

Environment and Social Impact Assessment Summary

200 MW Solar Power Project in Radhanesda
Solar Power Park, Gujarat, India

Electro Solaire Private Limited

FINAL REPORT

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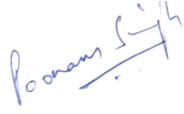
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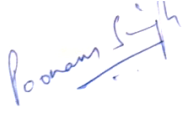
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Revision History

Revision	Revision date	Details	Authorized	Name	Position
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Executive Summary

Electro Solaire Private Limited (ESPL) has been selected for developing 200 MW solar power project after bidding by Gujarat Urja Vikas Nigam Limited for 700 MW grid connected Solar Photovoltaic Power Projects to be set up at Radhanesda Solar Park in Radhanesda village, Vav Taluka, Banaskantha district in the state of Gujarat (Phase III – R). Gujarat Power Corporation Limited (GPCL) has been appointed as a nodal agency for development of the 700 MW Ultra Mega Solar Power Park under the National Solar Mission by Ministry of New and Renewable Energy (MNRE).

Solairedirect Energy India Private Limited, the Indian subsidiary of Engie Solar India Private Limited has incorporated a Special Purpose Vehicle (SPV) namely M/s Electro Solaire Private Limited (hereinafter referred as 'Client'/ESPL) for the development of the 200 MW project. The 200 MW solar power plant is proposed to be set up on 380 hectares (~938.06 acres) of land (two [02] land parcels of 190 hectares each) that has been leased by GUVNL for a period of 25 years to ESPL.

The ESIA has been undertaken as per requirements of International Finance Corporation (IFC) Sustainability Framework (Policy and Performance Standards on Environmental and Social Sustainability) 2012 and the associated World Bank Group Environmental Health and Safety Guidelines, ADB's 2009 Safeguard Policy Statement (SPS), FMO's Social Sustainability Policy and Equator Principles IV (2020).

AECOM India Private Limited (hereinafter referred to as 'AECOM') has been appointed by ESPL to undertake the ESIA study to evaluate environment and social risks and impacts associated with the Project.

The overall area covered by the assessment includes the following constituent areas:

- The footprint of the project, hereafter referred to as the '**Project Site**';
- The area extending 5 km outward from the Project Site boundary (estimated to contain the potential receptors of any project-related environment, social and ecological impacts), hereafter referred to as the '**Area of Influence**' or '**AOI**'; and
- The alignment of the external transmission line, along with the area extending 500 m on either side of the alignment, hereafter collectively referred to as the '**Transmission Corridor**'.
- The 'Project Site', the 'AOI' and the 'Transmission Corridor' are hereafter collectively referred to as the '**Study Area**'.

Project Description

The proposed project site is spread over an area of ~938.06 acres of land in the Radhanesda village of the state of Gujarat in India. The site can be accessed through State Highway (SH) 127 which passes through the village Kundaliya and connects to Radhanesda village at a distance of 8 km from the site. The road further connects to Limbiya village (Limbiya- Baet road) which is an existing government paved road (~3.5 m wide) and runs parallel towards north of the site.

ESPL is in the process of appointing a lump sum Turnkey contract with an Engineering, procurement and construction (Sub-contractor or EPC) contractor for development of this proposed project.

Power Evacuation

Power generated through PV modules will be stepped up to 33kV and will be pooled to main HT panel using breaker feeder. As per information provided by ESPL, a 33kV/220 kV internal common pooling substation (PSS) which will be constructed by GUVNL near the Project Site for all the Solar Power Developers in the Solar Park and the power will be further evacuated through a 400-kV transmission line of length ~35 km. The transmission line will be connected to the 400/200kV Banaskantha substation in Khimanavas village (Inter-Connection Point/Delivery Point), which is situated at a distance of 35 km from the project site. As per the information available, the transmission line corridor is currently under construction and is expected to be commissioned by March 2020.

