Environmental & Social Impact Assessment of 105.90 MWp Solar Power Project in Village Chormar, Jandwala Jattan, Salamkhera, District-Sirsa, Haryana, India

PREPARED FOR

CleanMax

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Executive Summary

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EXECUTIVE SUMMARY

E.1 Project Background

Environmental Resource Management (ERM) India Private Limited (hereinafter referred as "ERM") was commissioned by M/s. CleanMax (hereinafter referred to as "CleanMax" or "Client") to undertake Environmental and Social Impact Assessment for a proposed 105.90 MWp solar power Project located in villages: Chormar khera, Jandwalan Jattan and Salamkhera; Tehsil Dabwali, Sirsa District in the state of Haryana (hereinafter referred to as "Project").

M/s. CleanMax Terra Private Limited, an SPV of CleanMax Enviro Energy Solutions Private Limited (hereinafter referred to as "Company"), is a company incorporated under the provisions of the Companies Act, 2013 and having its registered office at 33, Ashoka Apartment, Rungtha Lane, Off Napeansea Road, Mumbai-400006 and address for correspondence at 4th Floor, The International, 16 Maharshi Karve Road, New Marine Lines Cross Road No.1, Churchgate, Mumbai-4000020.

ERM undertook a site reconnaissance visit of the Project site from 23rd January to 25th January 2024 (03 days) to obtain data on the environmental conditions for the various identified parameters along with an assessment of socioeconomic conditions, and biodiversity related parameters. Further Environmental baseline data collection was undertaken from 23rd January to 28th January 2024.

E.2 Project Overview

CleanMax Enviro Energy Solutions Private limited is developing a 105.90 MWp Solar Power Project located at central geo-coordinate (29°46'54.15" N, 74°50'21.44" E) in Villages-Chormarkhera, Jandwala Jattan and Salamkhera, in district Sirsa, in the state of Haryana, India, of which M/s CleanMax Terra Private Limited is developing a 19.8 MWp Solar Power Project.. The Project Site consists of a solar park of 105.78 Ha (261.3875 acres), a transmission line tower footprint of 0.19 Ha (0.463 acres), and a transmission line right of way (RoW) of 12.69 Ha (31.3815 acres) with elevation ranging from ~189 m to ~217 m above mean sea level (amsl). As observed during the site visit, 80% area of the Project Site has been demarcated by concrete boundary walls on all sides. The Project is currently in the construction phase with activities including the installation of transmission line foundations and erection work, as well as the completion of piling work for a 14 MW capacity completed. The villages impacted due to transmission line tower footprint and RoW include Salamkhera and Nuhiyanwali. Further, Salamkhera village will be affected by access road and movement of vehicles, localized opportunities for employment in the construction phase and localized stress on common natural resources (e.g., water, power, land availability, etc.), since 85% of the Project land is located there.

The Ghaggar is a significant seasonal river located about 52.5 km from the proposed project site, flowing through Sirsa, Rania, Ellenabad, and part of Baragudha blocks. After Ottu Weir (Ch. Devi Lal Weir), it turns westward. Two canals, the northern and southern Ghaggar,

originate from Ottu Weir. The river can flood during monsoons, damaging crops and property. The river's length in the district is approximately 85 km.

The proposed site is accessible via National Highway 09 (Old NH 10), about 2.07 km away, to be used for light and heavy vehicles during construction. Sirsa Railway Station, around 40 km from the site, is the nearest commercial railway station. The closest airport is Shaheed Bhagat Singh International Airport in Chandigarh, approximately 243.3 km away.

According to Biogeographic Zones of India the landscape of Sirsa district is classified as 4A: Semi- Arid -Punjab Plains. The district is under intensive cultivation and therefore it is deficient in natural forests. The predominant vegetation types are Tropical Thorn Forest dominated by trees such as *Acacia senegal, Acacia leucophloea* and *Prosopis cineraria*. The annual temperature in the region ranges from 21 – 46 ºC.

E.3 Applicable Reference Framework

The applicable reference framework for the proposed ESIA study is as follows:

- Applicable national and state legislation, regulations, policies and standards in relation to the planning/pre-construction (land procurement), construction, operation and decommissioning of solar Project and associated facilities in India and relevant to environment, health, safety, labour, land acquisition, stakeholder engagement and indigenous peoples (as relevant);
- IFC Performance Standards (2012);
- IFC/World Bank General Environmental Health & Safety (EHS) Guidelines (2007);
- IFC/World Bank EHS Guidelines for Electric Power Transmission and Distribution (2007);
- IFC/EBRD Workers' Accommodation: Process and Standards;
- IFC's Good Practice Handbook on Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets;
- In particular, for Haryana Solar Energy Policy, 2016
- Traditional or customary land ownership use and access rights and
- IFC Utility Scale Solar Photovoltaic Power Plants: A Project Developer's Guide (2015).

Where there is a discrepancy between the prevailing environmental and social standards in India on noise limits, health etc. and the corresponding standards published by the IFC/ World Bank General EHS Guidelines, ERM will incorporate the more stringent standards.

E.3.1 Applicability to IFC Performance Standards

The following IFC Performance Standards are applicable to the Project:

TABLE 0.1 IFC PERFORMANCE STANDARDS AND THEIR APPLICABILITY

Description	Applicability	Objectives and Applicability to Project
IFC PS 1 - Assessment and Management of Environmental and	Yes	This PS aims to assesses the existing social and environmental management systems of Project Company and CleanMax to identify the gaps with respect to their

Description	Applicability	Objectives and Applicability to Project
Social Risks and Impacts		functioning, existence and implementation of an environmental and social management plan (ESMP), a defined EHS Policy, organization chart with defined roles and responsibilities, risk identification and management procedures as well as processes like stakeholder engagement and grievance management. This ESIA is being conducted as part of the "identification of risks and impacts" requirement under the IFC PS 1. The management plan prescribed in this ESIA report will be implemented for mitigation of impacts identified.
IFC PS 2 - Labour and Working Conditions	Yes	This PS is guided by a number of international conventions and instruments on labour and workers' rights. It recognises that the pursuit of economic growth through employment creation and income generation should be accompanied by protection of fundamental rights of workers. The PS covers following themes: human resource policy and management, workers' organization, non-discrimination and equal opportunity, retrenchment, protecting the workforce and occupational health and safety. This PS helps to assess the status of the employees and workers in CleanMax as well as any contractors. The Project is in construction phase and during site visit there were approximately 86 skilled, semi-skilled and unskilled labourers at site were employed at the Project site. Similarly, 15 employees and worker will be engaged during operation phase. CleanMax has a dedicated contractor management plan and Corporate level HR policies in line with IFC standards. The Project company will ensure that the HR policy in line with Corporate level HR policy is followed.
IFC PS 3 - Resource Efficiency and Pollution Prevention	Yes	PS-3 covers the use resources and materials as inputs and wastes that could affect human health. The objective of PS-3 are to avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities; to promote more sustainable use of resources, including energy and water, and to reduce project related GHG emissions. Key themes covered under PS-3 are: pollution prevention, resource conservation and energy efficiency, wastes, hazardous materials, emergency preparedness and response, greenhouse emissions, pesticide use and management. This PS will assess how CleanMax intends to minimize pollution related impacts, management plans and systems are in place, and measures it plans to take to conserve and use resources more efficiently.

