

# Non - Technical Summary of Environment and Social Impact Assessment of 50 MW Solar Power Project, Tirunelveli District, Tamil Nadu, India

Cleantech Solar

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## 1. Introduction

### 1.1 Project Background

### 1.2 This Document

This document is the Non-Technical Summary for the ESIA. It is a stand-alone document, which provided interested parties and stakeholders, such as members of the public, with a short overview of the ESIA in non-technical language. It provides an overview of the Project, identified sensitivities and constraints of the Project site and surrounding area, and summarises the findings of the environmental and social assessment and measure to manager potential risks and enhance benefits o the Project.

### 1.3 Structure of the ESIA Report

The ESIA document package consists of three volumes:

- **Volume I:** The Non-Technical Summary (this document)
- **Volume II:** The main ESIA Report provides a detailed description of the Project and presents the assessment methodologies, findings and conclusions of the process; and
- **Volume III:** The Technical Annexes provide supporting information for a number of the assessments undertaken and reported on in Volume II.

### 1.4 The ESIA Process

The ESIA has been completed in accordance with International Finance Corporation (IFC) Performance Standards (2012) and Work Bank Group Environmental, Health and Safety (EHS) Guidelines (General Standards). The ESIA process included the following activities:

#### 1.4.1 Scoping Exercise

A scoping exercise was undertaken to identify and focus the impact assessment on potentially significant environmental and social issues associated with the development of the Project (through the construction, operation and decommissioning phases). Scoping has an important role to play in achieving proportionate and effective assessment. Key stakeholders, including interested and affected parties, were identified during this exercise and provided with an opportunity to raise any comments, concerns and/or queries that may have on the

proposed Project. A Scoping Report was prepared for the Project in March 2019 and provided in **Volume III – Technical Annexes of the ESIA report.**

#### 1.4.2 Impact Assessment

The impact assessment provides a detailed analysis of the potential environmental and social issues that may result from the Project. The assessment is supported by specialist scientific studies. It also provides details of the measure and management actions that will be implemented to avoid, reduce, remedy or compensate for any significant adverse impacts predicted. Where practicable, details of how the consortium will maximum potential positive benefits and opportunities from the Project are also given. The assessment was completed in June 2019 and report provided in **Volume II – ESIA Report.**

#### 1.4.3 Stakeholder Engagement

Stakeholders have been engaged throughout the ESIA process. Key findings from the scoping and impact assessment activities have been presented to local communities and key interested groups.

## 2. Project Description

### 2.1 Introduction

Basic project components for a solar power plant include: Solar PV array, transformer, inverter, substation, transmission line, associated infrastructure (office building, control room, guard room etc.).

Solar power is trapped through the PV cells in the modules, which are connected to form an array to produce higher voltage. Since the power generated through the solar panels is a Direct Current (DC) and electrical appliances use the Alternating Current (AC), inverters are used to convert DC to AC generated in the solar farms. Transformers are then connected with the AC to step up the voltage to 33 kV for transmission to substation.

The Project will comprise the following core components within the site boundary:

- Solar PV Modules
- Module Mounting Systems
- Inverters
- Transformers

- Earthing and Lighting Protection System
- Auxiliary Electrical Equipment
- Transmission Line
- Pooling Sub-station
- External and Internal Access Roads
- Main control room which will include the SCADA, CCTV access and RTU for SLDC communication;
- Switch Yard; and
- Associated infrastructures such as office building, control room, guard room etc.

Construction is expected to commence in January 2020 and will be completed within 4-5 months. The operating life of the Project is 20 years (design life of the Project). During the peak construction phase spanning over a period of 1 month, the manpower requirement will be 550 – 600 (contractual workers) encompassing 400 workers in the unskilled category, 150 workers in the skilled category and 50 workers in the highly skilled category. It must be noted that the Project design assessed through the ESIA process is subject to change according to final Engineering, Procurement and Construction (EPC) Contractor selection.