Access road

The site can be accessed through State Highway (SH) 127 which passes through village Kundaliya and connects Radhanesda village at a distance of 8 km from the site. The road further connects Limbiya village (Limbiya-Baet road) which is an existing government paved road (~3.5 m wide) and runs parallel towards the north of the site. The road leading to the site is an existing paved village road, and thus, no new road will be required to be developed for the project.

Land Requirement

The project land (380 hectares) allotted on lease basis for a period of 25 years to ESPL, is owned by the Gujarat Power Corporation Limited (GPCL). The said land does not include any private or forest land.

Project Activities

Construction Phase

Construction Labour: As informed, during the peak construction phase, 600-700 workers will be employed for a duration of 2-3 months. While most of the workers in the unskilled and semi-skilled categories will be hired from the neighbouring villages and from within the Banaskantha district, the manpower requirement in the skilled and highly skilled categories will be sourced from outside the state. Approximately 30% of the construction manpower will be migrant workers who will be provided accommodation in a labour camp proposed to be built at a distance of 1 km from the project site during the construction phase. **Water requirement:** it is estimated that water requirement for the construction phase will be 100 KL (Kilo litres) which includes water requirements for curing works, sprinkling and batching plant). The water will be sourced through a branch of the Sardar Sarovar Narmada Water canal located at a distance of 40 km from the Project Site. Reverse Osmosis (RO) treated packaged drinking water will be provided to the workers at site (~5000L/day) for peak construction period. One labour camp will be constructed, as reported.

Operation and Maintenance Phase

Water Requirement: During the operation phase, Reverse Osmosis (RO) treated packaged drinking water will be provided to the workers at site (~250L/day). Water for domestic requirement at the site will be ~1 KL and will be sourced through Narmada Canal.

As per the information provided by the Client, GPCL will construct a tank of 10 lakh litres capacity inside the solar park for meeting the water requirement for module cleaning for the entire solar park. Water for module cleaning will be sourced by GPCL through a branch of Narmada canal and will be stored in the tank to be constructed by GPCL for the entire solar park. Assuming a minimum of 2.5 litres of water per module, the water requirement for cleaning the whole plant (i.e. ~10 lakh modules) will be approximately 1,666 kilo litres, at one time. With a cleaning schedule of twice a month, it is estimated that approximately 3,332 kilo litres of water will be required for cleaning purpose on a monthly basis.

Analysis of Alternatives

The proposed project is an opportunity to utilize the solar potential of the state for power generation. A "No Project Scenario" will not address the issue of power shortage. An alternative without the project is undesirable, as it would worsen the power supply-demand scenario, which is expected to be a constraint on economic growth.

There are no fuel requirements or large quantities of water required for the operation of the plant. GHG emissions and other environmental pollution (stack emissions, ash management etc.) issues are also limited. Furthermore, there are minimal social issues associated with solar power projects.

The following additional criteria have been considered for site selection:

- The site is located away from major settlements;
- The site does not fall under any reserved or protected forests;
- The land procured for the site mainly comprises of fallow land which is barren in nature and practically unusable for any other purpose; and
- No environmentally sensitive features such as water bodies, forests, archaeological sites are located in the immediate site surroundings.

Environmental Baseline

A study area of 5 km from the proposed project area was considered for the evaluation of environmental and social existing status and potential impacts.

Ambient Air Quality: All of the parameters measured for ambient air quality were noted to be well within the permissible limits of the National Ambient Air Quality Standards (NAQSS, 2009) for rural area, as defined by MoEF&CC at the sampled locations.

Ground Water quality: The results of ground water sample were compared with acceptable and permissible limits as specified in the drinking water standards - IS 10500:2012. The pH value of the sample was observed to be within the prescribed range, indicating neutral balance. The hardness and total dissolved solids (TDS) value in the groundwater sample exceeds the permissible limit. Chemical parameters such as chloride and magnesium were noted to be exceeding the permissible limit. Calcium was noted to be exceeding the acceptable limit but is within the permissible limit. Other heavy metal parameters such as Selenium, barium, Fluoride, boron were detected in the groundwater sample but were noted to be within acceptable limit. The groundwater sample does not show the presence of faecal coliforms implying that there is no faecal contamination in the groundwater. All other parameters were observed to be within the acceptable limits as specified in the drinking water standard of IS 10500:2012. It can be inferred from the water quality that groundwater contains high number of dissolved solids and has high hardness and thus is not completely fit for human consumption prior to conventional treatment.