Description	Applicability	Objectives and Applicability to Project
		The Project construction activities will lead to increased fugitive dust emissions, especially in the area it is being developed due to the presence of limited vegetation. The project activities will also lead to increase in ambient noise level during the construction phase which may impact the villages namely Salamkhera (located at a distance of 2.7 Km at SE direction, Jandwala jatta (located at a distance of 1.4 km at NW direction) and Chormar khera (located at a distance of 2.19 km at NE direction) in the study area. In addition to this, the project activities will involve generation of waste. Source of the water will be tanker water from the nearby community which may cause significant stress on the existing source of water. However, wet module cleaning will be opted for solar panels cleaning during operation phase so water will be required for drinking purpose and for business only. Therefore, PS 3 is applicable to the Project.
IFC PS 4 - Community Health, Safety and Security	Yes	This PS-4 requires due diligence to anticipate and avoid adverse impacts on the health and safety of the affected community during the project life from both routine and non-routine circumstances. It also requires ensuring that the safeguarding of personnel and property is carried out in accordance with relevant human rights principles and in a manner that avoids or minimizes risks to the affected Communities. Key areas of compliance screened under PS-4 includes: infrastructure/equipment safety, hazardous material safety, natural resource issues, exposure to disease, emergency preparedness and response, and security personnel requirements. The Project would affect the health and safety of the communities adjacent to it during construction phase. The Project will involve construction activities that will lead to stress on the Project access road and on the area in general. Transportation of equipment and increased traffic in the area may lead to accidents and other threats on community health and safety. Therefore PS 4 is applicable to the Project.
IFC PS 5 - Land Acquisition and Involuntary Resettlement	Yes	Not Applicable PS-5 requires Project proponents to anticipate and avoid, or where avoidance is not possible, minimize adverse social and economic impacts from land acquisition or restrictions on land use. The key themes covered under this are: compensation and benefits for displaced persons, consultation and grievance mechanism, resettlement planning and implementation, physical displacement,

Description	Applicability	Objectives and Applicability to Project
		economic displacement. The PS-5 also prescribes private sector responsibility to supplement government actions and bridge the gap between governments assigned entitlements and procedures and the requirements of PS-5. As per the information provided, a total of ~105.686 hectares (261.3875 acres) of land is required for the Project. As informed by the land owners and land aggregator that the land is being taken on lease from the landowners for period of 29 years and it was also informed that Project will not result in any physical displacement. The land is private agriculture land but the area is ground water & rain deficit therefore the farmers are struggling for income from cultivation. As per the consultation held with the landowners; the landowners are willing to give their land so that they could have a fixed income.
IFC PS 6 - Biodiversity Conservation and Sustainable Management of Living Natural Resources	Yes	PS 6 aims to protect and conserve biodiversity; to maintain the benefits from ecosystem services; and to promote the sustainable management of living natural resources through the adoption of practices that integrates conservation needs and development priorities.
IFC PS 7 - Indigenous Peoples	Not Applicable	This Performance Standard applies to communities or groups of Indigenous Peoples who maintain a collective attachment, i.e., whose identity as a group or community is linked, to distinct habitats or ancestral territories and the natural resources therein. PS-7 endeavor to ensure that the development process fosters full respect for the human rights, dignity, aspirations, culture, and natural resource-based livelihoods of Indigenous Peoples. Key themes covered under PS-7 are: avoidance of adverse impacts, consultation and informed participation, impacts on traditional or customary lands under use, relocation of IPs from traditional or customary lands, and cultural resources. As confirmed during community consultations, interview with land aggregator and consultation with the Project team, no indigenous peoples will be affected by the Project activities and no ST land will be purchased. As per the discussion with Project team and the local community, all the land procured for the solar plant is private land and there is no common property resource in the procured/leased land parcels. The Project does not envisage adverse impacts on communities of Indigenous peoples. Therefore, PS 7 is not applicable to the Project.

Description	Applicability	Objectives and Applicability to Project
IFC PS 8 - Cultural Heritage	Not Applicable	For the purposes of PS-8, cultural heritage refers to (i) tangible forms of cultural heritage; (ii) unique natural features or tangible objects that embody cultural values; and (iii) certain instances of intangible forms of culture that are proposed to be used for commercial purposes. The requirements of PS-8 apply to cultural heritage regardless of whether or not it has been legally protected or previously disturbed. As confirmed during ERM site visit, no cultural heritage will be affected by the Project activities. Therefore, PS8 is not applicable to the Project.

E.3.2 Project Categorization and Justification

Based on the assessment as per IFC categories, the Project has been categorised as **Category B** based on the following reasoning:

- **Potentially limited risks/impacts and reversible**: Environmental, ecological and social impacts of the Project are anticipated during the construction phase and will encompass changes in land-use, increased noise levels, changes in air quality, use and changes in water quality, impacts on terrestrial ecology, occupational health & safety, etc. Further, there is no physical displacement involved in this project.
- **Unprecedented**: Development of solar power projects is occurring in large numbers in the last decade and therefore several such projects are located across India. A solar power project can therefore not be considered an unprecedented activity. Furthermore, there are upcoming solar power projects (Proposed Solar Power Project of Sunsure Groups and Aller Energy) located within approximately 35-40 km of the proposed 105.90MWp project).
- **Limited adverse impacts on the baseline**: Solar based energy development is a less polluting source of energy and thus is not likely to lead to any adverse impacts on the baseline environment during the operation phase. In terms of social impacts, the land required is composed of private agricultural land. The site location of the project does not involve any anticipated settlements and physical displacement.

E.4 Baseline Conditions

E.4.1 Environmental Baseline

The land use is primarily scrub land in the study area (5 km) of solar project contributing majorly falls under Agricultural land i.e., 93 % followed by built-up area 3.7% and Open Scrub i.e. 1.2 %.

According to the CGWB brochure (2016), Sirsa district has a tropical desert climate with hot, dry summers and cold winters, except during the monsoon season. There are four seasons: hot weather (mid-March to late June), monsoon (late June to September), post-monsoon (September to October), and winter (late November to early March). The district receives an average annual rainfall of 318 mm, mostly during the monsoon season (80% from late June to

September). July and August are the wettest months. The temperature ranges from 48°C in summer to 1°C in winter. Humidity peaks in August, with 89% in the morning and 19% in the evening.

Based on satellite images and an ERM site visit, the proposed solar power plant is situated at an elevation of 189 m to 217 m above mean sea level, with a slight slope from west to east. The topography varies from flat terrain to slight undulations. Analysis of the digital elevation indicates elevations ranging from 189-197 m above mean sea level, contributing to the area's undulating nature.

