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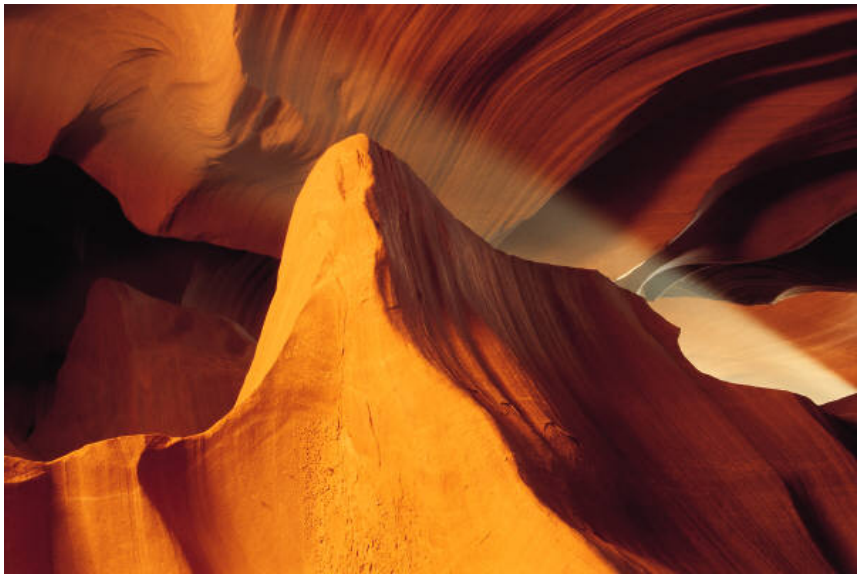
# NOORo III Tower CSP Plant,

# Ouarzazate, Morocco

## Non-Technical Summary



ACWA Power

March 2015

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## Document Information

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|---|---|
| **Project** | NOORo III CSP |
| **Project Number** | 1305/001/010 |
| **Report Title** | Non-Technical Summary |
| **Client** | ACWA Power |
| **Project Manager** | Zeina Jokadar |
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## Document Control

| Rev | Issue Date | Description | Author | Reviewed | Approved |
|---|---|---|---|---|---|
| 1 | 06/09/2014 | For pre-bid submission | ZMJ CPM | KRW | |
| 2 | 19/12/2014 | Review following IFI's comments | ZMJ | CPM | |
| 3 | 31/12/2014 | Review following IFI's comments | ZMJ | CPM | |
| 4 | 27/03/2015 | Final | ZMJ CPM | CPM | KRW |

# List of Abbreviations

| Abbreviation | Meaning |
|---|---|
| ACWA Power | Arabian Company for Water and Power |
| AP | ActionPlan |
| BAT | Best Available Techniques |
| BOO | Build, Own and Operate |
| CESMP | Construction Environmental and Social Management Plan |
| CEMS | Continuous Emission Monitoring System |
| CNEIE | Committee National de EIE |
| CSP | Concentrated Solar Power |
| dB(A) | A-weighted decibels |
| EHS | Environmental, Health and Safety |
| ESMP | Environmental Management Plan |
| EMS | Environmental Management System |
| EPC | Engineering, Procurement and Construction |
| EPFI | Equator Principle Financial Institutions |
| FESIA | Framework Environmental and Social Impact Assessment |
| ha | Hectares |
| $hm^3$ | Cubic Hectometres |
| IFC | International Finance Corporation |
| MASEN | Moroccan Agency for Solar Energy |
| MEMEE | Moroccan Ministry of Energy, Mines, Water and Environment |
| NOx | Nitrogen Oxide |
| $NO_2$ | Nitrogen Dioxide |
| OESMP | Operational Environmental Management Plan |
| O&M | Operation and Maintenance |
| PAH | Polycyclic Aromatic Hydrocarbons |
| $PM_{10}$ / $PM_{2.5}$ | Particulate matter with an aerodynamic diameter of less than 10 / 2.5 micrometers. |
| PPE | Personal Protective Equipment |
| SESIA | Specific Environmental and Social Impact Assessment |
| SPC | Solar Power Complex |
| $SO_2$ | Sulphur Dioxide |
| SPC | Solar Power Complex |
| CSP | Concentrated Solar Power |
| TSS | Thermal Storage System |

| Abbreviation | Meaning |
|---|---|
| VOC | Volatile Organic Compounds |
| WWTP | Wastewater Treatment Plant |
| 5 Capitals | 5 Capitals Environment and Management Consultancy |

REPORT STRUCTURE

In order to comply with the requirements for environmental assessment and international best practice, this report is presented in the following format:

Volume 1: Non-Technical Summary and Main Text

Volume 2: Technical Appendices

Volume 3: Environmental and Social Management Plan

Volume 1 comprises the Non-Technical Summary and main text of the report with the issues identified that the NOORo 2 CSP may impact upon (following the framework assessment) each following a similar general structure:

- Introduction and Project Background;
- Legal Framework, Standards and Guidelines;
- Methodology;
- Baseline Information;
- SESIA Assessment Method;
- Assessment of Effects/Impacts, Mitigation Measures, and Residual Effects During Construction Phase;
- Assessment of Effects/Impacts, Mitigation Measures, and Residual Effects During Operational Phase; and
- Assessment of Effects/Impacts, Mitigation Measures, and Residual Effects During De-Commissioning Phases, where relevant.

Volume 2 comprises all Technical Appendices (consultation meeting, baseline survey reports, monitoring reports and other Technical Studies).

Volume 3: provides the framework for the development of the Construction Environmental Social Management Plan (CESMP) by the main contractor and all sub-contractor; and the Operational Environmental and Social Management Plan (OESMP) to be developed by the project proponent and implemented by the Operation and Management (O&M) team.

**NON TECHNICAL SUMMARY**

The Moroccan Agency for Solar Energy (MASEN) is planning to construct a 500MW Solar Power Complex in Ouarzazate, to meet the national renewable energy policy objectives. The consortium, lead by ACWA Power has been awarded the EPC for the third phase of the Solar power Complex, which will produce 150MW using Tower Concentrated Solar Power (CSP) technology.

MASEN prepared a Framework Environmental and Social Impact Assessment (FESIA) for the 500MW Solar Power Complex. '5 Capitals Environmental and Management Consulting' (5 Capitals) has been commissioned by ACWA Power to undertake the Specific Environmental and Social Impact Assessment (SESIA) for the proposed NOORo III Tower CSP (NOORo III tower CSP Plant, 'the Project'), in Ouarzazate, Morocco. . A Specific Environmental and Social Impact Assessment was prepared for NOORo 1 prior to the start of construction, and another SESIA is being prepared for NOORo 2.

The project is situated in a greenfield of the Ghessat Ogrour Toundout rural commune area commonly known as "Tamzaghten Izerki" along the national highway connecting Ouarzazate and Errachidia. The proposed site is approximately 10Km north east of the city of Ouarzazate and 4Km north of National Road N10. The specific plot for NOORo III is located at the northern extent of the total SPC site, north of the NOORo 1 plant that is under construction and north of the plot for NOORo 2, which will be constructed at the same time as NOORo III. The site for NOORo III has a total area of 598ha. The electricity generated will be supplied to the Ouarzazate 225/60 KV station located near the complex.

The proposed project site is located on a sparsely vegetated and flat rocky plateau, which is crossed north to south by Chaabas. Prior to construction of Phase 1 of the Solar Power Complex, the plateau was used by nomads for crossing and while crossing for cattle grazing, even though the grazing quality was low due to the sparse vegetation.

