# 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 first phase of the project, which will produce 160MW using parabolic solar power concentration technology.

'5 Capitals Environmental and Management Consulting' (5 Capitals) have been commissioned by ACWA Power to undertake the Specific Environmental and Social Impact Assessment (SESIA) for the proposed Ouarzazate Solar Power Complex 'Ouarzazate SPC;), Phase 1, in Morocco.

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 5Km north of National Road N10. The specific plot for Phase 1 is located in the south of the SPC site and has a total area of 450ha. The electricity generated will be supplied to the Ouarzazate 225/60 KV station located near the complex.

It is understood that construction is expected to last about 28 months, from the second quarter of 2013 to the third quarter of 2015, followed by a 12-months period during which commissioning activities and performance guarantee tests are undertaken. Therefore, the final Commercial Operation Date will start in the first quarter of 2016.

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.

The project is seeking a proportion of financing from international lenders. The specific requirements of each IFI cannot reasonably be incorporated into the SESIA, as the IFI's requirements can be contradictory, and would only result with confusion. It is common practice for the IFIs to accept a common approach when co-financing projects. Three sets of international environmental standards, which are widely adopted and considered best practice, have been applied to this project. These are the WB Environmental Safeguard Policies, the IFC standards and guidelines and the Equator Principles.

A checklist of applicable Principles and Performance Standards is shown in the attached table.

The environmental assessment has considered Primary Issues relating to the commissioning, construction, and operation works associated with the following aspects of the Project:

- Soil and ground contamination, and
- Water and Wastewater Management.

Additionally, a range of Secondary Issues have been considered and assessed, including air quality, noise and vibration, solid and hazardous waste management, stormwater management and erosion control, terrestrial ecology, traffic and transportation, socio economic, cultural heritage and archaeology, and landscape and visual.

In response to the assessment of each of these technical 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.

The cumulative effects of 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 and Land 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, the soil conditions are considered good and not contaminated by any heavy metals or hydrocarbons. Nevertheless, soil sampling and analysis was carried out in order to develop a benchmark. 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 show that at all 5 sampling locations the levels of heavy metals and hydrocarbons were well below the Dutch target values and Canadian Indicative values. Therefore, based on the analytical information, historical land use and site observations, it can be concluded that the soils are not contaminated by heavy metals and hydrocarbons.

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.

The main soil contamination risk at the operational phase will be leaks or spills of HTF at the various process systems. The weak points at these systems are the tubing, flanges, valves and other such connection points. However, routine inspections and maintenance will help to prevent and minimise any incidents. The facilities have been designed to include leak detection systems and containment structures to prevent spreading of the HTF and facilitate collection and treatment. Furthermore, a soil bio-remediation facility will be built to treat any soils polluted with HTF.

**Water and Wastewater Management**

The construction and operation of first phase of the SPC 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 46,184.6 $m^3$ for 28 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 over hard standing areas with the appropriate runoff collection mechanisms.

The water use for phase 1 of the Ouarzazate SPC will be 0.3 $Mm^3$ over 27 months (0.13 $Mm^3$/year) during construction and 1.75 $Mm^3$/year during operation. This represents 0.03% and 0.41% respectively of the average contribution to the Mansour Ed Dahbi Reservoir, that is 420 $Mm^3$.

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, cooling tower blow down, concentrate from reverse osmosis, boiler blow down, tempering water, oily water, water with HTF 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 425,000$m^3$/year. As a result of this, there will be no wastewater discharges from the plant during the operation phase.

**Air Quality**

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 $SO_2$, $NO_x$, 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 Ouarzazate proposed Solar Power Complex are well within the national ambient air quality guidelines for $SO_2$, $NO_x$ and VOCs. According to these paramentes, the air quality on the site can be considered good.

Regarding particles, the 24hr average concentration of suspended dust is below the Moroccan maximum allowable limit (MAL) for $PM_{10}$. However, on one occasion at site 2 (Dust 2) the observed concentration was 51 µg/m$^3$, which is just above the MAL. This indicates that the natural particles concentration in the area is close to the MAL.