The district is poor in mineral resources. Kankar and saltpeter are the only minerals found in the region. Small deposits of kankar are found at places in the sandy tract. Saltpetre occurs in waterlogged areas of Sirsa. A number of refineries exist in the area for extraction of saltpetre. The Project site is not underlain by any important mineral resources. The soil characteristics were assessed as follows: Soil pH ranging from 7.1 to 7.4 indicates strong alkalinity, attributed to a high calcium carbonate content, hindering nutrient absorption by plants. Electrical conductivity (EC) values of 299 and 355 mmhos/cm suggest a low concentration of soluble salts, deemed adequate for germination. However, the levels of essential soil micronutrients, including iron (6962-8035 mg/kg), copper (10.04-10.76 mg/kg), and zinc (23-29 mg/kg), were found to be deficient, which could significantly impede plant growth and metabolism. Therefore, despite favorable EC values, the soil lacks crucial metals and micronutrients essential for healthy plant development.

According to the CGWB brochure (2016), the Ghaggar River is the primary drainage system in Sirsa District, flowing through Sirsa, Rania, Ellenabad, and Baragudha blocks before turning west at Ottu Weir (Ch. Devi Lal Weir) and exiting near Kariwali village into Rajasthan. The river, which is dammed at Ottu to form the Northern and Southern Ghaggar canals, is about 85 km long in the district. Monsoon rains can cause flooding, damaging crops and property. A site visit confirmed no natural water bodies within the project site or a 2 km radius, only small artificial ponds used for livestock and irrigation.

Groundwater recharge in Sirsa District comes from inflow, rainfall, canal seepage, irrigation return, and surface water percolation. The district has unconfined aquifers down to 60 m depth, with fine to medium sand mixed with kankar. The depth to water level ranges from 10-20 m below ground level (bgl), with the shallowest at 2.27 m bgl in Chikani Dhab village. Water levels are rising in Dabwali, Odhan, Baragudha, and Natusari Chopta, but declining in Sirsa, Rania, and Ellenabad due to overuse.

According to the groundwater assessment undertaken by CGWB for Sirsa district in 2016[1], the chemical quality of ground water in the district has been studied from the available data of chemical analysis of water samples collected from the National hydrograph network stations located in various parts of the district. The analytical data of ground water samples indicate that the ground water of the district is, in general, alkaline and saline in nature.

Groundwater samples from the Project AoI were analyzed against IS: 10500:2012 standards, revealing a pH of 7.19 (within the acceptable range of 6.5 to 8.5), slight turbidity exceeding

[1] Sirsa.pdf (cgwb.gov.in)

the 1 NTU limit, TDS levels of 1512 and 1520 mg/L (above the acceptable limit of 500 mg/L but within the permissible 2000 mg/L), total alkalinity of 518 and 540 mg/L (above the 200 mg/L acceptable limit but within the 600 mg/L permissible limit), and total hardness of 190 and 480 mg/L (exceeding the 200 mg/L acceptable limit). Fluoride levels were 0.2 and 0.4 mg/L (within the 1.5 mg/L permissible limit), and no total coliform or E. coli were detected. Concentrations of heavy metals, trihalomethanes, and pesticide residues were below detectable limits. The groundwater is unsuitable for drinking or domestic use without conventional treatment but can be used for construction with prior government approval.

Surface water samples were analyzed against CPCB standards, showing pH levels ranging from 7.01 to 7.8, within the acceptable range but slightly alkaline. Dissolved oxygen (DO) concentrations were 5.9 and 6.2 mg/L, while turbidity was below 1 NTU, meeting the acceptable limit. Total dissolved solids (TDS) were 162 and 332 mg/L, below the acceptable limit of 500 mg/L. Fluoride was below the detection limit, complying with the permissible limit of 1.5 mg/L. Total coliform and E. coli were not detected, meeting standards for surface water. Heavy metals, trihalomethanes, and pesticide residues were within acceptable and permissible limits. Based on these results, both samples (SW-1 and SW-2) are classified as "Class A," meeting the criteria for best use classification.

The equivalent ambient noise levels during the day (Leq day) at N1, N2, N3, and N4 monitoring locations were 55.9, 54.2, 52, and 52.7 dB(A) respectively. Although the noise level at N1 slightly exceeded the CPCB daytime limit of 55 dB(A), possibly due to nearby anthropogenic activities, the levels at N2, N3, and N4 were within the prescribed limits. During the night (Leq night), the noise levels at N2, N3, and N4 were 41.3, 40.8, and 43.3 dB(A) respectively, all falling within the CPCB limit of 45 Leq dB(A), except for N1, which was slightly above at 45.7 dB(A).

Particulate matter (PM_{10}) and ($PM_{2.5}$), Sulphur Dioxide, Nitrogen Oxide and Carbon Monoxide (CO) were found within the prescribed limits for all the four location of the Project site.

Based on data provided by the Building Materials & Technology Council (BMTPC) and Haryana State Disaster Management Authority, the Project site is situated in Zone II with MSK VI classification for earthquakes, indicating a low risk of damage from seismic activity. However, the area experiences high wind velocities, with a classification as a high damage risk zone for cyclones. Fortunately, the site is not susceptible to flooding incidents nor prone to drought. These assessments provide valuable insight into the potential natural hazards that could affect the Project, guiding appropriate mitigation and preparedness measures to ensure safety and resilience.

E.4.2 Social Baseline

Haryana is located between 27°39' to 30°35' N latitude and between 74°28' and 77°36' E longitude and is a landlocked state in north India. It shares its borders to the west with Punjab, to the north with Himachal Pradesh, to the east with Uttar Pradesh, to the south with Rajasthan, and surrounds Delhi to the north, west, and south.

Haryana has a total population of 2.53 crore[2] (Census, 2011) and has a geographical area of 0.44 lakh[3] sq. km. The population density of the state is 573 persons per sq. km. in 2011 (as compared to 478 persons per sq. km in 2001). Haryana has 6 administrative divisions, 22 districts, 74 sub-divisions, 95 tehsils, 49 sub-tehsils, 143 blocks, 154 towns, and 6841 villages. Its capital is Chandigarh, which it shares with the neighboring state of Punjab.

About 35% of the population of Haryana is urban. The state has a lower sex ratio as compared to India; 879 females per 1000 males as compared to India's sex ratio, which stands at 943 (Census, 2011). The state has a striking child sex ratio (0-6 years) of 834 girl children to every 1000 boys. A declining or a low child sex ratio indicates a drop in the future adult sex ratios, implying an unequal demography.

The state has a literacy rate of 75.6%, which is slightly higher than India's overall literacy rate of 73%. The male literacy rate is relatively higher at 84.1% while the female literacy rate is 65.9%, which is comparable to the national female literacy rate of 65.5%.

The state holds 5th rank in terms of Scheduled Caste[4](SC) population with a proportion of 20.2% of the total population, while the state has no Scheduled Tribe[5](ST) population.