It is understood that construction is expected to last approximately 30 months, from the Notice to Proceed, followed by 1 year of optimization and demonstrating performance guarantees to reach Final Commercial Operation.

The SESIA has been prepared in accordance with Law No. 11-03 for the Protection and Improvement of the Environment and Law No. 12-03 for the Environmental Study Impact Process of Morocco.

Equally, the environmental and social requirements of the IFIs have been taken into consideration for the preparation of this SESIA.

Under Moroccan and international guidelines for environmental impact assessments, the evaluation of various project design and activity alternatives were considered, in order to ensure that the objectives of the proposed project have accounted for social, ecological, economic and technological options.

The following project alternatives were considered:

No Project

The "No Project" option is not a viable alternative, as the objective of the renewable energy law is to diversify the sources and production measures of power for the Kingdom of Morocco.

Alternative solar power production technologies

The Framework Environmental and Social Impact Assessment (FESIA) that was carried out in January 2011, identified and assessed four technologies for solar power production in relation to ecological and social settings of the proposed site. The alternative technologies considered included: Photovoltaic without tracking devices, photovoltaic with tracking devices, solar power tower with solar farm, and parabolic trough solar field.

The solar power tower with solar farm was identified as the preferred choice, as power could still be generated during lower solar irradiance without the use of boilers, and the power reserve in low solar irradiance periods is greater than with other solar farm technologies.

Alternative project location and layout

The location of the NOORo 2 CSP is restricted at the southern and northern boundaries by the under construction NOORo 1 and proposed future NOORo III tower CSP, respectively. Furthermore, the eastern boundary of the site abuts the newly built access road, and any possible shift to the west is prevented by the presence of the Chaabas and canyon.

The environmental assessment has considered all environmental Issues relating to the commissioning, construction, and operation works associated with the Project, which include:

- Soil contamination
- Water and Wastewater Management
- Air quality
- Noise and vibration
- Solid and hazardous Materials,
- Stormwater management,
- Ecology and Biodiversity
- Traffic and transportation,
- Socio economic,
- Cultural heritage and archaeology, and
- Landscape and Visual Impact.

In response to the assessment of each of these environmental disciplines, a range of specific mitigation measures have been set out to prevent, reduce or remediate the potential impacts identified as a result of both construction and operational phases of the Project.

It should be noted that the decommissioning phase of the project has only been discussed in general terms, since the NOORo III tower CSP Plant is contracted under a 25 year BOOT scheme (Build-Own-Operate-Transfer). Therefore, the ownership of the SCP will be handed over to MASEN at the end of the 25 year period and consequently the responsibilities for the decommissioning of the plant will fall under the responsibility of MASEN. However, mitigation measures to address significant issues during decommissioning (such as waste management, hazardous waste management, and prevention of associated secondary impacts such as soil contamination) are included in the SESIA and will be developed in more detail in the decommissioning plan to be drafted prior to the start of the decommissioning activities.

The cumulative effects of all phases of the SCP and other any identified neighbouring commercial and industrial facilities have been included in the assessment of impacts, in addition to the potential residual impacts following the implementation of the recommended mitigation measures. Air quality and noise modelling was undertaken to assess the extent and pattern of dispersion of these pollutant/nuisances in relation to the closest sensitive receptors within and off the proposed project site.

**Soil Contamination**

Soil will be susceptible to contamination from various sources during the construction and operational phases of the project. The main sources of contamination are typically those places along the handling and processing of products where liquid waste and hazardous material can escape into the soil. These are commonly associated with the transport, handling and storage of such materials and the potential threat of releases and spills into the ground. These include, for example, fuel spills, industrial wastewater and sanitary wastewater spills, oils and lubricants leaks or washed-off by rainwater.

Considering that the site is a greenfield and no commercial or industrial activities are located in close proximity to the site. Due to the previous land uses onsite (passage on foot and pastoral activities) there is no reason to believe that hydrocarbon contamination of soils could be problematic. No evidence of hydrocarbon spills was identified during the different site surveys. Soil sampling and analysis was carried out for heavy metals and the results indicate that the soils onsite are not contaminated. The data obtained will be used for comparative assessment purposes in the event of a spill or leak to verify that remediation was successfully completed and for cumulative assessment purposes over the lifetime operation of the plant.

The results of the sampling campaign showed in general the level of heavy metals from the soils collected on site, were below the Dutch target values and Canadian Indicative Values. One sample collected offsite, from the ravine draining to the Oued on the western side of the site, recorded high levels of Barium. However, given the soils were predominantly clay

and the sample was collected from a rain channel, the high levels are attributable to accumulated absorption in the soils, and not an indication of contamination.

Therefore, based on the analytical information, historical land use and site observations, it can be concluded that the soils on site are not contaminated by heavy metals.

Prevention, control and remediation of any spillages and leaks at the construction phase will be managed in accordance with the mitigation measures identified in the CESMP. These methods and practices are well established and proper training and implementation of the mitigation measures identified in the CESMP will ensure that risks are minimized and any negative impacts are insignificant. The mitigation measures include, but are not limited to, the storage of chemicals, fuels, lubricants and paints on dedicated locations such as paved ground surfaces to prevent leakage into the ground; the storage of hazardous liquid waste and chemicals, such as oils, etc. in contained areas where oil drums have drip collectors to avoid spillage to the ground; and spillage and leakage prevention measures including regular inspection of containers.

**Water and Wastewater Management**

The construction and operation of NOORo III tower CSP will result in water consumption and in the generation of a number of wastewater streams that will require appropriate management techniques to be employed to ensure compliance with international best practice.

The main wastewater contamination risks arising during construction relate to sanitary waste and to contaminated wastewater generated by storm water events washing oil spills from construction vehicles machinery. The quantities of sanitary wastewater can be estimated at approximately 54,556 m3 for 30 months. This wastewater will be generated and stored on-site prior to removal by a licensed contractor. Mitigation measures are outlined to ensure that the handling of sanitary wastewater is done in such a way that pollution events are minimised. To avoid storm water runoff getting contaminated by oil spills, all vehicles onsite shall be adequately maintained and any repairs or maintenance will carried out over impermeable surfaces with the appropriate containment and runoff collection mechanisms.

The proposed source of water for this project is the Mansour Ed Dahbi reservoir. Contributions to the Mansour Ed Dahbi dam average 420 $hm^3$ per year (varies from 68 to 1300 $hm^3$). The rate of filling of the dam has experienced fluctuations over the years ranging from 12% to 40% and over 90% in the last few years (97% on 04/05/2010). The provision reserved for drinking water from the Mansour Ed Dahbi dam is 3.5 to 4 $hm^3$/year against approximately 180 $hm^3$/year for irrigation. Evaporation losses are estimated at about 56 $m^3$/year. In years of drought, the buffered groundwater driven system of the north-eastern regions provides a

reliable base for irrigation and an almost constant inflow of 50 $hm^3$ per year to the reservoir. This assures that even in years of severe drought the reservoir does not dry up.

The water use for NOORo III tower CSP will be 0.2 hm3 over 30 months (0.087 hm3/year) during construction and 0.2 hm3/year during operation. This represents 0.13% and 0.29% respectively of the lowest recorded contribution to the Mansour Ed Dahbi Reservoir, that is 68 hm3.

Freshwater from the Mansour Ed Dahbi Reservoir will be treated onsite to the required quality parameters. The main wastewater sources during operation will be sludge from dissolved air floatation, cycle blow down, concentrate from reverse osmosis, boiler blow down, oily water, and sanitary water. These will be treated according to their characteristics, reused for lower quality uses when possible and otherwise discharged to evaporation ponds. The estimated total wastewater flow to be discharged to the evaporation ponds is 33.4m3/h. As a result of this, there will be no wastewater discharges from the plant during the operation phase.

