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FINAL

ESIA for 300MW Solar Project, Barmer, Rajasthan, India

Prepared for: Avaada Suryapower Pvt. Ltd.

EXECUTIVE SUMMARY

Project Background

Surbana Jurong India Pvt. Ltd. (SJIPL) has been entrusted by Avaada Suryapower Pvt. Ltd. for undertaking Environmental and Social Impact Assessment (ESIA) of 300 MW solar Power Plant in Giral & Jalila Villages, Taluka- Sheo, Barmer District, Rajasthan, India. The project site is connected through the village access road of approximately 7 km, that is directly connecting the site with the existing National Highway – 68.

The land identified for the project is around 1000 acres, of land, wherein 940 acres of project land (private land) has already been leased and for 17.64 acres of government land, the Avaada land team is in the process of undertaking the land on lease. The duration of the project is said to be around 29 years and 11 months.

Solar PV modules based on Bifacial Topcon technology have been proposed for this plant. The PV Power from Solar panels will be converted to AC through 4.4MW grid connected central Inverters. The 300MWac Solar plant will have 36 blocks of approximately 8.33 MW each, with an overall DC capacity of 401 MWp. The inverters will be connected to the grid via step-up inverter transformers at the 33 kV level, which will then step up to 220 kV through two 135/160 MVA, 220/33-33 kV solar transformers.

The evacuation system for 300 MW Solar PV Power Plant is proposed to connect at 220kV voltage level, utilizing a single-circuit radial line to be connected at the 765/400/220 kV Fatehgarh IV ISTS Substation. The Transmission Line length is approximately 22 km comprising ~78 towers.

SJIPL team conducted site visit held from 8th to 10th July, 2025 during which the project was under land leasing stage and no construction commenced.

Applicable Framework

Environmental and social regulations (with subsequent amendments) and policies in India and state of Rajasthan that are applicable to the project have been considered and discussed in Chapter 3 of the report.

The International standards referred for the project were:

- IFC performance standards (2012)
- Equator Principles, 2020
- ADB safeguard Policy statement 2009
- Sustainable Development Goals

Applicability of IFC Performance Standards is given below:

S.No.	Performance Standard	Description and Applicability
1.	PS1 – Assessment and Management of Environmental and Social Risks and Impacts	Applicable PS 1 is applicable to the project as there are aspects such as air pollutant emissions, noise pollution, wastewater generation, waste generation (including hazardous wastes) etc. associated with project related activities.
2.	PS2 – Labour and Working Conditions	Applicable The project will engage direct workers, workers engaged through third parties (contracted workers), as well as workers engaged by the

S.No.	Performance Standard	Description and Applicability
		developer's primary suppliers (supply chain workers) for both construction and operation phase.
3.	PS3 - Resource Efficiency and Pollution Prevention	Applicable As the project activities envisage waste generation, wastewater generated from project site, discharge runoff; biodiversity impacts, etc.
4.	PS4 – Community Health, Safety and Security	Applicable The proposed project will involve transportation of construction material and movement of construction machinery which may pose safety risks to the affected communities/stakeholders.
5.	PS5 – Land Acquisition and Involuntary Resettlement	Solar Park- Not Applicable The solar power project is proposed to be spread across 1000 acres of land, wherein 940 acres of project land, including 17.64 acres of government land has already been leased. No forest land is involved for the project. The private land for the project were procured on Willing Lessor -Willing Lessee (WLWL) basis for 29 years and 11 months with landowners had the right to refuse the land lease. No involuntary restriction on land use and access to natural resources cause a community people to lose traditional or recognizable usage rights is observed or anticipated by the project footprint. No economic/ physical displacement is observed or anticipated due to land procurement. As indicated earlier no sharecropper/ dependency on the project land for earning livelihood could be observed. No instruments of involuntary nature is employed for project specific land procurement. However, open grazing was seen both in the private and government lands, but it was noted that livestock has been kept by the landowners essentially for their food security purposes and does not have any direct source of income from grazing. Transmission Line-Applicable The transmission line (requiring 78 towers over 22 kilometres approx.) will pass mostly through private land. The land procured and/ or will be procured by obtaining land use rights from landowners through a one-time compensation negotiated mutually, as mentioned by the land team. However, concurrence on the route of transmission line is yet reached or finalised, as noted during our assessment period. Right of Way for transmission tower and transmission line will be taken based on Indian Telegraph Act, 1885 and The Indian Telegraph Right of Way Rules, 2016 with payment of compensation as per these regulatory provisions.
6.	PS6 – Biodiversity Conservation and Sustainable Management of Living Natural Resources	Applicable The Project Site, as well as the estimated area of influence of the project, contain natural and modified habitats. The Project infrastructure & activities can potentially impact biodiversity & ecosystem services.
7.	PS7 – Indigenous People	Not Applicable The project does not fall under the Schedule V Areas as defined in the Indian Constitution under Article 342.