As per the District Census Handbook, 2011, the district of Sirsa has a total area of 4,277 sq. km. with a total population of 1,295,189 persons and a population density of 303 persons per sq. km. The district has 334 Gram Panchayats, 7 Panchayat Samitis and the Zila Parishad.

According to Census 2011, the Project footprint area (solar plant and transmission line ROW) specifically comprises a SC population of 30%, and the overall study area encompasses a slightly higher SC population at 31%. Notably, there are no records of ST population in Haryana.

The major social group in the village includes Punjabi Sikhs who are classified as General Caste6, while Kumihars, Totars, and Bagri are the major Other Backward Classes (OBCs).7 The major SC sub-caste include Harijan, Mazhabi Sikhs, and Meghwals.

The settlement pattern in villages of the study area has a medium degree of nucleation with dominant caste groups occupying the middle part of the village while marginalized groups like SC communities occupying the periphery of the village boundary.

The Project Villages comprise 1315 households with a population of 6779 individuals. The entire population in the Study Area falls in the rural category. Chormarkhera village has the highest sex ratio amongst the Project villages. The AoI has a sex ratio of 908 females per 1000 males, which is higher than the district figure (897) as well as the state figure of 879.

[2] A crore denotes ten million and is equal to 100 lakh in the Indian numbering system.
[3] A lakh is a unit in the Indian numbering system equal to one hundred thousand.
[4] The official name given in India to the lowest caste, considered 'untouchable' in orthodox Hindu scriptures and practice, officially regarded as socially disadvantaged. The constitution defines them as the **castes**, races or tribes or parts of or groups within such **castes**, races, or tribes as are deemed under Article 341 to be **Scheduled Castes** for the purposes of the **Constitution**
[5] The tribes or tribal communities or parts of or groups within tribes or tribal communities which shall for the purposes of this Constitution be deemed to be **Scheduled Tribes**
[6] General caste is a term used in India to denote castes which are not listed in SC, ST or OBC reservation lists.
[7] The Other Backward Class (OBC) is a collective term used by the Government of India to classify castes which are educationally or socially backward. It is one of several official classifications of the population of India, along with general castes, Scheduled Castes and Scheduled Tribes (SCs and STs).

The total literacy in the Study Area is 62 percent, whereas the female literacy rate is 52 percent which is much than the district and state female literacy rates. Within the Study Area, the female literacy is even lower in the Project villages (46 percent) compared to that in the AoI. While Sirsa district has a reported SC population of 30 percent- it ranges from 22 percent to 47 percent in the Project Villages.

As per census 2011, the male and female literacy rates for the villages in the study area are presented in the table below. We see that the female literacy rate for the villages in the solar plant footprint is 46% which is much lower than that for the total study area (52%) and the national female literacy rate of 65.5%. The male literacy rate for the solar plant footprint is much higher (64%) than its female counterpart, but lower than the national male literacy rate (82.14%).

The land in the study area is predominantly used for agriculture. The data shows that 93 percent of the land in the Project Footprint, 91 percent in the AoI and 92 percent in the overall Study area comes under Net Sown Area and 0% of the Project Footprint, AoI and Study Area are current fallows. Apart from land under cultivation, nearly 8 percent of the land in the Study Area (7 percent in the Project Footprint) consists of barren and uncultivable land area.

The study area relies mainly on rain-fed agriculture, with some canal irrigation from the Bhakra Nangal Main line canal. Crops are categorized into Kharif (summer) and Rabi (winter) seasons, with cotton being the key commercial crop, followed by paddy, wheat, and mustard. The pre-monsoon phase is crucial for sowing, leading to a shift in labor dynamics. During winters, many agricultural laborers switch to daily wage jobs due to reduced farming activity. Most households own about 10 acres of land, but declining land productivity has led many landowners to consider renting out less fertile land and investing in more fertile areas near canals and the Ghaggar river.

Due to the absence of district level secondary data on land ownership at the time of writing this report, this section includes an analysis of the breakdown of the land ownership amongst male and female land lessors as reported by the CleanMax Project team for the project components. From the table below we can see that out of the 116 land lessors who have leased their land for the project, there are 22 female land lessors. However, it is noteworthy that none of the women hold individual land leases; rather, all are engaged in joint leases. In contrast, there are 8 single leases, and all of them are held by men.

The primary livelihood in the study area is agriculture and allied activities, with 41% of workers as cultivators and 34% as agricultural laborers according to Census 2011 data. About 92% of the land is under cultivation, while approximately 8% is used for non-agricultural purposes. However, recent trends show a shift away from farming, with more people pursuing non-farm occupations like daily wage labor, small businesses, and government services. Younger generations, in particular, are increasingly opting for non-farm-based careers, attributing this shift to improved access to education over the past decades.

Work Participation Rate (WPR) is the % of total workers (main workers and marginal workers) to the total population of the study area. The WPR in the Study Area is 40%. Non-workers constitute 60% of the Study Area population and include children and the elderly, in addition to the unemployed. Most of workers other than farmers or agricultural labourers are either

engaged in daily wage labour during non-cropping season while some of them migrate to nearby districts for daily wage work. The Project villages had a Work Participation Rate (WPR) of 37% approximately. 86% of workers describe their work as Main Work (Employment or Earning more than 6 Months) while 14% were involved in Marginal activity providing livelihood for less than 6 months. It is to be noted that nearly 76 % of the main and marginal workers of the working population in the Project villages are engaged in agriculture (both cultivators and agricultural labourers).

The primary crops in the region include cotton, paddy, wheat, and mustard, with agriculture largely reliant on rainfall due to the absence of irrigation canals and saline groundwater. Farmers reported an average annual agricultural income per acre ranging from INR 50,000 to 60,000 during years of sufficient rainfall, while average expenditures per acre ranged from INR 1,00,000 to 1,25,000. Agricultural labor wages varied from INR 350 to 400 for women and INR 450 to 500 for men, with most laborers sourced locally from the village. Landowners typically hire 3-4 laborers for cotton picking and 2 for weeding per acre, without any sharecropping arrangements. Major crops grown include Cotton and Guar in the Kharif season and wheat and oilseeds like mustard in the Rabi season, with produce primarily sold at local government markets called "anaaj mandis" in Odhan and Kalanwali.

In addition to farmers and agricultural laborers, most workers in the area are engaged in daily wage labor, with male laborers earning between INR 300 and 500, and female laborers earning between INR 250 and 300. Migration to nearby states is uncommon in the Project villages, with households preferring to stay within the state for daily wage work. These workers are primarily involved in construction projects in nearby villages and districts. Approximately 95% of the Scheduled Caste (SC) population in the Project villages are beneficiaries of the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) Scheme.