**Air Quality**

The proposed NOORo III tower CSP Plant will be built in a relatively isolated area. The closest large town, Ouarzazate, is over 12Km from the site and only two roads, RN 10 and RP 1511, currently pass adjacent to the project. Long-term traffic on these roads is limited to light commercial and private transport, with few heavy vehicles being used for small construction projects, such as houses or small/low-rise buildings. Recently, heavy vehicle traffic has increased due to the construction of the NOORo 1 CSP, however, this is considered a short term impact, and the frequency of vehicle use will decrease as the quantities of major equipment and building materials decreases.

No heavy industries are found as far as 75Km upwind from the site, this is due to the topography of the Atlas Mountains range. Equally, further north in the Province of Marrakesh, no heavily polluting industries are found. The main commercial activities in the area are agro-industries (processing of fruit and vegetables, wool, flour), building materials, leather goods production and carpet production.

As a result, point source and non-point source emissions around the proposed project area are insignificant and any impacts to the ambient air quality are considered negligible.

During construction, the ambient air quality at local receptor sites may potentially be affected by increased dust, particularly during the earthworks phase and by gaseous exhaust fumes from construction vehicles, plant and additional vehicle movements to and from the site. At the operational phase impacts to the air will be insignificant, and originating from the boiler when it is operated.

Thanks to the remoteness of the site and absence of neighbouring heavy commercial and industrial developments the background air quality is considered good and well below the National and WHO limits for ambient air quality.

Monitoring was however carried out in order to develop a benchmark for the site. The parameters monitored were $SO_2$, NOx, VOC and $PM_{10}$. These parameters were selected, as they are the typical emissions resulting from construction and operation of the proposed Solar Power Plant. The data obtained will be used for comparative and cumulative assessment purposes during the routine air quality monitoring programme, which is to be implemented at the construction and operational phases in accordance with the procedures established within the CESMP and OESMP.

The results of the monitoring campaign show that the ambient air quality conditions within and adjacent to the NOORo III Solar Power Complex are well within the national ambient air quality guidelines for SO2, NOx, O3 and PM10. According to these parameters, the air quality on the site can be considered good.

Green House Gas (GHG)

Generally, solar power plants by their very nature are low emitters of air pollutants. The objective of the facility is to use renewable and clean fuel to generate power. The clean fuel in this type of operation is solar heat that is magnified by the mirrors, trapped by an oil which is then converted into thermal energy within a boiler to produce steam for a conventional steam turbine. In fact, the solar power plant will have a net positive impact on the regional air quality, as it will prevent approximately one million tonnes of $CO_2$ per year from being emitted, if a conventional fossil fuel power plant had been used (according to the MEMEE estimates). Therefore, the solar plant is helping to offset negative impacts from $CO_2$ emissions and the effects of Global Warming.

The Project will have back up heating to maintain the heat/conversion system when solar heating isn't available, and to keep the salt for storing heat in a liquid state. As such air emissions from the boilers will meet the appropriate WBG EHS Guidelines for thermal power generation. As the boilers will be used primarily for standby heat, they are likely to run less than 500 hours per year, the threshold for the application of the WBG air emission guidelines. The Project will nonetheless monitor the hours of operation and the air emissions of the boiler. These boilers will be the primary source of green house gases (GHG) for the Project.

**Noise and Vibration**

The proposed site is located in an isolated area, with no significant developments or commercial activities located within a 6 Km radius. The only identified source of noise is sporadic in nature and emanates from the two roads, which run parallel to the site. In the

past, traffic was light and consisted of private vehicles and light commercial trucks. However, recently construction activities for NOORo 1 CSP have started and as a result noise levels have increased, however this is considered uncharacteristic of the typical historical noise conditions and is temporary in nature.

Noise impacts during construction will be generated by construction machinery and activities, and the main sensitive receptors will be workers and road users. Due to the impact of topography and distance on noise propagation, the village of Tasselmant is not likely to notice noise impacts.

During operation, continuous noise sources will be located in the 'power island'. Due to the impact of distance attenuation on noise propagation, noise levels at the project boundary are expected to be of little significance. The modelling suggests that this noise can amount to 50dB. Due to the continuous nature of the operations, it is anticipated that the noise impacts are likely to resemble humming noises, combined with sporadic noises from certain processes, mobile equipment and moving vehicles. The noise will not impact any residential dwellings and is unlikely to be noticed by road users.

The proposed site is located in an isolated area, with no significant developments or commercial activities located within a 6 Km radius. The only identified source of noise is sporadic in nature and emanates from the two roads, which run parallel to the site. Consequently, the noise would be anticipated around 35-40dB, with sporadic levels reaching 60dB due to traffic.

In order to develop a benchmark of the onsite noise conditions, a noise monitoring campaign was carried out in the day and night-time in February 2015. The data obtained will be used for comparative and cumulative assessment purposes during the routine noise monitoring programme, which is to be implemented at the construction and operational phases in accordance with the procedures established within the CESMP and OESMP.

The results of the monitoring campaign show that both the day-time and night-time noise levels at the boundaries of the SPC, reflect a quiet, undeveloped area. The levels do not change significantly between night and day and they are below the maximum allowable noise limits for residential areas. The average noise levels along the road reflect typical noise levels that would be generated by light traffic. Additionally, there is no significant change between the night and day readings, and in comparison to the Industrial/Commercial limits, the levels are compliant.

During the construction stage and in accordance with the typical Health and Safety requirements, no employee should be exposed to a noise level greater than 80 dB (A) for duration of more than 8 hours per day without hearing protection. Hearing protection should

be provided for all employees working in close proximity to equipment with noise levels >85 dB(A).

During operation, the EPC contractor will be required to comply with at least a 60 dB(A) standard 1m from the SPC boundary fence line. Modelling has been undertaken and shows that at the site boundary the noise from the power island is reduced to less than 45dB(A). In addition the noise levels at sensitive receptor sites identified in the SESIA, due to the plant operation, will be required to meet WB/IFC standards for industrial and residential receptors respectively. This will be tested by the EPC during the commissioning phase of the project to demonstrate compliance.

In order to achieve the relevant standards, mitigation measures and silencer performance specifications will be required and are described in the SESIA. A programme of on-going monitoring will be carried out at sensitive receptors to ensure compliance with World Bank/IFC noise standards.

**Solid and Hazardous Wastes**

During construction, waste would be generated during earthworks, construction of the fence, paths, road accesses and buildings, and connecting the power systems to the network. The main types of waste generated would be sand, gravel, concrete, asphalt, scrap steel, glass, plastic, wood, packaging materials and municipal waste from construction workers. Construction material is mainly inert and does not pose a threat to human health or the environment. However, proper management is required in order to reduce associated secondary impacts such as resource use, dust emissions, and habitat destruction.

The hazardous fraction of construction waste will represent less than 15% of the total amount of construction waste likely to be generated, its disposal requires careful consideration

During operation, solid wastes will be generated at several facilities within the power block. Some of these will be direct products resulting form the operation and maintenance of the facilities, whilst other wastes will be the by-products of primary waste treatment processes, for example the sludge that results from wastewater treatment.

In addition to solid waste generation from the tower CSP, domestic waste from the administration and canteen facilities will also be generated. With regards to hazardous wastes, these will include:

- Sludge from the various waste water and waste oil treatment processes;
- Heavy metals within the sludge;
- Waste oil, oily sludge, oily rags, chemicals, solvents from general maintenance of on-site plant and machinery;
- Used chemical and fuel drums;

- Used filter mediums;
- Soil contaminated by potential spills and leaks;
- Miscellaneous wastes such as batteries, wire cables, and
- General clean-up materials.

