at regularly scheduled intervals.

The ECO will keep records of all activities on site, problems identified and transgressions. He/she will be responsible to maintain a detailed incident and complaint register on site along with a method statement on how these items are to be addressed and/or list mitigation measures that will remedy the issue.

The ECO will keep and maintain a daily site diary and will be responsible for ensuring all Site Documentation is up to date and relevant. The ECO will be the custodian of all Site Documentation and will be responsible for the submission of all monitoring reports to the relevant CA’s. The ECO will be responsible for keeping copies of all reports submitted to the Department as well as relevant communications, the scheduling of activities and the monitoring of such activities.
The ECO has the authority to stop works if in his/her opinion the operation imposes a serious threat to the environment or if an incident has occurred due to neglect or disregard. Any non-compliance recorded in terms of the conditions and stipulations of the Site Documentation, constitutes as a breach of Contract allowing the ECO to suspend part or all of the works, as required.

The ECO will be the official liaison between the CA and the Project Company, and must handle all sensitive information originating from whistle blowers and incidents and report these to the regulating authorities.

### 7.4. Waste Management Control Officer (WMCO)

The Project Company will designate a Waste Management Control Officer (WMCO), who will monitor and ensure compliance and correct implementation of all conditions and provisions as stipulated in Conditions 7 of the EA and the EMP related to waste management activities associated with the Project and its supplementary infrastructure.

The WMCO will report any and all non-compliance with any conditions pertained in the Site Documentation and related environmental consent requirements or provisions of the NEM: WA to the DEA via reasonable means and to the ECO.

The WMCO will be responsible for the implementation of method statements which identify and implement measures in respect of waste minimization, including the reduction, recovery, re-use and recycling of waste. The WMCO will take all reasonable steps to ensure compliance by the Project Company with the license conditions and requirements and the provisions of the NEM: WA.

### 7.5. Site Engineer (SE)

The SE is a registered professional engineer appointed by the Project Company, as the site representative. The SE has the authority to issue instructions and oversees the operations of the EPC Contractor. Upon request from the EM/ECO the SE has the mandate whereby, in emergency circumstances, he may override the instructions of the Contractor. The SE is responsible for overseeing site works, issuing site instructions and variation orders to the Contractors, following request by the CER or ECO. The SE may act as the liaison with the Contractor and ECO on behalf of the PM. The scope of involvement for the SE will cease at the end of the rehabilitation period, post construction of the Project.

### 7.6. Contractor’s Environmental Representative (CER)

The CER is employed by the EPC Contractor to ensure that the EPC Contractor complies with the environmental standards, specifications, as well as the conditions and stipulations contained within the Site Documentation. The CER is available on site at all times and has the experience and/or knowledge to deal with environmental issues. It is furthermore the responsibility of the CER to communicate the contents of the Site Documentation to all staff working for and / behalf of the Contractor.

The person appointed as CER will have to be knowledgeable in the concepts of integrated environmental and waste management, have a sound background on environmental and waste management legislation and be suitably qualified / experienced. The CER needs to ensure that all personnel working for and/or on behalf of the EPC Contractor and the O&M Contractor understands the concept of integrated environmental and waste management and the various issues specific to the site they are working on. The CER has the prerogative to issue non-conformances to the Contractors, hazard and risk certificates and fines if deemed suitable. A CER will be on site during both the construction and operational phases. The CER will be responsible for the life of Project for the following tasks: Understanding the EMP and all its specifications and implications; Ensuring that all aspects and specifications of the EMP and approved Method Statements
are implemented by the Contractors and their representatives; Reviewing and commenting on environmental compliance assessments and reports; Recording and informing the PM and ECO of incidents or problems while implementing the EMPr as well as recommending ways of resolving these incidents or problems; Reporting and recording all accidents and incidents in the absence of the ECO; Recording all public complaints received and immediately informs the D/P and ECO of these. Ensuring that proper records are kept of all compliance status/feedback reports, incident reports and complaints register and that these documents are available for auditing by the PM, Authorities or ECO upon request. Communicating the content of the ECO reports and any advice received from the ECO (verbally / in writing) to Contractor and Subcontractors employees. Designating the working areas and ensuring that these are managed (including sensitive environments) as per the approved construction site layout plan.

8. Estimated Cost

The budget presented below is a tentative budget based on rough estimates. Most of the ESMP budget will be borne by the EPC Contractor. A more detailed budget will be provided in the EPC Construction ESMP prior to commencement of clearing and works.