Ambient Noise quality: The ambient noise level at location NQ 1 (near the site boundary) was noted to be exceeding the permissible standards of noise levels prescribed by CPCB for day time and night time i.e., National Ambient Air Quality Standards (NAAQS) in respect of noise limits for day time and night time for residential area. The high noise level can be attributed to vehicular movements, ground levelling work being undertaken nearby the site and high wind movement on the day of monitoring. Ambient noise level at NQ 2 (Radhanesda village road) was noted to be within permissible limits for the day time. However, noise levels were noted to be exceeding slightly above the permissible limits for night time. The ambient noise level at location NQ 3 (empty land parcels near the site) was noted to be exceeding the permissible standards for day time whereas the night time levels were within the permissible limits for noise level. The high noise levels at NQ 2 and NQ 3 can be attributed mainly to the high wind velocity on the day of monitoring and some construction activities being undertaken in the area in and around the Project Site (construction of the boundary wall, shops in the near vicinity, etc.).

Soil Quality: The pH values of the soil samples at the project site (SQ1) and around the site (SQ2) indicate normal to slightly saline soil conditions. Electrical conductivity of soil samples indicate that soil at the project site (SQ1) is injurious to most crops and thus indicates high salinity of soil and the soil around the project site falls under Normal category. The relatively high Sodium concentration in Soil sample at the project site indicates highly sodic soil and indicates that the soil has poor soil structure with low infiltration rate and aeration and thus the soil is not suitable for cultivation of many crops. Iron content in the soil samples were noted to be high. Heavy metals such as chromium, cadmium, Mercury were not detected in the soil samples. Whereas other heavy metals such as lead, nickel and arsenic were observed in the soil samples. The texture of soil sample SQ 1, i.e. the soil at the Project site is "Sandy Loam", and the texture of soil sample SQ 2 (around the Project site) is "Sandy".

Traffic Analysis: Out of the total traffic at the Village road, maximum influx and outflux was observed for light vehicles (four wheelers) such as cars, vans (48%), followed by two wheelers (26%). This is followed by Six Wheelers/Heavy Vehicles such as Light Commercial vehicles, Trucks and Buses etc. (24%). Further, cycles amounted for less than 1% of the traffic at the road.

Morning peak hour for maximum traffic influx was noted as 11:00-12:00 hours with 34.1 units. During night, peak traffic was observed at 17:00-18:00 hours with 32.75 units. Daily cumulative traffic movement at the village road was observed to be 335.9 units.

Socio-Economic Baseline

The project area is in Radhanesda village, Vav Tehsil in District of Banas kantha. The project area is spread over 938.06 acres in Radhanesda Village. Radhanesda village falls under the jurisdiction of Radhanesda Village Panchayat. The study area has been further divided into direct impact area (the area where the project will be located) and indirect impact area (within 05 km of the project area). Kundaliya village falls within the 5-kilometre radii of the project.

Biodiversity Baseline:

The Study Area, which includes the estimated areas of influence of both, the Project and its shared facilities, represents a part of the north-eastern fringe of the Little Rann of Kutch. The natural vegetation of the Study Area represents desert thorn scrub forest-type typical to semi-arid tracts of north-western India, including unique edaphic forms, such as Rann Saline Thorn Scrub and *Salvadora* Scrub. The habitat profile of the Study Area consists of a mosaic of near-natural to slightly modified habitats, with the Project Site containing mainly near-natural habitats, such as saline flats, grassland and scrub, while the Transmission Line Corridor contains mainly modified habitats, such as cultivated or fallow farmland, but also a few natural wetlands. The floristic and faunal profiles of the Study Area are characterized by habitat-specialist species of thorny scrub and wetlands. There is considerable presence of the invasive alien species *Prosopis juliflora*, throughout the Study Area. At least three (3) designated areas are situated in the vicinity of the Study Area, at distances of 1.5 km to 17 km from the corresponding nearest point on the boundary of the Study Area. The Study Area is situated within the Central Asian Flyway and in proximity to the East Asia – East Africa Flyway. A critical habitat assessment, involving focused monitoring of the Study Area for identified critical habitat trigger species, has concluded that it is improbable that the Project Site represents critical habitat with respect to the concerned species. The Study Area provides priority provisioning ecosystem services to the local pastoral community in terms of fodder for livestock.