The mitigation measures proposed will help to reduce the impact significance for both construction and operation waste to minor and moderate levels. These mitigation measures refer to both hazardous and non-hazardous wastes, as there is much overlap in the treatment and handling mechanisms for both types of wastes.

All elements of waste mitigation are captured in the Waste Management Plan of the CESMP, OESMP. The mitigation measures will be cross-referenced within the Waste Management Plan and focus predominantly on the appropriate handling, storage, segregation, transport, and disposal of all waste. Such mitigation measures include:

- Segregation and storage;
- Use high quality raw material;
- Reduction of packaging.
- Recycling;
- Regular inspections, audits, and monitoring of waste streams generated;
- Bunding of hazardous wastes and storage in protected areas.
- Collection and transport by licenced handlers.
- Implementation of spillage and leakage prevention measures;
- Mandatory training program for employees to increase awareness of waste management.

These measures are identified as a means to ensure that resources are efficiently utilised and pollution is controlled.

**Stormwater Management**

The characteristic erosion patterns observed at the site are a result of the combined effects of the precipitation, topography, soils types and sparse vegetation cover in the study area. The generated surface run-off and ephemeral streams have resulted with siltation problems in the Mansour Ed Dahbi Reservoir.

The project will change the patterns of storm water runoff and divert the Chaabas that run through the site. This can potentially lead to increased erosion and flooding risk downstream.

The drainage system on site is designed in such a way that the rainfall that falls into the areas where there could be oil contamination would be collected, treated and discharged to the evaporation ponds. The rest of the rainwater falling on the site will be channelled through pipes and concrete ditches to the canyon to the south east of the site.

An erosion protection design shall be implemented to protect against erosion at each discharge point. Re-vegetation will be undertaken on the canyons to further protect the area against erosion and reduce silt contributions to the Mansour Ed Dahbi Reservoir.

**Ecology and Biodiversity**

A detailed three-day ecology site survey was carried out in 2010 for the FESIA, covering the SPC site and nearby areas, to identify different habitat types and species present. Consequently, a follow up Rapid Ecological Assessment of the site was undertaken in May 2014 to verify if any significant changes to the ecological conditions had occurred.

The site is located on a rocky plateau on the border of the South Atlas Mountains. Due to low rainfall in these areas, the vegetation is typically sparse and concentrated along the Oueds and drainage patterns that traverse the plateaus in a north to south direction.

The biological diversity of the fauna and flora is therefore concentrated around these vegetated areas. Few endemic species and no threatened or endangered species were encountered during any of site visits, although the Spiny Tailed Lizard, which is listed as Near Threatened on the IUCN red list, has been historically recorded in these areas.

Generally, the biological diversity of the site was considered low and would not be significantly impacted by the development of the proposed project.

Five protected areas have been identified within a 15Km radius of the site. However, they are all located outside the potential impact zone of the proposed project, with the exception of the South Moroccan Oasis Biosphere Reserve and the Mansour Ed Dahbi reservoir Ramsar site and an Important Bird Area (IBA). The South Moroccan Oasis Biosphere Reserve includes the entire province of Ouarzazate, and the Mansour Ed Dahbi reservoir is located approximately 7.5 km south of the southern boundary of the site and could potentially be affected by the project. Regarding the South Moroccan Oasis Biosphere Reserve, the proposed project is located within Zone B of its framework management plan, which is defined as a buffer zone with the objective of only permitting developments that are compatible with conservation principles. Water abstraction from the Mansour Ed Dahbi reservoir has been minimised by using dry cooling and treating and reusing water, to minimise impacts on the wetland.

Solar plants have a variety of potential impacts on avifauna, such as impact trauma or electrocution. However, there is a specific concern about solar tower facilities, the solar flux. Solar flux, or concentrated sunlight, is a measure of how much light energy is being radiated in a given area. The available evidence on avian mortality caused by tower CSP plants is contradictory. Laboratory tests suggest that damage to avifauna due to avian flux impacts is not a high risk. The monitoring data from a tower power plant in California (Ivanpah tower

CSP Plant) shows avian mortality rates that are higher than those reported in the other plants using parabolic CSP or PV technologies (Genesis CSP Parabolic and Desert sunlight PV) where similar monitoring was undertaken. The reported mortality rates were approximately twice as high in the Tower CSP than in the PV plant and four times higher in the tower CSP than in the parabolic CSP. However, the reported impact on water birds was lower in the tower CSP plant, accounting for a 11% of the total fatalities, compared to 20% in the parabolic CSP plant and 48% in the PV plant. The impact on water birds of solar plants is caused by collisions, when water birds confuse the reflection of the continuous surface of mirrors or panels with the reflection from water. It seems that water birds are less likely to confuse the way that mirrors are arranged in tower CSP plants with water. The data from tower PPs in Spain and the Al Naqab Desert shows much lower mortality rates than in the Ivanpah plant. Even if the figure of the Ivanpah PP is considered to be more realistic, the avian mortality caused by tower CSP plants is low compared to other mortality rates caused by other human activities.

Recommended mitigation measures include covering the evaporation ponds with a net to avoid aquatic birds accessing them, and not using large shrubs or trees onsite, as the existing evidence suggests that it attracts both birds and insects to the site. Daily monitoring will be undertaken to obtain a clear picture on the impacts of the solar tower technology in Ouarzazate. Based on the results of the monitoring, a mitigation plan for avifauna will be designed, potentially including measures such as model predators, gas cannons, pyrotechnics, bio-acoustic deterrents, falconry, and radio-controlled model aircraft to minimise avian fatalities.

**Socio Economics**

The report has considered the social and economic aspects associated with the development and subsequent operation of the NOORo III tower CSP. The assessment was informed through desk-based study and site visits.

The proposed project is located within an uninhabited area of the Ait Oukrour Toundout ethnic group, and was used for grazing by pastoralists; therefore the project did not require the relocation of any communities. The land purchase by MASEN was completed in October/November 2010, and was conducted in accordance with statutory terms of sale. The review commission established the purchase price, and the funds were put into a special account on behalf of the Ait Oukrour Toundout Collectivity at the Ministry of the Interior, and will be managed by the Directorate of Rural Affairs.

MASEN has also undertaken a socio-economic study and has prepared a socio-economic Action Plan, which will be used in conjunction with the CESMP and OESMP to ensure that the

community's and employee's concerns and complaints are addressed through appropriate initiatives.

Furthermore, the assessment confirmed that there will be a positive impact upon the local and regional economy as a result of the plant, due to employment, increased local spending on goods and services and increased training levels within the local community.

The operation of the plant will provide electricity to communities further afield and will ensure a reliable source and increased power supply to the neighbouring communities; thereby facilitating the development and expansion of commercial and small industrial businesses. With regards to employment, the opportunities for women to gain work experience will be increased.

A targeted system of local recruitment and investment in the human capital of the local workforce will enhance this process and consequently increase the benefit to the local economy. Up to 1,000 workers will be employed during construction and 60 during operation. Overall the various community consultations indicated that the local population perceived the project with a positive outlook for the creation of jobs and boosting the local economy.

The cultural heritage and the natural landscape are important for the tourist industry at Ouarzazate. As it is explained in the landscape and in the cultural heritage sections, the impacts on the cultural and natural landscape are not expected to be significant, so from an economic perspective the potential negative impact on tourism is assessed as negligible. Additionally, MASEN will create a tourist site within the tower CSP, as one of the initiatives to boost commerce at the neighbouring villages.