The boilers on site will be powered by solar energy through the HTF and by salts that store the heat for night hours. Therefore, fossil fuels will not be used for electricity generation. Only under very specific conditions (night time, low temperatures) will diesel be used to run the boilers to ensure optimal temperature of the HTF is retained. Air quality modelling using AERMOD software was undertaken to predict the dispersion of pollutants from the auxiliary and HTF boiler stacks when diesel is used. Although diesel fuel will be used to run the boilers, the sulphur content will be specified to <50ppm and a range of pollution abatement techniques has been applied to the boiler operation and stack emissions to reduce $SO_2$ and $NO_x$ emissions as much as possible.

The results of the modelling demonstrated that the emissions from the entire plant are well below the national and IFC maximum allowable limits for point source emissions. Furthermore, ambient concentrations of the pollutants quickly dissipated to background levels within 300-500m from the point source. As a result, no impact to the ambient air quality at the closest sensitive receptors is identified, since they are several kilometres from the site.

In conclusion the air modelling has demonstrated the low impact nature of a solar power plant and the effectiveness of the pollution abatement and mitigation measures, including BAT, proposed to control air emissions from the SPC. Furthermore, the Ouarzazate SPC will help to offset Global Warming, as it will prevent over one million tonnes/year of $CO_2$ from being emitted, if a conventional power generation facility had been developed instead.

**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. 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 November 2012. 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 Waste Management**

The construction and operation of first phase of the SPC will result in the generation of a number of waste streams that will require appropriate waste management techniques to be employed to ensure compliance with international best practice.

The assessment identified the measures proposed for the recovery, re-uses, and recycling of all waste streams from the various facilities, thereby minimising the amount of waste sent to landfill.

Additionally, methods for the segregation of waste streams within the facility are detailed as well as detailing the requirement for a clear, comprehensive Waste Management Plan to be integrated into the CESMP and also the OESMP for the operational phases. Inclusion of detailed methods for appropriate storage, transfer and disposal of both hazardous and non-hazardous waste streams is also provided in the SESIA.

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**Stormwater Management and Erosion Control**

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 two wadis 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 or HTF 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.

**Terrestrial Ecology**

A detailed three-day site survey was carried out in 2010 for the FESIA, to identify different habitat types and species present. Consequently, a follow up Rapid Ecological Assessment of the site was undertaken in October 2012 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 wadis 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 which includes the Province of Ouarzazate within the framework management plan and the Mansour Ed Dahbi reservoir Ramsar site, that is located approximately 6 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.

**Socio Economics**

The report has considered the social and economic aspects associated with the development and subsequent operation of the first phase of the Ouarzazate SPC. 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 1,200 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 SPC, 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 project, a paved road will be provided for the village of Tasselmant.

All equipment and materials will be transported in containers by ships and lorries from the supplier's factories to the site in Ouarzazate. After the assessment, Agadir was considered the first option, since it is relatively close to the project site and it has the required infrastructure.

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, N10 and on the road that is being built for Tasselmant, until the access road is reached.

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.

**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**

The landscape and visual assessment has identified that the landscape in the Ghassat Commune has a high intrinsic value, and it is an important asset for the tourism industry. There are no anthropogenic elements on the study area other than a small camp for road construction and the tarmac road that is being built to connect the village of Tasselmant with the N10 and for site access and there are two telecommunication antennas in the intersection of the N10 and the road that is being built for Tasselmant.

The view of the first phase of the Ouarzazate SPC from the villages to the east and northeast and from Ouarzazate is blocked by the topography of the area. Therefore the landscape and visual impact from those sensitive receptors is considered to be neutral.

The site will be visible from a short distance (approximately 5Km) of the N10 road and from the access road to Tasselmant. In this area there are already anthropogenic elements, in particular two telecommunication antennas.

**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 November 2012 to inform the stakeholders of the details of phase 1 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.

**Environmental and Social Management Plan**

The requirements for the Construction Environmental and Social Management Plan (CESMP) and Operation Environmental and Social Management Plan (OESMP) are presented in Volume 3 of this SESIA and serve 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.

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 Ouarzazate SPC 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.