Livestock rearing, while not as prominent as agriculture for income generation in the study area, is still observed among households. Most households own cows and buffaloes primarily for household consumption of dairy products, with livestock holdings typically ranging from 1 to 2 animals. Livestock by-products, such as dung, serve as a reliable source of cooking fuel alongside LPG. While commercial livestock farming is not common, households utilize approximately 60% of cow milk produced for self-consumption and sell the remaining 40% to dairy cooperatives or local milk collection centers at around INR 45 per liter. Grazing practices involve allocating about 5% of total land specifically for grazing purposes, with landowners allowing landless individuals to graze their animals on their land through mutual agreements for monetary compensation or labor exchange.

There is one community health centre, one primary health centre, four primary health sub-centres, one maternity and child welfare centre, one dispensary and one family welfare centre in the AoI villages.

E.4.3 Ecology baseline

A rapid ecological survey was conducted from 23rd to 25th January 2024 to establish an ecological baseline and identify any sensitive ecological receptors within the study area of the Project.

during the site visit for the E&S Scoping, previous ERM experience in the landscape was also referred to especially for avifaunal species. Also, secondary data for the Project site was collected from the Management Plan[8] of Abohar Wildlife Sanctuary (~45km from Project site) and available published scientific literature.

The Project site location and immediate surroundings was also run for IUCN listed threatened species (CR, EN, and VU Species). Databases such as IBAT (Integrated Biodiversity Assessment tools), and crowdsourcing platforms such as ebird, iNaturalist, GBIF (Global Biodiversity Information Facility) to understand the presence and absence of the potential Critical Habitat (CH) trigger species and their habitat values.

According to Biogeographic Zones of India the landscape of Sirsa district is classified as 4A: Semi- Arid -Punjab Plains. The district is under intensive cultivation and therefore it is deficient in natural forests. The predominant vegetation types are Tropical Thorn Forest dominated by trees such as *Acacia senegal, Acacia leucophloea* and *Prosopis cineraria*. The annual temperature in the region ranges from 21 – 46 ºC.

There are no key biodiversity areas (KBAs), protected areas (PAs), important bird areas (IBAs) in the 5 km Study area. The closest protected area is Abohar Wildlife Sanctuary ~45km from the site.

India has 7 UNESCO Heritage Sites for Natural Significance[9]. The nearest natural heritage site is Keoladeo National Park[10] (criteria x[11]) located approximately 387 km south-east of the Project site.

There are 12 biosphere reserves[12] located within the geographical boundary of India. Haryana does not have any Biosphere reserves. The nearest Biosphere Reserve is Nanda Devi[13] located approximately 473 km east of the Project site.

India has 80 Ramsar sites as of January 2024[14]. The nearest Ramsar Site is Harike Lake Bird Sanctuary[15], located approximately 150 km north of the Project site.

The Project site does not fall within any biodiversity hotspot. The nearest hotspot is Himalaya biodiversity hotspot[16], located ~ 250 km north of the Project site.

India Hosts 12 Endemic Bird Areas[17]. Nearest EBA is Western Himalaya[18] located ~ 270 km north of the Project site.

[8] Kalpana, K. (n.d.). Management Plan: Abohar Wildlife Sanctuary (2020-2029). Punjab Forest, Ferozepur Wildlife Division. https://wildlife.punjab.gov.in/act_rulepdf/1650964212.Management%20Plan%20of%20Abohar%20WLS.pdf

[9] UNESCO World Heritage Centre. India - UNESCO World Heritage Convention. https://whc.unesco.org/en/statesparties/in

[10] UNESCO World Heritage Centre. Keoladeo National Park. https://whc.unesco.org/en/list/340

[11] Criteria x: to contain the most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation.

[12] Man and the Biosphere Programme (MAB) - Map. https://www.unesco.org/en/mab/map?hub=66369&f%5B0%5D=countries%3A747d4c41-004f-5cf1-8731-ff193a5acf29&f%5B1%5D=dataset_filters%3A6c254c17-2986-4f89-aa10-17d38a33454c#toggle-facets

[13] Nanda Devi. (2024, February 12). Man And the Biosphere Programme (MAB). https://www.unesco.org/en/mab/nanda-devi

[14] RAMSAR Wetland Sites (wiienvis.nic.in)

[15] Harike Lake | Ramsar Sites Information Service

[16] Himalaya | CEPF. https://www.cepf.net/our-work/biodiversity-hotspots/himalaya

[17] BirdLife Data Zone. https://datazone.birdlife.org/country/india/ebas

[18] BirdLife Data Zone: Western Himalayas

A total of twenty-eight (28) floral species belonging to fifteen (15) families were observed in the study area. Fabaceae was the most dominating family in the area with 10 species. None of the species identified in the region is endangered.

No IUCN threatened species (CR, EN and VU) were observed during the primary survey. One near-threatened species namely, Alexandrine Parakeet (Psittacula eupatria) [NT (IUCN v2023-1)] was observed. Besides, two IUCN vulnerable (VU) species: Common Pochard (Aythya ferina) and River Tern (Sterna aurantia) and four IUCN near-threatened species: Asian Woolly-necked Stork (Ciconia episcopus), Black-tailed Godwit (Limosa limosa), Ferruginous Duck (Aythya nyroca) and Oriental Darter (Anhinga melanogaster) were recorded. All the other recorded species have been classified as least concern as per the latest IUCN Red List (Online Version 2023-1). The waterbodies in the study area were mostly shallow village waterbodies, which were being used for irrigation as well as domestic purposes and are thus not expected to provide suitable habitat for large scale congregation of both migratory and residential wetland associated avian fauna.

India lies along the Central Asian Flyway, a global migratory pathway that connects the Palearctic (Europe and Northern Asia) to the Indian subcontinent. The birds that utilize this flyway congregate at key water bodies around India.

Twelve (12) species of mammals are reported from Sirsa district. All the recorded species are classified as least concern as per the latest IUCN Red List (Online Version 2023-1). Seven (07) of the twelve species reported - Blackbuck (*Antilope cervicapra*), Bengal fox (*Vulpes bengalensis*), Golden fox (*Canis aureus*), Indian grey mongoose (*Urva edwardsii*), Indian porcupine (*Hystrix indica*), Jungle cat (*Felis chaus*) and Small Indian civet (*Viverricula indica*) are protected and categorized under Schedule I as per the Wildlife (Protection) Amendment Act, 2022. Only one species namely, Five-striped palm squirrel (*Funambulus pennanti*) was observed during the primary survey.

24 species of herpetofauna are reported from the Sirsa district. The Common garden lizard, (*Calotes versicolor*) [LC (IUCN 2023-1)] and Rat snake, (*Ptyas mucosus*) [LC (IUCN 2023-1)] were encountered during the survey. Other herpetofauna such as frogs and geckos were not encountered as night surveys were not performed.

11 species of amphibians are recorded from the study area and adjoining landscape based on published literature[19]. No amphibians were encountered during the primary survey as there are not many waterbodies in the study area and due to lack of nocturnal surveys.