Further details of the socio-economic mitigation initiatives are provided in the Framework Environmental And Social Management Plan (ESMP), Volume 3.

**Traffic and Transportation**

Ouarzazate is linked to Marrakesh by the N9 and to Errachidia by the N10. There is no bypass road to Ouarzazate, so all traffic bringing equipment from the ports will cross the city. A noise baseline has been prepared for this sensitive receptor and is discussed in the noise section.

As a result of the construction of the three solar projects, a paved road has been built by MASEN for direct access from the N10 to the village of Tasselmant.

Transport of containers would be carried out mainly through the harbor of Casablanca. Then road transport would be carried out from Casablanca to Ouarzazate, crossing the Atlas, for most sensible supplies. For all sensible supplies like reflectors, HCE tubes, etc… the alternative route Casablanca – Agadir – Ouarzazate would be used.

One of the main port traffic volume expected is related to the Salt media (NOORo II & NOORo III), which is provided in big-bags. This transport would be carried out through the Casablanca port also.

All the considered routes use the N9, cross Ouarzazate and get to the access road through the N10. Therefore, construction activities will lead to an increase in vehicle numbers and traffic on the N9, and N10. During the peak construction period an expected traffic around 40 trucks per day would pass through the town of Ouarzazate

To reduce the impact derived from the transport of the construction workforce to the site on the N10 and on Ouarzazate, worker buses will be considered, as these will significantly reduce the number of vehicles accessing the site during construction. A car-pooling scheme should be implemented during operation. Wherever possible, heavy vehicle movements will be scheduled outside of peak periods and avoid times when nuisance will be higher. The construction vehicles leaving the site will be appropriately cleaned and all the vehicles used in the site shall be appropriately maintained.

Therefore, bearing in mind Main container/truck traffic volume expected from Casablanca port and from Tanger (road transport from Europe), preliminary traffic estimation is as follows:

- 40 trucks per day during peak construction activities
- Experience during NOORo 1 construction has shown that the existing roads Casablanca – Ouarzazate can handle with minimum impact additional traffic demanded by the construction of the Solar Plant.
- For HGV transport the port to be used will be mainly Nador, although possibilities of using Agadir port would also be considered. Special transports are considered those exceeding 60 t, which will require a special authorization. The following special transports (near 60 t or bigger) are foreseen.

Nador – Ouarzazate road has not a high traffic demand, therefore it is not foreseen a high impact of the HGV transport on this road.

Additionally these special transports would not cross the city of Ouarzazate. And impact on traffic of these special transports is not considered especially critical for the existing traffic if they are adequately & timely scheduled.

Finally, since construction of the two plants will be in tandem the traffic will be managed in tandem. This will enable to avoid cumulative impacts of traffic.

**Cultural Heritage and Archaeology**

A desk study relating to archaeological and cultural resources has been undertaken, in addition to a site walkover survey. Despite the rich history and abundance of historical sites

in the Ouarzazate province, no archaeological resources were identified in the Project site and study area, so no specific mitigation measures are considered necessary. A protocol for an archaeological watching brief has been detailed in case a chance find occurs, which will detail the required procedures to protect, report and preserve any archaeological finds.

**Landscape and Visual Impact**

The landscape is an important asset for tourism in Ouarzazate. There are no anthropogenic elements on the study area other than the NOORo 1 CSP, access roads for the village of Tassellmant and the solar projects, and the two telecommunication antennas in the intersection of the N10 and Tasselmant road. The NOORo III project, due to the height of the tower, which will be 247m, will be clearly visible from all nearby sensitive receptors. This impact results from the choice of technology, that was informed by the analysis in the FESIA.

Solar tower power plants are a cause of concern due to the Glare Effect. The aerial surveys undertaken in large tower facilities in the US showed that heliostats in standby mode can cause glare to aerial observers (pilots). The values were always below the ocular damage threshold. However, the glare from heliostats can cause after-image at far distances (up to 6 miles).

Plant Operating System:

Each heliostat will have its own independent PLC (Local Controller-LOC) to control and monitor the heliostat position. In addition there will be a redundant main control unit that will coordinate and control the performance of all the Plant heliostats.

In case of Plant black-out, there will be several UPS systems that will guarantee the power supply to all solar field local controllers and main control unit so that correct operation of the solar field control system will be maintained.

In the event of communication failure with main control unit, each LOC will have programmed a safety sequence that, after a certain time, will move the heliostat to a safe position (stow/horizontal position).

Regarding the glare effect of mirrors in the road/ airport, each LOC will have programmed several security zones. The outside area of the Plant will be one of them. Tracking will not be permitted in this area. Therefore, if a LOC receives a tracking order in a fixed point outside the Plant, it will reject the command. In addition, in case one heliostat in its stopped position has the reflected vector pointing outside the Plant, it will generate an alarm and, in case of danger, the central control system will order the movement of the heliostat out of the zone.

Mitigation measures to minimise the glare effect may include:

- A letter sent to the Civil Aviation Authority, to Ouarzazate Airport and to the airlines that fly to Ouarzazate notifying pilots of potential glare from the facility. The letter is intended to provide advanced notice to pilots flying over the area so that they are aware of the potential glare as they approach the site and will not be surprised by it.
- Modification of Heliostat Standby Positions to reduce the irradiance and number of heliostats that can reflect light to an aerial observer. Some strategies that can be considered include the following:
    - Increase the number of aim points near the receiver and have adjacent heliostats point to different locations so that the number of glare-producing heliostats visible from the airspace above is minimized at all locations
    - Position heliostats vertically or in other orientations that minimize glare
    - Bring heliostats up to standby position at top of receiver sequentially as needed to avoid having a large number of heliostats reflecting light into the airspace above
    - Incorporate a glare shield near the receiver that can serve as both the aim point for heliostats in standby mode and a preheater for the water entering the receiver

**Public Participation**

Several Community Consultation meetings have been held throughout the project scoping, planning and design phases. A further community consultation meeting was undertaken in February 2015 to inform the stakeholders of the details of NOORo III and incorporate their concerns in the assessment undertaken in the SESIA. Measures to compensate and/or mitigate the negative impacts that the community voiced in the consultation meeting have been incorporated in the design, operation and management of the proposed facility.

The meeting was considered to fulfil its aims, for the following reasons:

- It allowed for precise information to be provided about water use.
- It confirmed that the concerns raised by the population (employment of local people, water use, employment) were in line with the mitigation measures being proposed (e.g. minimal water use, zero wastewater discharges, water treatment for reuse onsite, inclusion of provisions in the CESMP / ESMP to promote the employment of the local population and the provision of training).

The detailed report of the community consultation meeting is provided in Appendix 1.

**Environmental and Social Management Plan**

The requirements for the Environmental and Social Management Plan for construction and operation are presented in Volume 3 of this SESIA. The ESMP serves as a basis for the preparation of comprehensive management plans in order to avoid, prevent, reduce or rectify environmental and social impacts that may arise during both construction and operation.

For construction the ESMP is termed Construction Environmental and Social Management Plan (CESMP) and for Operation it is termed Operation Environmental and Social Management Plan (OESMP).

Issues covered within each framework include: environmental and social management staff roles and responsibilities, environmental and social requirements and compliance, environmental training and social awareness programmes, and monitoring, recording, inspection and auditing protocol.