**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 all the mitigation measures and monitoring requirements that have been prepared for the project is provided in the relevant sections of the main report.

| Environmental Issue | Impact Significance | Mitigation Measure | Responsibility | Residual Impact | Monitoring |
|---|---|---|---|---|---|
| **Soil** | | | | | |
| **Spillages** | Moderate to major | • Preparation of the CESMP and OESMP.<br>• Appropriate material and waste storage design and handling procedures.<br>• Soil and groundwater protection measures (i.e. bunds).<br>• Establish a spill response contingency plan<br>• Provide staff training<br>• Leak detection systems (operator only) | Contractor and Operator | Minor Negative | • Conduct remediation monitoring following a spill incident.<br>• Twice yearly groundwater monitoring (operator only) |
| **Material storage** | Minor to moderate | | | | |
| **Cross contamination** | Moderate | | | | |
| **Air Quality** | | | | | |
| **Dust** | Minor to moderate | • Preparation of the CESMP and OESMP<br>• Dust control measures should be implemented for transport activities and groundworks.<br>• All machinery should be inspected for good operation<br>• stockpiles should be covered<br>• Burning of waste is forbidden<br>• Hazardous materials stored on site with potential gas emissions will be located in well ventilated secure areas<br>• Low Sulphur Fuel (<50ppm) will be used | Contractor and Operator | Construction : Minor Negative<br><br>Operation: Negligible | • Periodic ambient air quality monitoring ($NO_x$ & $SO_x$) 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 at the site will be conducted, |
| **Point Source** | Minor | | | | |
| **Non Point Source** | Moderate | | | | |
| **VOC, Odour** | Minor to moderate | | | | |

| Environmental Issue | Impact Significance | Mitigation Measure | Responsibility | Residual Impact | Monitoring |
|---|---|---|---|---|---|
| | | 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)<br>• The vent of the condensation tank will be equipped with an active carbon filter to avoid emissions of volatile compounds to the atmosphere. (Operator)<br>• Recovery techniques such as condensation and absorption will be used to control gaseous emissions at the operational stage. | | | in order to verify that on site operational activities are not contributing to any potential increases in dust levels. |
| **Noise and Vibration** | | | | | |
| **Construction**<br>**Site preparation, civil works, construction and installation** | Minor to Moderate<br>Vibration is negligible | • Preparation of the CESMP<br>• Timing of noisy activities<br>• Using silencers on noisy equipment<br>• Modify construction techniques<br>• Ensure optimum operation of Plant<br>• Use of sound barriers and ear protection. | Contractor | Neutral to Minor | • Independent noise monitoring as appropriate, at the site boundary. |
| **Operation**<br>**Balance of Plant (fans, pumps, turbines,** | Moderate<br>Vibration is negligible | • Preparation of the OESMP<br>• Noise performance testing will be conducted to validate any modelled | Operator | Minor | • Ongoing noise monitoring will be carried out at the SPC and at sensitive |

| Environmental Issue | Impact Significance | Mitigation Measure | Responsibility | Residual Impact | Monitoring |
|---|---|---|---|---|---|
| **compressed air)** | | observations.<br>• Noise suppression techniques will be implemented<br>• Areas of high noise will be designated as such, and protective equipment will be worn. | | | receptors to ensure noise levels are within regulatory specifications |
| **Waste Management** | | | | | |
| **Construction**<br>**a. Non Hazardous**<br>**b. Hazardous** | a. Major<br>b. Moderate | • Preparation of a waste management plan within the CESMP<br>• Promotion and implementation of material re-use and recycling.<br>• Promotion of resource use minimisation<br>• Provision of storage facilities for segregated wastes<br>• Adequate design of hazardous waste storage facilities<br>• Provision of spill response kits<br>• Procedures and rules for hazardous waste handling<br>• Training of staff | Contractor | a. Negligible<br>b. Negligible | Undertake regular inspections, audits, and monitoring of waste streams generated to ensure that all necessary mitigation measures are being implemented. |
| **Operation**<br>**a. Domestic**<br>**b. Non** | a. Moderate<br>b. Minor<br>c. Moderate | • Preparation of a waste management plan within the OESMP<br>• A bioremediation tank will be built on site | Operator | a. Minor<br>b. Minor<br>c. Minor | |

| Environmental Issue | Impact Significance | Mitigation Measure | Responsibility | Residual Impact | Monitoring |
|---|---|---|---|---|---|
| **Hazardous**<br>**c. Hazardous** | | to process soil contaminated by HTF.<br>• Segregation and storage of different types of waste in separate labelled containers, to promote the re-use and/or recycling of materials<br>• Same as contractor mitigation measures. | | | |
| **Water and Wastewater** | | | | | |
| **Construction**<br>**a. Water use**<br>**b. Wastewater** | a. Negligible<br>b. Moderate | • Preparation of the CESMP<br>• Oily wastewater from vehicle maintenance will be collected via interceptors.<br>• Construction of a specific area for site machinery maintenance work.<br>• Construction of a settling basin<br>• The storage of waste generated on site shall be located outside areas in which runoff could affect nearby watercourses<br>• Employee training to minimise water consumption and ensure an understanding of wastewater issues<br>• 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 | Contractor | a. Negligible<br>b. Negligible | Site inspections will be carried out regularly to ensure that all wastewater generated is properly managed, and no leakages or spillovers occur.<br>The basins must be monitored to establish the regularity of sludge drainage |