13 species of reptiles are reported from the study area and adjoining landscape based on secondary data. The Common garden lizard (*Calotes versicolor*) [LC (IUCN 2023-1)] and Rat snake (*Ptyas mucosus*) [LC (IUCN 2023-1)] were encountered during the survey.

E.5 Stakeholder Engagement

The key groups that were consulted during the ESIA study process were: land lessors, agricultural labourers working on the leased land and land lessors from the Project villages,

[19] Roy, S., Sethy, P. G. S., Bahuguna, A., & Deuti, K. (2020). Amphibia fauna of Haryana. ResearchGate. https://www.researchgate.net/publication/341576817_Amphibia_Fauna_of_Haryana

local elected representatives (Sarpanch), government officials (Anganwadi worker), on-site labourers, land aggregator and the CleanMax land team.

The key concerns and expectations that were raised during the stakeholder consultation process have been summarised below:

- **Key feedback received from local community in the study area:** It was informed during the consultation with the community that there is a lack of irrigation facilities and decline in crop yield. There was a positive outlook towards the solar Projects in the area. They expect to receive benefits from the Project in terms of employment and development of infrastructure and the overall community. In addition, they also demanded preference to the local community in contractor and employment opportunities from the Project.
- **Key feedback received from 4 land lessor who were consulted during the site visit:** It was informed that the lessor are willing to lease their land due to the low productivity of the agricultural land, dependency on monsoons and lack of irrigation facilities. The amount received after leasing their land was reinvested into to build houses or was spent their children's wedding or their education. The major concern of the stakeholder group till now is related to availability of employment opportunities that the Project will generate.
- **Community Development activities**: The local communities were of the opinion that apart from the economic opportunities, the local community should also benefit from the Project in terms of community development activities. Some of the key areas for development activities identified included creating a digital library, a wifi-zone with seating area.

E.6 Key Identified Impacts

E.6.1 Planning phase

Impact due to land procurement (long term lease) on title-holders- The project encompasses a solar park, transmission line footprint, and right of way, totaling 118.66 Ha. Land leased from Salamkhera, Chormarkhera, and Jandwala Jattan is primarily agricultural. Of the 116 land lessors, 94 are male and 22 are female. They leased land due to low agricultural productivity, with rent providing a stable income. Post-decommissioning, land will revert to agriculture. No families are displaced, and all landlessors belong to the General caste, owning alternative land. Impact magnitude is assessed as small.

Impact of land procurement on Land users (agriculture labourers and Sharecroppers on leased land)- Consultations and secondary census data indicate that cultivation and agricultural labor are the primary occupations in the study area, with average wages ranging from INR 350 – 500. The land procurement concluded in December 2019 affected agricultural laborers who were engaged in activities like cotton picking, weeding, and sowing. While efforts were made to absorb them into alternate lands owned by land lessors, this wasn't documented. Consequently, economic displacement and loss of wages for these laborers cannot be entirely ruled out, with a medium impact assessed due to the involuntary nature of displacement and temporary income loss. Non-title holders were not separately briefed by the project team, resulting in medium receptor sensitivity for them.

E.6.2 Construction phase

Change in Land-use- The total study area covers approximately 105.686 hectares, mainly consisting of open scrub and agricultural land, along with the transmission line footprint and right of way. The project site comprises solely private agricultural land. A 132 kV external transmission line will connect to the Haryana Vidyut Prasaran Nigam Limited Grid Sub-Station at Nuhiyanwali. Grazing dependency on the land is minimal, resulting in a medium receptor sensitivity. Establishment of the solar plant will convert cultivable land to industrial use for 29 years, with changes in land use during construction lasting approximately 4-5 months, leading to a medium impact magnitude.

Impact on topography and drainage- The project area has a flat topography with minor undulations and no water bodies passing through. Solar projects typically don't require significant leveling. As the proposed project and access road are on flat terrain, receptor sensitivity is low. Any alterations to the topography due to excavation work will be minimal and restricted to the immediate vicinity of project components. Therefore, impact magnitude is assessed as small, considering the project's footprint.

Impact on Soil Environment- During construction, soil compaction and erosion are expected due to vehicular movement, particularly in sandy loamy soil which is more prone to erosion. Site clearance activities can expose topsoil to erosion, especially in loose soil conditions. Soil compaction from excavation can increase surface runoff and decrease percolation rates, though impacts may be minimized in drought-prone areas. Overall, resource sensitivity is assessed as low to medium, with impact magnitude ranging from small to medium.

Waste Generation and Soil Contamination- During construction, general waste like concrete, steel cuttings, and packaging materials, along with municipal solid waste from canteen facilities, will be generated. A small portion will be hazardous, including waste fuel and oil. Improper management of solid waste could impact soil quality. Soil contamination may occur from leaks/spills of oil, fuel, or chemicals, potentially affecting soil quality long-term. Receptor sensitivity and impact magnitude are assessed as medium due to these factors.

Impact on Water Environment- The proposed project site is categorized as over-exploited for groundwater, as per CGWB and Haryana State reports. While no borewell or well is present, water tankers from nearby villages are used for construction, and RO packages are used for drinking. Sandy soil type allows high percolation, affecting groundwater. Accidental spillage of chemicals and fuel can contaminate groundwater during construction. Thus, receptor sensitivity and impact magnitude on water quality and quantity are assessed as medium..

Impact on air quality- During the initial phases of construction, comprehensive baseline data was collected to assess potential environmental and socio-economic impacts. The project area, characterized by loamy sandy soil prone to erosion, will see short-term air quality changes due to construction activities and increased vehicular traffic. Villages nearby will also be exposed to these changes. However, ambient air quality in the study area was observed within limits. Receptor sensitivity is medium. Air quality impacts during construction will primarily stem from fugitive dust emissions, increased vehicular traffic, exhaust emissions from machinery, and diesel generator use. Fugitive dust emissions are the main source, but since construction is short-term (~4 to 8 months), impact magnitude is assessed as small.

Impact on Ambient noise- During the construction phase, noise sources include construction activities, operation of DG sets, and vehicle movement. Increased anthropogenic activity in the area will also contribute to noise levels. Construction is expected to last approximately 4 to 8 months, with activities restricted to daytime. It is assumed that only one of each type of equipment will be on-site during any period. Re-assessment of noise levels may be needed if actual equipment inventory and sound power levels differ from assumptions.

Impact on Occupational, Health and Safety- The Project includes the large workforce engagement, occupational health and safety concerns are significant throughout the project lifecycle. Activities such as working at heights, operation of pile drivers, cranes, and mechanical lifting equipment, laying interconnecting cables, and working with live electrical components pose risks. Measures for fire safety, structural safety, and emergency response are essential. These concerns persist across construction, operation, and decommissioning stages, with impacts consistent in nature.

Impacts on Landscape and visual impacts- The project site, situated on plain terrain with slight undulation, will undergo significant visual changes due to land use alterations during construction, commissioning, and operation phases. However, it's noteworthy that this solar power project is the only one in the vicinity within a 5 km radius. Despite off-site manufacturing of components and a relatively short construction duration (approximately 4 to 8 months), the presence of various equipment and infrastructure like ground-mounted structures, PV modules, transformers, and transmission line towers will contribute to visual impacts. These impacts diminish with increasing distance from the development but are still influenced by the presence of project infrastructure such as construction material storage areas and temporary offices.