The following recommendations are made to ensure management and monitoring of NOORo III tower CSP during construction and operational phases is in accordance with international best practices:

1. Prepare a detailed Construction Environmental and Social Management Plan and ensure that a full-time Environmental/Social Co-ordinator is appointed to manage and oversee day - day environmental/Social management/monitoring activities, training and reporting.
2. Independent environmental audits should be undertaken quarterly to monitor compliance with MEMEE/WB/IFC standards and this information reported to the lenders and regulators.
3. Prior to operations commencing, an EMS consistent with ISO 14001 should be developed and implemented by the Operations & Maintenance Company. This should be subject to external auditing in the future.

The EPC and Contractors will be responsible for the development of their own, activity specific CESMP.

The Operator will be responsible for the of their own, activity specific OESMP

MASEN and the IFI, will receive, review and comment on the routine monitoring reports supplied by the EPC, and Operator.

**Environmental impacts and mitigation measures summary table**

The following table provide a summary of the identified environmental impacts, their significance, the main mitigation measures proposed, the responsibilities for the implementation of the mitigation measures and the main monitoring activities. This table only outlines what are considered to be the main mitigation measures and monitoring activities. A

full description of the main mitigation measures and monitoring requirements for the NOORo III tower CSP Plant is provided below.

| Environmental Issue | Impact Significance | Mitigation Measure | Responsibility | Residual Impact | Monitoring |
|---|---|---|---|---|---|
| **Soil** | | | | | |
| **Spillages** | Moderate to Minor | Preparation of the CESMP and OESMP. | Contractor and Operator | Minor Negative | Conduct remediation monitoring following a spill incident. Twice yearly groundwater monitoring at two wells of Tasselmant applicable for all three phases of NOORo SCP(operator only) |
| | | Appropriate material and waste storage design and handling procedures. | | | |
| | | Soil and groundwater protection measures (i.e. bunds). | | | |
| | | Establish a spill response contingency plan | | | |
| **Material storage** | Moderate to Minor | Provide staff training | | | |
| **Cross contamination** | Minor to Negligible | Leak detection systems (operator only) | | | |
| **Water and Wastewater** | | | | | |
| Construction<br>a. Water use<br>b. Wastewater | a. Minor<br>b. Moderate | Preparation of the CESMP | Contractor | a. Negligible<br>b. Minor | Site inspections will be carried out regularly to ensure that all wastewater generated is properly managed, and no leakages or spill overs occur. The basins must be monitored to establish the regularity of sludge drainage. |
| | | Oily wastewater from vehicle maintenance will be collected via interceptors. | | | |
| | | Construction of a specific area for basic site machinery maintenance work. | | | |
| | | Construction of a settling basin | | | |
| | | The storage of waste generated on site shall be located outside areas in which runoff could affect nearby watercourses | | | |
| | | Employee training to minimise water consumption and ensure an understanding of wastewater issues | | | |

| Environmental Issue | Impact Significance | Mitigation Measure | Responsibility | Residual Impact | Monitoring |
|---|---|---|---|---|---|
| | | Dismantling of storage tanks shall include the final drainage of any existing water and sludge, removal of the waterproofing sheet, and filling in of the basin to its initial configuration. Demolition of ditches. All excess products must be taken to the landfill site. | | | |
| Operation<br>a. Water use<br>b. Wastewater | a. Minor<br>b. Moderate | Preparation of a waste management plan within the OESMP | Operator | a. Negligible<br>b. Minor | Routine testing of the effluents to verify compliance with technical specifications, national legislation.<br>Routine inspection of drainage wells located under the evaporation ponds. |
| | | Recycle and re-use of the treated effluent to minimise primary water resource use | | | |
| | | All above ground tanks and basins will have overflow pipes to an effluent collection point. | | | |
| | | Employee training to minimise water consumption and wastewater issues. | | | |
| **Air quality** | | | | | |
| Dust | Minor to Moderate | Preparation of the CESMP and OESMP | Contractor and Operator | Construction: Minor Negative<br><br>Operation: Negligible | Periodic ambient air quality monitoring (NOx & SOx) will be undertaken at the identified sensitive receptors, in order verify that national ambient air quality MALs are not exceeded.<br>Routine monitoring of the dust levels and wind conditions |
| | | Dust control measures should be implemented for transport activities and groundworks. | | | |
| | | All machinery should be inspected for good operation | | | |
| | | stockpiles should be covered | | | |
| | | Burning of waste is forbidden | | | |
| | | Hazardous materials stored on site with potential gas emissions will be located in well ventilated secure areas | | | |

| Environmental Issue | Impact Significance | Mitigation Measure | Responsibility | Residual Impact | Monitoring |
|---|---|---|---|---|---|
| Point Source | Minor | Low Sulphur Fuel (<50ppm) will be used for the boilers and all other fossil fuel burning plant. The boilers will have one common exhaust stack. The flue stack will include sample points for the temperature analysis and control of combustion. (Operator) | | | at the site will be conducted, in order to verify that on site operational activities are not contributing to any potential increases in dust levels. |
| Non Point Source | Moderate | The vent of the condensation tank will be equipped with an active carbon filter to avoid emissions of volatile compounds to the atmosphere. (Operator) | | | |
| VOC, Odour | Minor to Moderate | Recovery techniques such as condensation and absorption will be used to control gaseous emissions at the operational stage. | | | |
| **Noise and Vibration** | | | | | |
| Construction Site preparation, civil works, construction and installation | Minor to Moderate<br><br>Vibration is negligible | Preparation of the CESMP | Contractor | Minor | Independent noise monitoring as appropriate, at the site boundary. |
| | | Timing of noisy activities | | | |
| | | Using silencers on noisy equipment | | | |
| | | Ensure optimum operation of Plant. (following the manufacturer specifications, tightening adequately different pieces of equipment, lubricating the equipment) | | | |
| | | Use of sound barriers and ear protection. | | | |
| Operation Balance of Plant (fans, pumps, turbines, compressed air) | Minor<br><br>Vibration is negligible | Preparation of the OESMP | Operator | Negligible | Ongoing noise monitoring will be carried out at the tower CSP and at sensitive receptors |
| | | Noise performance testing will be conducted to validate any modelled observations. | | | |
| | | Equipment to be operated and | | | |

| Environmental Issue | Impact Significance | Mitigation Measure | Responsibility | Residual Impact | Monitoring |
|---|---|---|---|---|---|
| | | maintained as per manufacturer's specifications | | | to ensure noise levels are within regulatory specifications |
| | | Areas of high noise will be designated as such, and protective equipment will be worn. | | | |
| **Solid and Hazardous Materials** | | | | | |
| Construction<br>a. Non Hazardous<br>b. Hazardous | a. Major<br>b. Moderate | Preparation of a waste management plan within the CESMP | Contractor | a. Moderate<br>b. Minor | Undertake regular inspection, audits and monitoring of waste streams generated to ensure that all necessary mitigation measures are being implemented. |
| | | Promotion and implementation of material re-use and recycling. | | | |
| | | Promotion of resource use minimisation | | | |
| | | Provision of storage facilities for segregated wastes | | | |
| | | Adequate design of hazardous waste storage facilities | | | |
| | | Provision of spill response kits | | | |
| | | Procedures and rules for hazardous waste handling | | | |
| | | Training of staff | | | |
| Operation<br>a. Domestic<br>b. Non Hazardous<br>c. Hazardous | a. Minor<br>b. Moderate<br>c. Minor | Preparation of a waste management plan within the OESMP | Operator | a. Minor<br>b. Minor<br>c. Negligible | |
| | | Segregation and storage of different types of waste in separate labelled containers, to promote the re-use and/or recycling of materials | | | |
| | | Same as contractor mitigation measures | | | |
| **Stormwater** | | | | | |