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|---|---|---|---|---|---|
| | | taken to the landfill site. | | | |
| **Operation**<br>**a. Water use**<br>**b. Wastewater** | a. Minor to moderate<br>b. Moderate | • Preparation of a waste management plan within the OESMP<br>• Recycle and re-use of the treated effluent to minimise primary water resource use<br>• All above ground tanks and basins will have overflow pipes to an effluent collection point.<br>• Employee training to minimise water consumption and wastewater issues. | Operator | a. Minor to moderate<br>b. Negligible | Routine testing of the effluents to verify compliance with technical specifications, national legislation.<br>Routine inspection of drainage wells located under the evaporation ponds. |
| **Stormwater** | | | | | |
| **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>• Wadis 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>• 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>• The longitudinal slope of the road will be at least 3% in order to facilitate surface | Contractor and Operator | a. Negligible to Minor<br>b. Negligible to Minor | The time that it takes for rainwater to wash off the surfaces where there is a risk of HTF and 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 |

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|---|---|---|---|---|---|
| | | run-off of water and to avoid the build up of sediment in gutters | | | erosion.<br>Regular inspection for HTF spills and verification of drainage to treatment system (operator) |
| **Ecology** | | | | | |
| **Biodiversity**<br>**Flora and Fauna** | Minor | • Minimise laydown areas and construction routes on the site and retain existing vegetation wherever possible;<br>• Pesticides will be avoided as much as possible. If they are required, they will be strictly limited and carefully managed;<br>• Avoid unnecessary cutting of vegetation, especially in areas around the wadis.<br>• Assist in facilitating the process of revegetation in places where colonisation is difficult or in the interest of an accelerating the process.<br>• Ensure that wastes from sites are cleared and workers are informed of the requirement to not hunt or injure local wildlife such as raptors;<br>• Only native vegetation will be planted on site with regards to landscaped areas; and<br>• Establish procedures for the occasion any | Contractor and Operator | Negligible to minor | |

| Environmental Issue | Impact Significance | Mitigation Measure | Responsibility | Residual Impact | Monitoring |
|---|---|---|---|---|---|
| | | species are found on the construction site including procedures for reporting, identification and potential relocation. | | | |
| **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 withinthe OESMP.<br>• The EPC/O&M must address all complaints, 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.<br>• Employment from local community<br>• Development of technical skills. | Contractor and Operator | a. Moderate positive<br>b. Negligible<br>c. Minor negative | A complaints register will be established and used for documenting all community and worker complaints.<br>MASEN's Socio-economic Action Plan and the CESMP/OESMP will be combined to ensure that community grievances are addressed through apporpriate initiatives. |
| **Traffic and Transport** | | | | | |
| **Off-site** | Moderate negative | • Schedule major material supply for off-peak hour traffic.<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 |

| Environmental Issue | Impact Significance | Mitigation Measure | Responsibility | Residual Impact | Monitoring |
|---|---|---|---|---|---|
| | | • Designate parking/staging areas. Provide adequate parking stations for the estimated numbers of visitors to the site (workers and suppliers).<br>• MASEN and the Consortium may engage in discussions with the public transport authority to increase public transport to the site.<br>• Allow for easy access to public transport routes from the site.<br>• Clearly identify truck routes and entry points for heavy vehicles entering the site. | | | minimise traffic impacts on local roads networks, particularly through the city of Ouarzazate.<br>If congestion is observed, conduct monitoring traffic numbers at entry/exit point. |
| On-site<br>(new road development for the villages) | Minor positive | • Develop a Traffic Management Plan (operation).<br>• Clearly post site entry / exit signs. 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. | Contractor and Operator | Minor positive | If congestion is observed, conduct monitoring traffic numbers at entry/exit point. |
| **Cultural and Archaeological** | | | | | |
| | Minor negative | In the event that any artefacts are unearthed during the excavation works, the following steps will be implemented to prevent and minimise any further damage to the site:<br>• The possible or confirmed existence of heritage objects or places, and any suspected heritage | Contractor and Operator | Negligible | |