Impact from influx of Migrant Labour- The project will employ skilled, semi-skilled, and unskilled workers throughout its lifecycle, including contractual, local, and migrant workers. Skilled workers, likely migrants, will be needed for specialized tasks like steelwork. Unskilled labor requirements can be met locally but are temporary. The location of the labor camp is within the project area, potentially impacting the local community engaged mainly in agriculture. The sudden influx of migrant workers may cause local resentment. Impact magnitude is assessed as medium, and receptor sensitivity is medium due to the mismatch in local skill availability and potential social tensions caused by migrant labor influx.

Impacts on Community, Health and Safety- During the construction phase, activities such as erecting solar panels, constructing transmission lines and substations, and material/personnel movement may impact community health and safety. Accidents on access roads can result in injuries to people or livestock. Migrant labor and construction of labor accommodations may lead to waste and wastewater generation, with mobile sanitation facilities posing risks of waterborne diseases. Lack of waste disposal systems and collection at the project site and labor camps can contribute to airborne diseases. The presence of large-scale labor, including migrants, may exacerbate the spread of communicable diseases due to poor hygiene and camp management protocols.

Impact on Economy and Employment- During the peak construction period of 4-6 months, the Project is expected to employ approximately 100-150 workers, providing employment opportunities for unskilled and semi-skilled labor from the local community. Various civil works

such as construction of solar PV module mounting area, transformer yard, internal roads, and transmission lines will create job opportunities. Locals with vehicles like tractors or dumper trucks may also find contracting opportunities for transporting materials. Indirect employment opportunities may arise from the establishment of small shops and repair outlets. Skilled labor brought in from other states may further stimulate economic activity, benefiting local vendors and businesses.

Stress on Community Resources- Based on consultations with the Project team, it was clarified that water requirements for civil work, construction (approximately 50-60 litres/ day) would be fulfilled using water tankers. These tankers would in turn, source water from borewells belonging to specific households in the Project villages. It is important to note that as of now, the current arrangement operates on a mutual agreement, with the Project team compensating these households monetarily in exchange for the provision of water. The Project related construction activities are understood to span across 4 months and this sourcing of water might affect the ground water table in the area.

Ecological Impacts- During the construction phase, activities such as road construction, walling, and installation of solar modules will generate noise and vibrations, impacting the surrounding areas. This continuous movement of vehicles and people will disturb local fauna, hindering their natural activities like foraging and breeding. Additionally, vegetation clearance and soil preparation will alter soil properties, potentially affecting local flora and ground-dwelling fauna. While fauna may adjust to the disturbance, they could relocate, leading to changes in species composition. Moreover, increased human activity may raise the risk of human-wildlife conflict, including hunting and road kills, especially if proper facilities are lacking for laborers.

E.6.3 Operational phase

Impact on Soil Environment- During the operation and maintenance (O&M) phase, soil compaction and erosion are expected to be infrequent due to occasional vehicle movement for maintenance activities only. As a result, the impact magnitude of soil compaction and erosion during this phase is assessed to be small.

Impact on Waste generation and Soil Contamination- During the operation phase, the Project generates domestic solid waste at MCR room and substation, along with hazardous waste such as waste oil, lubricants, and oil-containing jutes and rags, as well as broken modules during maintenance activities. While any leak or spill of hazardous waste could contaminate the soil and groundwater, the quantity of hazardous waste generated is significantly lower compared to the construction phase. As a result, the receptor sensitivity is assessed as low, and the impact magnitude is considered small during the operation phase.

Impacts on Water Environment- During the operation phase, water requirements for domestic use, including cleaning modules and meeting the needs of O&M staff (~70 KLD), will be sourced from the nearest village via tankers and RO plant/drinking water supply. Wet cleaning technologies will be utilized for module cleaning, minimizing wastewater generation. Sewage generated from the MCR room will be negligible. Given the project area's classification as over-exploited for groundwater, receptor sensitivity is assessed as high. The impact magnitude is

considered medium, considering the project's adoption of wet cleaning technologies and minimal wastewater generation.

Impact on Landscape and Visual Impacts- The primary components of the Project include PV modules arranged horizontally, with a maximum height of 2 meters above ground level. The site will be enclosed by a boundary wall approximately 2 meters high to maintain inconspicuousness. Although the site currently lacks permanent structures, the introduction of PV modules will permanently alter the landscape, potentially affecting nearby habitations and passersby visually.

Impact on Economy and Enployment- During the operations phase, the requirement for unskilled and semi-skilled labour is expected to reduce to 15-20 respectively. The services for which labour will be required will include maintenance work of the facility, providing 24-hour security, bush and undergrowth cleaning and housekeeping activities. As per consultation with the Project team robotic dry brushing method of cleaning is most likely to be used for cleaning the solar PV modules in order to improve efficiency and reduce water consumption.

Collision and Electrocution- The impact of transmission lines on biodiversity, particularly bird mortality due to collision and electrocution, is well-documented and represents a significant anthropogenic threat to avian populations. Studies have shown that power line collision mortality can have substantial population-level effects, potentially contributing to declines in species such as cranes and diurnal raptors. Inappropriately routed or designed transmission lines can exacerbate these impacts, particularly for migratory and soaring birds. Electrocution risk arises when birds perch or nest on transmission lines, exposing them to uninsulated electrical components. Reduced visibility of lines during both day and night increases the likelihood of collision. While internal transmission lines within solar projects may mitigate some risks due to restricted access for birds, seasonal waterbodies in the study area may attract migratory and resident birds, further heightening the risk of collision and electrocution.

E.6.4 Decommissioning phase

Impact on Soil Environment- The decommissioning phase of the project is expected to impact the soil in several ways. Increased vehicular and workforce movement, dismantling of plant components, and removal of internal electric lines may lead to soil compaction. Waste generated during decommissioning, including dismantled plant components and demolition debris, poses a risk of soil contamination, although this is considered to be minimal. Receptor sensitivity to these impacts is assessed as medium. Removal of grounded structures and demolition of various components may affect the top layers of soil and lead to loss of topsoil quality, but these effects can be mitigated over time. Additionally, the large number of laborers during decommissioning is expected to generate significant domestic waste, particularly at labor camps, contributing to the medium impact magnitude.