Table 8.1. ESMP estimated cost

<table>
<thead>
<tr>
<th>PROJECT PHASE</th>
<th>PROPOSED MANAGEMENT MEASURES</th>
<th>ESTIMATED BUDGET (TENTATIVE) ZAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONSTRUCTION</td>
<td>Biodiversity Management</td>
<td>625,000.00</td>
</tr>
<tr>
<td></td>
<td>Water Management</td>
<td>625,000.00</td>
</tr>
<tr>
<td></td>
<td>Heritage Management</td>
<td>625,000.00</td>
</tr>
<tr>
<td></td>
<td>Socio-economic Management</td>
<td>625,000.00</td>
</tr>
<tr>
<td></td>
<td>Construction Camp Structures &amp; Facilities</td>
<td>5,500,000.00</td>
</tr>
<tr>
<td></td>
<td>Impact from Earthworks during site clearance</td>
<td>5,500,000.00</td>
</tr>
<tr>
<td></td>
<td>Impact from dedicated area</td>
<td>5,500,000.00</td>
</tr>
<tr>
<td></td>
<td>Impact from handling and storage of dangerous goods</td>
<td>5,500,000.00</td>
</tr>
<tr>
<td></td>
<td>Impact from waste produced on site</td>
<td>5,500,000.00</td>
</tr>
<tr>
<td></td>
<td>Destruction of biodiversity through site clearance</td>
<td>5,500,000.00</td>
</tr>
<tr>
<td></td>
<td>Destruction of heritage sites</td>
<td>5,500,000.00</td>
</tr>
<tr>
<td></td>
<td>Destruction of water resources</td>
<td>5,500,000.00</td>
</tr>
<tr>
<td></td>
<td>Disturbance of soil and erosion</td>
<td>5,500,000.00</td>
</tr>
<tr>
<td></td>
<td>Pollution Management</td>
<td>5,500,000.00</td>
</tr>
<tr>
<td></td>
<td>Impact on air quality</td>
<td>5,500,000.00</td>
</tr>
<tr>
<td></td>
<td>Social &amp; Socio-Economic Management</td>
<td>5,500,000.00</td>
</tr>
<tr>
<td>OPERATION</td>
<td>Waste Management</td>
<td>1,000,000.00</td>
</tr>
<tr>
<td></td>
<td>Water Management</td>
<td>500,000.00</td>
</tr>
<tr>
<td></td>
<td>Fauna and Flora Management</td>
<td>500,000.00</td>
</tr>
<tr>
<td></td>
<td>Avifauna Management</td>
<td>1,000,000.00</td>
</tr>
<tr>
<td>DECOMMISSIONING</td>
<td>Biodiversity Management</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Pollution of the air quality</td>
<td>-</td>
</tr>
</tbody>
</table>
9. Implementation Schedule and Reporting

9.1. Implementation

The construction period is 30 months post financial close. The minimum design life of the plant is 30 years. The term of the PPA is 20 years, including the two year construction period. An ESMP implementation schedule has been developed (see Annex 1) taking into account all activities related to the proposed mitigation measures, the monitoring program, consultations, complementary initiatives and institutional arrangements in co-ordination with the overall project implementation plan.

9.2. Reporting

The Project Company will keep copies of all records relating to monitoring and auditing on site and have it available for inspection at any time to any relevant authority. All documentation e.g. audit/monitoring/compliance reports and notifications, required to be submitted to the DEA in terms of the EA will be submitted to the Director: Compliance Monitoring at the DEA as per the agreed upon schedule with the CA. The ECO will be responsible for the compilation of a monthly report pertaining to all environmental matters on site and the relevant authorizations pertained in the Site Documentation.

The Project Company must within 14 days inform the DEA and DWS of the occurrence of any incident or detection of an incident as per Condition 17.4 of the EA, and issue a Remedial Plan of Action along with the notification in accordance with the conditions pertained in the EA. A record of all incidents must be kept during the construction and operational phases of the Project, and must be available for both internal and external audits.

The Project Company must submit an Environmental Audit report to the DEA within 30 days after the completion of the construction phase and within 30 days of completion of the rehabilitation activities. The environmental audit report needs to address all components listed in the EA and WML.

Liability rests with the EPC Contractor - for non-compliance with the ESMP and EA. A penalties schedule will be developed prior to construction, by the CER in conjunction with the Project Company and be implemented in the instance of any non-compliance by any Contractor working on the Project Site. This will ensure that the Project Company has a means to manage their risk in respect of non-compliance by these Contractors.

In accordance with the ISS, quarterly monitoring reports will be submitted to the AfDB for review and approval. The AfDB environmental & social safeguards specialists will also be undertaking periodic monitoring visits to monitor compliance against the project ESMP as well as offer additional support on matters of environmental and social risk management.

10. Conclusion

The mitigation measures identified in this EMPr will be strictly adhered to by any and all parties working for and on behalf of the Project Company. Guidelines with respect to environmental monitoring throughout the construction and operational phases of the Project will be implemented in order to minimise the environmental impacts associated with the Project.
The EMPr will facilitate appropriate environmental input during construction activities as well as the future operational activities associated with the Project. The management measures defined in the EMPr will aim to promote positive environmental consequences and reduce adverse environmental impacts of the Project.

This EMPr is a dynamic document which will be updated and revised as required. Amendments made to this document must be submitted to the Department for acceptance prior to implementation, and an application for amendment as per the relevant EIA Regulations submitted, where relevant. This EMPr will be included in all contract documentation associated with the Project. The content of this EMPr is relevant and binding on the activities associated with the pre-construction, construction and operation & maintenance of the Project.

An Environmental and Social Action Plan (ESAP) has been prepared which includes specific E&S action items to be addressed in order to be fully compliant with the AfDB ISS. The ESAP will be part of the project loan agreement, the Common Terms Agreement (CTA).

11. References and Contacts

11.1. References

- IFC Environmental and Social Review Summary, 25 August 2015. URL: https://disclosures.ifc.org/#/projectDetail/ESRS/34050

11.2. Contacts

- Jing LI, Principal Investment Officer, email: j.li@afdb.org
- Erika AUER, Social Development Specialist, email: e.auer@afdb.org
- Yusef HATIRA, Environmental Specialist, email: y.hatira@afdb.org