S.No.	Performance Standard	Description and Applicability
8.	PS8 – Cultural Heritage	Not Applicable There is no evidence of any historically significant or archaeological site in or around the project site of state or national importance.

Baseline Environmental, Biodiversity and social aspects

To understand and assess the environmental, ecological and social risks associated with the project, baseline data were collected within the study area considering:

- Core project site area
- Buffer area covering 5km radius around the project site and 500 metres buffer area on either side of the transmission line.

The project area falls under the Thar formation and is represented by fine aeolian sand and silt with occasional kankar. The elevation at site ranges from 226 metres to 258 metres above mean sea level. The landuse of project area majorly falls under 'Open Land/Fallow Land/Waste Land' category. No major drainage exists in the project area except few ephemerals streamlets and interdunal area. As per CGWB, groundwater in the Barmer district and project area is categorized as "Over exploited". Seismically, the Barmer district falls under Zone III: Moderate Damage Risk Zone.

Environmental Assessment:
Baseline environmental monitoring for ambient air, ambient noise, surface & ground water and soil was carried out by NABL Accredited laboratory in May 2025. The parameters measured for ambient air and noise quality within the permissible limits prescribed by CPCB/MoEFCC. The surface water sample collected from nearest pond located in Giral was found to be unfit for uses like drinking & outdoor bathing. Due to absence of any source in the study area, groundwater monitoring was not carried out. The soil monitoring results, and site conditions suggest that poor quality of soil. The texture of the soil samples indicate that they are sandy in nature.

Biodiversity Assessment:
The habitat profile of the Study Area is observed to be dominated by modified habitats interspersed with patches of natural habitats. The natural habitats mainly consist of near-natural to moderately degraded shrubland, forest, grasslands and natural inland wetlands. The natural inland wetlands mainly include small seasonal and perennial streams and lakes. The modified habitats mainly consist of arable lands, heavily degraded former forest, plantations and built spaces comprising rural habitation and semi-urban areas and wetlands such as ponds and reservoirs.

The result of a generic free screening using the Integrated Biodiversity Assessment Tool (IBAT) against the IUCN Red List indicates that at least 831 IUCN Red List assessed species potentially occur within 50 km of the centre of the Project Area, of which 35 qualify globally threatened. Based on review of the available government documents and observations recorded during the field visit, at least 37 species of higher flora, 25 species of mammals, 92 birds, 14 reptiles and 1 amphibian potentially occur in the Study Area. The Critical Habitat Screening identified 14 CH Candidates, all of which were ruled out as potential CH Triggers based on the available information and criteria defined in IFC PS6.

Social Assessment:

As part of social assessment, primary and secondary data was gathered. The primary data has been obtained through consultations with the landowners, village Sarpanch, Project Affected Families, opinion leaders (leader, principal/teacher at Government School, Giral village), community members of Giral village (Focus Group Discussions), grazing community representatives and other villagers interested in the project has been taken as the primary source of information; whereas the secondary data was sourced from Census Data 2011.

There are only two Core zone villages (Giral and Jalila) where solar plant project shall be located. The total population of Core zone as per 2011 Census of India data is 1,174 living in 229 households. The condition of literacy is below the state average Core zone level, i.e., 52.36%. The female literacy rate is significantly 26.61% in comparison to 73.03% male literates. Similarly, the literacy rate at Buffer zone villages is 52.19%, female literacy rate is 30.70% and male literacy rate is 70.59%. Similarly, the vulnerable community, 29.74% is SC population and no ST population.

A **Need Base Assessment (NBA)** was conducted to understand the socio-economic context and development priorities of the communities in and around the proposed solar power project site and to identify existing gaps and key areas where project-linked Corporate Social Responsibility (CSR) or community development initiatives could improve the quality of life for the affected and surrounding populations. The thematic areas covered under this study included following:

- Education: Anganwadi Centres (AWC), Primary School Education, Secondary School Education, College and Higher Education
- Sanitation & Hygiene: Drinking water, Toilet, Drainage system
- Health: Public Health Centres, Health Camps
- Livelihood: Agriculture/ Irrigation, Employment opportunities in the area

Human Rights Risk Assessment (HRRA) for the project was carried out which integrated a review of secondary literature and project documentation with field-level insights gathered through stakeholder consultations. This provided a contextual understanding of potential and actual human rights risks and impacts associated with the project during its pre-construction and construction phases. The HRRA was undertaken in alignment with key human rights instruments, including the International Labour Organization's (ILO) Fundamental Conventions, the Universal Declaration of Human Rights (UDHR), the International Covenant on Civil and Political Rights (ICCPR), and the International Covenant on Economic, Social and Cultural Rights (ICESCR). National legislative frameworks and applicable human rights standards were also taken into consideration during the assessment. The assessment identified moderate human rights risks primarily related to land use and livelihood, community health and safety, and labour and working conditions. Mitigation measures and management actions have been recommended to strengthen the project's human rights performance and ensure alignment with international best practices.