Impact on Water Environment- Water during the decommissioning phase will be consumed by labourers and will be required for civil work such as demolition and dismantling, Site grading and leveling, Excavation and backfilling, Erosion and sediment control, Revegetation and landscaping, Infrastructure removal and restoration. The water demand is expected to be met through procurement of water tankers from community. Also, there is a potential for contamination of groundwater water resources resulting from improper management of

sewage and accidental spills/leaks at the storage areas. Therefore, the receptor sensitivity is assessed to be **medium.**

Impact on Air Quality- During the decommissioning phase, air quality will be impacted by various sources, including dust emissions from demolition activities such as dismantling of solar panels and transmission towers, as well as increased vehicular movement for transporting dismantled materials. Additionally, emissions from emergency power diesel generators used during decommissioning activities will contribute to air pollution. Receptor sensitivity to these impacts is assessed as medium. However, since the demolition activities are expected to occur for a relatively short period, the impact magnitude has been assessed as small.

Impact on Noise- During decommissioning phase of the Project, noise will generated from dismantling of structure, movement of vehicles carrying dismantled structure and equipment. The area would then be an Industrial area and therefore the receptor sensitivity is assessed to be **low to medium.** Impact magnitude is considered to be **small** considering the decommissioning period to last for small duration.

Impact and Economy and Employment- During the decommissioning phase, social impacts may arise from the loss of jobs and associated income for households directly affected by the project closure. However, the impact is expected to be limited due to the relatively small number of permanent employees affected, mainly security guards. Additionally, improper disposal of construction waste and debris from dismantling activities may lead to soil contamination and discontentment within the project villages. Despite these potential impacts, the overall magnitude is considered small given the short duration of the decommissioning period.

E.7 Climate Change screening

Baseline: Water Stress and Extreme Heat are identified as high-risk hazards for the site.

Furthermore, no risk associated with riverine or coastal flood, landslides, and cyclone is identified for the assessed site.

Future Scenarios: In both scenarios (SSP 2-4.5 and SSP 5-8.5), across two-time horizons (2030 and 2050), the risk of water scarcity will remain high for all sites. Additionally, extreme heat is projected to increase by 0.66°C in SSP2-4.5 and 0.83°C in SSP5-8.5 for the site in 2030.

E.8 Mitigation Measures and ESMP

For the purpose of providing site specific mitigation measures to mitigate key identified impacts from the Project, an ESMP has been developed. The ESMP specifies the standards and controls required to manage and monitor environmental and social impacts during construction operation and Decommissioning phases. To achieve this, the ESMP identifies potential adverse impacts from the planned activities and outlines mitigation measures required to reduce the likely negative effects on the physical, natural and social environment. This is in accordance to IFC Performance Standards 1, which emphasizes the importance of managing social and environmental performance throughout the lifecycle of the Project.

E.8.1 Roles and Responsibilities

The responsibility for implementing the Environmental and Social Management System (ESMS) rests with the ESMS Implementation Committee, composed of key stakeholders at both corporate and Project/site levels. At the corporate level, the committee includes the Chief Operating Officer (COO) - Projects, tasked with overseeing ESMS implementation and ensuring alignment with organizational goals. Additionally, the Head of Execution - Solar & Wind Farm leads ESMS activities related to Projects, while the Head of Health, Safety, and Environment (HSE) integrates health, safety, and environmental considerations into the ESMS framework. At the Project/site level, the committee consists of the Site In Charge, responsible for on-site leadership and adherence to ESMS procedures. The HSE Manager oversees health, safety, and environmental initiatives, while the Administrative Officer supports ESMS implementation through administrative coordination and communication facilitation.

E.8.2 Inspection, Monitoring and Audit

CleanMax Energy Solutions (CMES) is committed to actively monitoring and evaluating the effectiveness of its Environmental and Social Management System (ESMS) throughout all phases of its Projects and facilities. This involves engaging with diverse stakeholders, including contractors, laborers, suppliers, and local communities impacted by Project activities. Rigorous inspection and monitoring will be conducted during both construction and operation phases to ensure ESMS compliance. Regular inspection, auditing, and monitoring processes, as outlined in CMES's manual, will be carried out to ensure adherence to applicable frameworks, including risk assessment checklists and action plans. Both internal teams and external agencies or experts will conduct inspections and audits, with comprehensive documentation of all processes and findings. Contractors will be required to implement corrective actions based on inspection and audit outcomes within their respective areas of operation.

E.8.3 Reporting and Documentation

CleanMax shall establish and implemented documentation and record-keeping system to ensure the updating and recording of requirements specified in the ESMS. Relevant personnel will be assigned responsibilities to maintain the ESMS documentation system and ensure document control, including access and distribution to identified individuals. This will involve the following documents:

- Master Environment Management System document
- Legal Register
- Operation control procedures
- Work instructions
- Incident reports
- Emergency preparedness and response procedures
- Training records
- Monitoring reports
- Auditing reports
- Complaints register and issues attended/closed

E.8.3.1 External Reporting and Documentation

CleanMax Energy Solutions (CMES) will provide transparent reporting on environmental and social impacts, aligning with shareholder agreements and investor expectations. Reports will detail project impacts, highlight instances of non-compliance, and evaluate ESMS effectiveness.

E.8.3.2 Internal Reporting and Communication

CleanMax will establish an internal reporting system to monitor ESMS objectives regularly. Findings from inspections, audits, and other asset-level information will be communicated back to the ESMS Manager and corporate committee by the HSE representative or designated staff. This communication will follow specific ESMS requirements discussed within the ESMS Committee, facilitating feedback and input from asset-level stakeholders.

E.8.4 Documentation

The ESMP acts as an environment and social management tool which needs to be periodically reviewed to address changes in the organization, process or regulatory requirements.

Following a review, the Site in-charge in coordination with personnel delegated EHS will be responsible for making the amendments in the ESMP and seeking approval from the designated approval authority. The amended ESMP will be communicated to all the staff on the Project.

E.8.5 Training Programme and Capacity Building

Training is needed for effective implementation of ESMP. The training programme will ensure that all concerned members of the team understand the following aspects:

- Purpose of management plan for the Project activities;
- Requirements of the management plan and specific action plans;
- Understanding the sensitive environmental and social features within and surrounding the Project areas; and
- Aware of the potential risks from the Project activities.

E.8.6 Purpose of the ESMP

CleanMax recognizes the importance of training for the effective implementation of its Environmental and Social Management Plan (ESMP). The training program will ensure that all team members understand the purpose and requirements of the management plan, as well as sensitive environmental and social features and potential risks associated with Project activities. The Head of HSE at CleanMax will oversee the identification and delivery of environmental, health, and safety induction training, along with job-specific training for construction and operation personnel. Additionally, general environmental awareness will be promoted among the Project team to encourage environmentally sound practices and compliance with regulations. Contractors and subcontractors will also receive training to ensure a consistent level of awareness and commitment to environmental stewardship.

E.9 Conclusion

The Project is a green energy Project proposing to generate 105.90MWp power through solar energy by CleanMax. The Project and its key components such as solar plant area, site office

building, external transmission lines, internal transmission line, etc. are likely to have had environmental impacts on baseline parameters, such as on land use (conversion from agricultural to industrial land), ambient air quality and noise quality, especially during the construction phase. The social impacts from the Project are assessed to be beneficial in terms of local employment and overall local area development.

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Building 10B
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