| Environmental Issue | Impact Significance | Mitigation Measure | Responsibility | Residual Impact | Monitoring |
|---|---|---|---|---|---|
| a. Stormwater contamination<br>b. Erosion | a. Moderate<br>b. Minor | Settling ponds to capture stormwater and allow for deposition and solids and contaminants<br><br>Chaabas coming from the north of the site will be channelled to the side canyons to avoid intense runoff through the site during the earthworks.<br><br>Access roads will be defined so as to avoid gradients in excess of 15% and existing topography will be adopted so as to facilitate surface drainage by way of gutters.<br><br>The longitudinal slope of the road will be at least 3% in order to facilitate surface run-off of water and to avoid the build up of sediment in gutters | Contractor and operator | a. Negligible<br>b. Negligible | The time that it takes for rainwater to wash off the surfaces where there is a risk of oil spills will be monitored to ensure that 10 minutes is sufficient to collect all the potentially polluted wastewater.<br>Routinely check the stormwater system and drainage system to ensure that water flows (volume and velocities) are adequate and are not contributing to erosion.<br>Regular inspection and verification of drainage to treatment system (operator). |

| Environmental Issue | Impact Significance | Mitigation Measure | Responsibility | Residual Impact | Monitoring |
|---|---|---|---|---|---|
| **Ecology** | | | | | |
| Operational impacts on avifauna | Moderate | No large shrubs or trees will be used onsite for landscaping, as the existing evidence suggests that it attracts both birds and insects to the site, and this will increase bird mortality at NOORo III.<br><br>The evaporation ponds will be covered (e.g. by a net) to avoid aquatic birds accessing them;<br><br>Anti-perching devices will be installed to prevent birds from perching, roosting and nesting on surfaces and ledges around the tower and the power island.<br><br>The results of the monitoring plan will be used to determine if additional mitigation is required. If the monitoring programme identifies high avian mortality rates, a mitigation programme will be design including measures such as:<br>• Model predators<br>• Gas cannons<br>• Pyrotechnics<br>• Bio-acoustic deterrents<br>• Falconry<br>• Radio-controlled model aircraft | O&M | Negligible to Moderate | A monitoring plan will be undertaken, either for each plant separately or for the entire tower CSP, to monitor avian fatalities. Monitoring will be undertaken daily for at least the first two years of operation of the plant. |

| Environmental Issue | Impact Significance | Mitigation Measure | Responsibility | Residual Impact | Monitoring |
|---|---|---|---|---|---|
| | | The avian impact mitigation plan may be more effective for the entire SPC than for phase 3 and the other phases in isolation. If the avifauna monitoring programme shows that phases 1, 2 and 3 of the NOORo SPC have an impact on waterfowl birds, the mitigation measures will be implemented jointly between the three plants. | | | |
| **Traffic and Transport** | | | | | |
| Highways | Minor negative | Schedule major material supply for off-peak hour traffic.<br>Clearly identify truck routes and entry points for heavy vehicles entering the site.<br>Designate parking/staging areas.<br>Provide adequate parking stations for the estimated numbers of visitors to the site (workers and suppliers).<br>Encourage car pooling by site workers. | Contractor | Minor negative | Site operations will be monitored to ascertain that congestion is minimised outside the site, and to minimise traffic impacts on local roads networks, particularly through the city of Ouarzazate.<br><br>If congestion is observed, conduct monitoring traffic numbers at entry/exit point. |
| Local Roads | Moderate negative | Develop a Traffic Management Plan (operation).<br>Clearly post site entry / exit signs.<br>Use 24hr security and document all vehicles entering/exiting the site.<br>Clearly post on-site speed limits, recommended 5Km/hr during construction and 10Km/hr during operation.<br>MASEN and the Consortium may engage in discussions with the public transport | Contractor and Operator | Minor Positive | |

| Environmental Issue | Impact Significance | Mitigation Measure | Responsibility | Residual Impact | Monitoring |
|---|---|---|---|---|---|
| | | authority to increase public transport to the site.<br>Allow for easy access to public transport routes from the site. | | | |
| **Socio-economic** | | | | | |
| a. Financial<br>b. Cultural Heritage<br>c. Seasonal Pastoralists | a. Moderate positive<br>b. Negligible<br>c. Minor negative | A Recruitment Policy will be incorporated into the EPC's Construction Environmental and Social Management Plan (CESMP) and the O&M's recruitment plan within the OESMP. | Contractor and Operator | a. Moderate positive<br>b. Minor Positive<br>c. Negligible | A complaints register will be established and used for documenting all community and worker complaints. MASEN's Socio-economic Action Plan and the CESMP/OESMP will be combined to ensure that community grievances are addressed through appropriate initiatives. |
| | | The EPC/O&M must address all complaints, and comments from stakeholders through a Grievance Mechanism, and responses will be prepared within an adequate time frame. If the complaint is serious, corrective measures will be taken immediately. All corrective actions will also be documented in the register, and any changes in work methods, resulting form the complaints, will be updated in the CESMP/OESMP revisions. | | | |
| | | Employment from local community | | | |
| | | Development of technical skills. | | | |
| **Cultural and Archaeological** | | | | | |

| Environmental Issue | Impact Significance | Mitigation Measure | Responsibility | Residual Impact | Monitoring |
|---|---|---|---|---|---|
| Discovery of Artefacts | Moderate Negative | If artefacts are unearthed during the excavation works, the following steps will be implemented:<br>The possible or confirmed existence of heritage objects or places, and any suspected heritage discoveries, will be communicated to all staff including machinery operators.<br>When work is conducted near identified heritage items, the items will be clearly marked with temporary flagging or fencing prior to the commencement of works; and an exclusion zone will be created around the items. | Contractor and Operator | Negligible | |
| **Landscape, Visual and Glare** | | | | | |
| Glare Effect / Aerial receptors | Moderate | A letter will be sent to the Civil Aviation Authority, to Ouarzazate Airport and to the airlines that fly to Ouarzazate notifying pilots of potential glare from the facility. The letter is intended to provide advanced notice to pilots flying over the area so that they are aware of the potential glare as they approach the site and will not be surprised by it.<br>Modification of Heliostat Standby Positions: Heliostat standby positions will be designed to reduce the irradiance and number of heliostats that can reflect light to an aerial observer. Some strategies that can be considered include the following;<br>• Increase the number of aim points | O&M | Minor | Monitored through the grievance mechanism, in case of complaints from pilots |

| Environmental Issue | Impact Significance | Mitigation Measure | Responsibility | Residual Impact | Monitoring |
|---|---|---|---|---|---|
| | | near the receiver and have adjacent heliostats point to different locations so that the number of glare-producing heliostats visible from the airspace above is minimized at all locations<br>• Position heliostats vertically or in other orientations that minimize glare<br>• Bring heliostats up to standby position at top of receiver sequentially as needed to avoid having a large number of heliostats reflecting light into the airspace above<br>• Incorporate a glare shield near the receiver that can serve as both the aim point for heliostats in standby mode and a preheater for the water entering the receiver | | | |

**Summary Compliance Tables**

The following tables have been prepared to summarise compliance with the following legislative and regulatory requirements:

- Equator Principles III (2013);
- World Bank/IFC Performance and Sustainability Standards;
- IFC/EHS Guidelines (2007);
- Law 11-03 and law 12-03

| Aspect/requirement | Relation to NOORo III tower CSP | Comment |
|---|---|---|
| ***Equator Principles*** | | |
| **Principle 1**: Project categorisation (category A, B & C) | Compliant | The NOORo III tower CSP is Categorised as A by the World Bank Regional Safeguard Advisor. |
| **Principle 2**: Social and Environmental Assessment (SEA) is required for category A or B project, which must comprise an assessment of social and environmental impacts including labour health and safety provision. | Compliant | The SESIA has been conducted for the NOORo III tower CSP project in accordance with international (WB/IFC/EP) and national requirements/standards/guidelines.<br>Social and environmental impacts including health and safety provision have been assessed, and mitigation measures have also been developed and put forward to minimise and/or mitigate any potential impacts identified. |
| **Principle 3**: Projects located in Non-OECD countries, the SEA should also refer to the IFC Performance Standards on Social and Environmental Sustainability and the relevant industry-specific Environmental, Health and Safety (EHS) Guidelines. | Compliant | Where applicable, the IFC eight (8) performance standards and EHS guidelines for Thermal Power Plants have been applied and incorporated in the assessments of the SESIA. These will be discussed the section of WB/IFC requirements of this checklist document. |
| **Principle 4**: For Category A and B projects located in Non-OECD countries, an Action Plan (AP) should be prepared, which addresses the relevant findings, and describes/prioritise the actions needed to implement corrective actions and mitigation and/or monitoring measures necessary to manage the impacts and risks identified in the assessment. | Compliant | The SESIA has identified and assessed all the potential issues/impacts. Each of these issues is discussed in detail in the sections of the SESIA report.<br>The mitigation measures and/or corrective actions have been recommended to avoid or minimise the impacts identified.<br>An Environmental and Social Management Plan (ESMP) and Monitoring, for the construction and operational phases, are also developed and put forward as a framework for the project contractor and operator, who are required to provide the detailed CESMP/OESMP. |
| **Principle 5**: For all Categories A and, as appropriate, Category B projects located in Non-OECD countries, the borrower should consult with project-affected communities. A Public Consultation and Disclosure Plan (PCDP) may be required by EPFIs. | Compliant | Several Community Consultation meetings have been held throughout the project scoping, planning and design phases.<br>Concerns voiced by the community have been considered in the SESIA assessment and measures to compensate and/or mitigate any perceived negative impacts have been incorporated in the design, operation and management of the proposed facility. The concerns raised in the community consultation and the replies that |

| Aspect/requirement | Relation to NOORo III tower CSP | Comment |
|---|---|---|
| | | were given are specified in Annex 1. |
| **Principle 6**: For all Category A and, as appropriate, Category B projects located in Non-OECD countries, the borrower will, scaled to the risks and adverse impacts of the project, establish a grievance mechanism as part of the management system in order to ensure that consultation, disclosure and community engagement continues throughout construction and operation of the project. | Compliant to Ouarzazate contractor/ Project Owner | Ref community consultation, please see Principle 5 above.<br>The EMP will, however, be provided by the EPC for construction phase and by the Project Company for the operational phase of the project. These documents will include relevant environmental requirements and management system including grievance mechanism, monitoring, reporting and auditing programme to address IFC requirements. (See framework of an ESMP in Volume 3 of the SESIA report).<br>A regular internal and external audit will be undertaken for the proposed project during construction and operational period, as normally required by lender bank(s). The external and internal audits will ensure that a grievance mechanism is implemented as part of the management system. |
| **Principle 7**: For all Category A and, as appropriate, Category B projects, an independent social or environmental expert not directly associated with the borrower will review the SESIA, AP and consultation process documentation. | Compliant | Typically, a team of independent experts is employed by lender bank(s), and/or the Project owner to review the SESIA report and its relevant documentations |
| **Principle 9**: For all Category A, and appropriate, for Category B projects, in order to ensure ongoing monitoring and reporting over the life of the loan EPFIs will require appointment of an independent environmental and/or social expert, or require the borrower retain qualified and experienced external experts to verify its monitoring information which would be shared with EPFIs. | Compliant | The Project Company will require the EPC to appoint independent environmental expert to undertake quarterly audits during construction. The O & M Company will also appoint an independent expert to undertake audits during the operational phase. |
| **Principle 10**: Each EP Financial Institution adopting the Equator Principles commits to report publicly at least annually about its Equator Principles implementation processes and experience. | Not applicable | This principle is applicable and required for a Financial Institution, who adopts the Equator Principles to report publicly their EPs implementation. |

| Aspect/requirement | Relation to NOORo III tower CSP | Comment |
|---|---|---|
| | | |
| **World Bank/ IFC Performance Standards** | | |
| **Performance Standard 1:** Social and Environmental Assessment and Management Systems | Compliant | This is consistent with the EP 2- SESIA (See Principle 2 above). Ref management systems see explanation in Principle 6 above. |
| **Performance Standard 2**: Labour and Working Conditions | Compliant | This performance standard is consistent with the national Labour Law Loi n° 65-99 relative au Code du travail. |
| **Performance Standard 3**: Pollution Prevention and Abatement | Compliant | Where possible, pollution prevention and abatement have been incorporated in the relevant areas, in particular the mitigation measures and an EMP framework proposed to minimise the impacts during the construction and operational phase, including air quality, water quality, noise, waste, wastewater management, soil/groundwater/land contamination, etc. |
| **Performance Standard 4**: Community Health, Safety and Security | Not applicable | This is not relevant to the NOORo III tower CSP project, as the communities that are near the project site are not likely to be affected due to the topography of the area and the types of impacts to be expected. |
| **Performance Standard 5**: Land Acquisition and Involuntary Resettlement | Not applicable | No land acquisition and resettlement is required for the NOORo III tower CSP, as the land is already owned by MASEN and the acquisition was assessed in the FESIA. No settlements/dwellings within or nearby the site were identified.<br>Although the land acquisition process was a voluntary process, the WB has determined that this operation triggered the Involuntary Resettlement Policy. Therefore, a Land Acquisition Plan (LAP) to describe the land acquisition process and monitor use of the proceeds to the benefit of the local population was prepared. The LAP includes, in particular, the following documents: a) copy of the land price committee determination of the price of the land, b) copy of the written agreement by the community of the Ait Oukrour Toundout on the sale and conditions of the transfer of the land, c) |

| Aspect/requirement | Relation to NOORo III tower CSP | Comment |
|---|---|---|
| | | copy of the authorization of the Supervisory Board about the transaction and d) ONE/MASEN/Community tripartite agreement on land acquisition. The land acquisition was completed as per the process described in the LAP, July 2011. |
| **Performance Standard 6**: Biodiversity Conservation and Sustainable Natural Resource Management | Compliant | Where possible and appropriate, this has been incorporated in the assessments, in particular in the area of terrestrial ecology, water quality, waste management (hierarchy) and EMP framework. |
| **Performance Standard 7**: Indigenous Peoples | Not applicable | There are no indigenous people or any local population within or nearby the project site. The only impact would be on nomadic pastoralists that use the site for passage. This impact has been assessed in the FESIA and the SESIA. |
| **Performance Standard 8**: Cultural Heritage | Compliant | The cultural heritage and archaeology has been assessed in the SESIA. The assessment indicated that there is no significant potential for artefacts or anthropogenic finds to be present on the NOORo III tower CSP site. |
| ***IFC EHS Guidelines*** | | |
| EHS General Guidelines and Sector Specific Guidelines | Compliant | Where applicable, the SESIA has referred and incorporated the relevant requirements/standards stipulated in the IFC-EHS guidelines. These include the EHS General guidelines and the sector specific guidelines for Thermal Power Plants. |
| ***Law 11-03 and law 12-03*** | | |
| MEMEE Law 11-03 and 12-03 for Environmental Protection and the EIA preparation and submission process. | Compliant | As mentioned in the EPs (Principle 2), the SESIA has been conducted in accordance with the MEMEE laws for Environmental Protection and EIS process. |