| Environmental Issue | Impact Significance | Mitigation Measure | Responsibility | Residual Impact | Monitoring |
|---|---|---|---|---|---|
| | | 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.<br>• When work is conducted near identified heritage items, an exclusion zone will be created around the items to prevent damage by excavation, vehicle movement and vibration, resulting from vehicles and equipment. | | | |
| **Landscape and Visual** | | | | | |
| | Minor negative to neutral | Construction traffic to the site will be minimised through effective transportation planning, combining loads and utilising non-peak timing where possible. Any flood lights required during night time construction activities will be directed onto the site, with a maximum position angle of 30° from vertical, therefore minimising any potential light leakage and impacts at night. | Contractor and Operator | Negligible | |

**Summary Compliance Tables**

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

- Equator Principles II (2006);
- World Bank/IFC Performance and Sustainability Standards;
- IFC/EHS Guidelines (2007);
- Law 11-03 and law 12-03

| Aspect/requirement | Relation to Ouarzazate SPC | Comment |
|---|---|---|
| ***Equator Principles*** | | |
| **Principle 1:** Project categorisation (category A, B & C) | Compliant | The Ouarzazate SPC is likely to be Category B EP as the anticipated environmental and social impacts are not unprecedented, can be readily mitigated and may be reversed in the future (it should be noted that under World Bank it has been classified as a Category A). |
| **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 Ouarzazate SPC 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 or OECD countries not designated as High Income, the SEA should also refer to the IFC Performance Standards on Social and Environmental Sustainability and the relevant industry- | 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. |

| Aspect/requirement | Relation to Ouarzazate SPC | Comment |
|---|---|---|
| specific Environmental, Health and Safety (EHS) Guidelines. | | |
| **Principle 4:** For Category A and B projects located in non-OECD countries or OECD countries not designated as High Income, 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 the potential issues/impacts, and classified/prioritised into Primary Issues and Secondary Issues. 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 Management Plan (EMP) 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 or OECD countries not designated as High Income, the borrower should consult with project-affected communities. A Public | 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 |

| Aspect/requirement | Relation to Ouarzazate SPC | Comment |
|---|---|---|
| Consultation and Disclosure Plan (PCDP) may be required by EPFIs. | | concerns raised in the community consultation and the replies that were given are specified in Annex 1 |
| **Principle 6**: For all Category A and, as appropriate, Category B projects located in non-OECD countries or OECD countries not designated as High Income, 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 | Compliant | • Typically, a team of independent experts is employed by lender bank(s), and/or the Project owner to review the SESIA report |

| Aspect/requirement | Relation to Ouarzazate SPC | Comment |
|---|---|---|
| independent social or environmental expert not directly associated with the borrower will review the SESIA, AP and consultation process documentation. | | 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 | 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 Ouarzazate SPC | Comment |
|---|---|---|
| processes and experience. | | |
| ***World Bank/IFC Performance Standard*** | | |
| **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 | Not | This is not relevant to the Ouarzazate SPC project, as the communities |

| Aspect/requirement | Relation to Ouarzazate SPC | Comment |
|---|---|---|
| Health, Safety and Security | applicable | that are near the project site and are not likely to be affected due to the topography of the area and the types of impacts to be expected.<br><br>(See also the above responses to various Equator Principles regarding to community aspect) |
| **Performance Standard 5**: Land Acquisition and Involuntary Resettlement | Not applicable | No land acquisition and resettlement is required for the First Phase of the Ouarzazate SPC, 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><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) copy of the authorization of the Supervisory Board about the transaction and d) ONE/MASEN/Community tripartite agreement on land acquisition. The |

| Aspect/requirement | Relation to Ouarzazate SPC | Comment |
|---|---|---|
| | | 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 Ouarzazate SPC site. |
| ***IFC EHS Guidelines*** | | |
| EHS General Guidelines and Sector Specific | Compliant | Where applicable, the SESIA has referred and incorporated the relevant requirements/standards stipulated in the IFC-EHS guidelines. |

| Aspect/requirement | Relation to Ouarzazate SPC | Comment |
|---|---|---|
| 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. |