Key Impacts and Mitigation:

The activities which will be carried out during pre-construction, construction, operation and decommissioning phase are considered for identifying impacts of the project on identified receptors. The activities during the pre-construction and construction phase include site preparation, excavation and levelling, establishment of site office and labour camps, storage and handling of construction material, erection of concrete, transportation of construction material, generation of waste construction material, storage, handling and disposal of solid, hazardous and construction waste material, excavation works and foundation works, earth works, installation of solar panels, etc. Operation phase involves operation and maintenance (O&M) of equipment, electrical works as installation of overhead electrical structures, signalling post, power sub-station, etc.

Key environmental and social components considered for above are as follows:

- Air Quality: Fugitive dust, gaseous emissions, fuel emissions, etc.
- Water Quality: Water requirement for construction, domestic and panel washing, wastewater discharge
- Land: Soil erosion, soil contamination, waste disposal, aesthetic changes etc.
- Noise & Vibration: Noise & vibration due to construction activities, maintenance activities, vehicular movement, etc.

- Biodiversity: Vegetation clearance leading to habitat loss, fragmentation or degradation, disturbance to wild fauna, loss of ecosystem services, etc.
- Socio-economy: Impact on landowners, employment opportunities, migrant labour, etc.
- Occupational Health & Safety: Safety of workers, exposure to hazardous materials, etc.
- Community Health & Safety: impact on community infrastructures, health and safety of community.

Each of the anticipated impacts for the construction, operation and decommissioning phases without mitigation and after mitigation have been evaluated considering its spread, duration, intensity and nature. Overall significance of these impacts is presented at pertinent places in the report.

Environment and Social Management Plan:

Environmental and Social Management Plan (ESMP) has been developed to ensure that social and environmental impacts, risks, and liabilities identified during the ESIA process are effectively managed during the pre-construction, construction, operation and closure of the proposed project. It will act as a tool to measure and check, in a continuous mode, the efficacy of the mitigation measures and project commitments incorporated in the ESIA to minimize or eliminate identified negative impacts. The ESMP has been designed to align the schedule for implementation of management plans. Key plans formulated under the ESMP are Waste Management (including hazardous waste), Water Management, Storm Water Drainage, Occupational Health and Safety Management, Community Health and Safety Management, Contractor and Labour Management, Worker's Accommodation, Gender Action Plan, Emergency Preparedness and Response, Green Belt Development and Biodiversity Management. Tentative budgetary allocation for implementation of EMP has also been provided.

Climate Change and Risk Assessment:

To assess the climate-related risks and opportunities associated with the construction and operation of the proposed Project, a detailed Climate Change Risk Assessment (CCRA) study was conducted for this project in line with Task Force on Climate Related Financial Disclosures (TCFD/EP4) guidelines. Impacts due to the project with respect to climate change were identified for construction, commissioning and operational phases of the project and were categorized based on high, moderate and low risk.

Out of climate-related physical risks and associated financial impacts during construction and commissioning phase, one was identified as high risk (potential heat stress/heat fatigue/other heat related illness to workers) and one as moderate (potential shutdown and damage to construction equipment and structures), remaining were low.

For operational phase, one climate-related physical risks and associated financial impacts are identified as moderate (potential shutdown and damage to construction equipment and structures), rest all low.

Overall climate-related transition risks and opportunities with associated financial impacts during both construction and operational phase that were identified as low as it is a clean and renewable energy project.

The transition opportunities have also been identified under sustainability scenario. The project appears to be compatible with India's NDC and in line with India government's current national energy policy to meet the increasing energy demand if the project considers the recommendations in addition to the proposed mitigation measures that would be adopted to tackle the climate change related physical and transition impacts.

Project Categorization and Justification

As per the IFC criteria. This project has been categorized as "**Category B**", due to following reasons:

- Solar projects are clean technology for generation of electricity
- The Project Site does not coincide or overlap with any Designated Area

- No resettlement and rehabilitation involved in the Project
- Private land and government land is being leased for developing the solar project site and transmission line
- The project site does not fall under scheduled V area and no land parcels belonging to ST community is being leased

Available data and assessment suggest that the construction, operation and decommissioning of the proposed solar power project are envisaged to have limited environmental and social impacts which can be readily addressed with mitigation measures