Stakeholder Engagement

- Interaction with relevant government stakeholders GPCL, GUVNL, GEDA officials, Revenue officer of Vav Tehsil, Veterinary Officer of Vav Tehsil as well as Village Panchayat (Local Government) heads of Kundaliya and Radhanesda villages were undertaken;
- Consultations with opinion leaders (leader, principal/teacher of Government School, Radhanesda village) was undertaken;
- Focus Group Discussions with the community members of Radhanesda and Kundaliya villages were undertaken; and
- Consultations with members of Rabari Community (OBC) a pastoral nomadic community was also undertaken.

Environmental and Social Impacts

The Project is a renewable energy project which uses solar energy for power generation. Renewable energy projects are considered to be cleaner compared to fossil fuel-based energy projects. The anticipated impacts during the construction, operation and decommissioning phases and after mitigation have been summarized in the Table below:

Impact Description	Impact Nature	Significant of Impact	Overall Impact after mitigation
Pre-construction and Construction Phase			
Ambient Air Quality	Negative	Moderate	Minor
Soil Quality	Negative	Moderate	Minor
Ambient Noise Quality	Negative	Moderate	Minor
Water resources Quality	Negative	Moderate	Minor
Solid and Hazardous Waste Management	Negative	Moderate	Minor
Impact on Traffic and Transport	Negative	Moderate	Minor
Impact to Occupational Health and Safety of Workers	Negative	Moderate	Minor
Biodiversity and Ecosystem Services (Project)	Negative	Moderate	Minor
Biodiversity and Ecosystem Services (Transmission Line)	Negative	Moderate	Minor
Operational Phase			
Aesthetic and Visual Impacts	Negative	Minor	Minor
Soil Quality	Negative	Moderate	Insignificant
Water Availability	Negative	Major	Moderate
Occupational Health and Safety Hazards Impact	Negative	Moderate	Minor

Impact Description	Impact Nature	Significant of Impact	Overall Impact after mitigation
Biodiversity and Ecosystem Services (Project)	Negative	Moderate	Minor
Biodiversity and Ecosystem Services (Transmission Line)	Negative	Major	Moderate
Employment Opportunities	Negative	Minor	Moderate
Impact on local economy	Positive	Minor	Moderate
Labour Rights and Welfare	Positive	Moderate	Minor
Decommissioning Phase			
Environment and Occupational Health and Safety Impact	Negative	Moderate	Minor
Impact on Land Due to Improper Waste Disposal	Negative	Major	Moderate
Biodiversity and Ecosystem Services (Project)	Negative	Moderate	Minor
Biodiversity and Ecosystem Services (Transmission Line)	Negative	Moderate	Minor
Employment Opportunities	Negative	Moderate	Minor

Based on the above impact assessment matrix, impacts due to Project and transmission line has been identified and all the impacts identified can be managed through mitigation measures. Mitigation measures for each identified impact have been provided, along with the overall significance of the impact, before and after application of the mitigation measures.

An Environmental and Social Management and Monitoring Plan (ESMMP) has been developed to ensure that social and environmental impacts, risks and liabilities identified during the ESIA process are effectively managed during the operation and closure of the proposed project. The ESMP delineates the monitoring and management measures to avoid and/or minimize the identified impacts by allocating management responsibility and suggesting skill requirement for implementation of these measures.