The manpower requirement during the Operation & Maintenance phase was reported by the Project proponent to be in the range of 10 – 15 workers who will be engaged on daily basis including 5 – 6 electricians, 1 site in-charge and 1 site engineer. The workers will be engaged by the O&M contractor. Some of the key activities to be performed by workers engaged in O&M phase include housekeeping, solar panel cleaning, bush cutting, security, etc.

## 2.2 Need of the Project

India is located in the equatorial sun belt of the earth and therefore receive abundant radiant energy. In most parts of India, clear sunny weather is experienced 250 to 300 days a year. The annual global radiation varies from 1600 to 2400 kWh/m<sup>2</sup>, which is comparable with radiation received in the tropical and sub-tropical regions. The equivalent energy potential is about 6,000 million GWh of energy per year. Theoretically, a square piece of land, 55 kilometres each side, in the empty desert, is enough to meet India's current energy demand. With more than 300 sunny days each year, large parts of Rajasthan, Gujarat, Rajasthan,

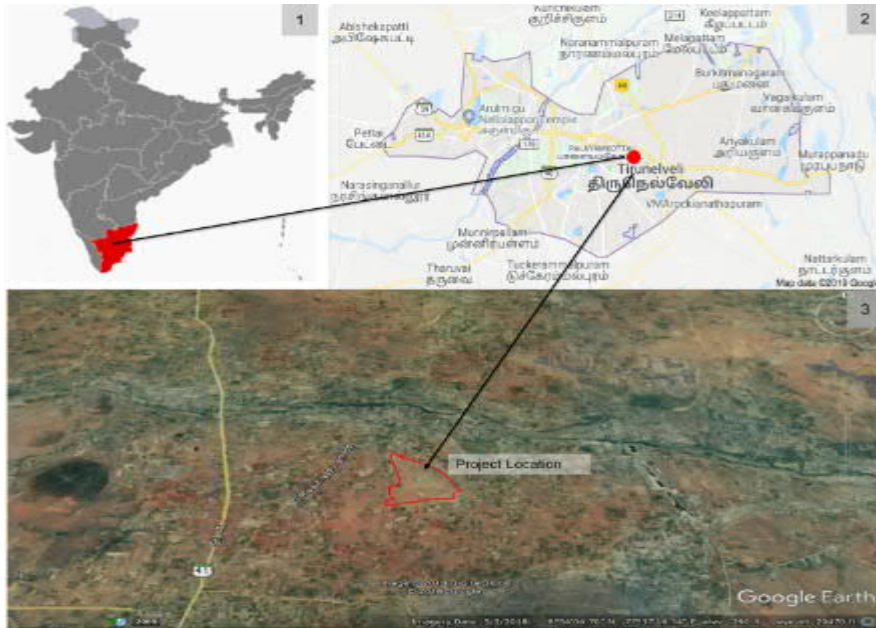
Andhra Pradesh, Tamil Nadu and Madhya Pradesh can produce 4.0-6.4 kilowatts per square metre. Sparsely populated, these areas are ideal for solar energy.

Review of the Tamil Nadu Solar Energy Policy in 2019 indicates that they have to develop 9000 MW by 2022 from solar energy and also taken target to develop infrastructure and financial assistance for development of roof top solar energy and solar parks.

Irrigation was noted to be a major consumer of electricity in state of Tamil Nadu, and with improved technology and irrigation facilities, electricity consumption is anticipated to increase in future. The proposed Project is an opportunity to utilize the solar potential of the area for power generation. A “No Project Scenario” assumes that the Project will not be carried out. A “No Project Scenario” will not address the issue of anticipated future power shortage. An alternative without the Project is undesirable, as it would worsen the power supply-demand scenario, which would be a constraint on economic growth. Additionally, continued use of traditional fossil fuel sources for power generation will have adverse effect on the environment.

## 2.3 Project Location and Site

The Project is proposed to be located on 170 acres of land, which is entirely in *Pillayarkulam* village of *Manur* taluk (Sub-district), Tirunelveli district in the State of Tamil Nadu, India. The 4-km transmission line will traverse the villages of *Pillayarkulam* and *Kanarpatti*. Project Site location is provided in **Figure 1 Location of the Project Site**.



**Figure 1 Location of the Project Site**

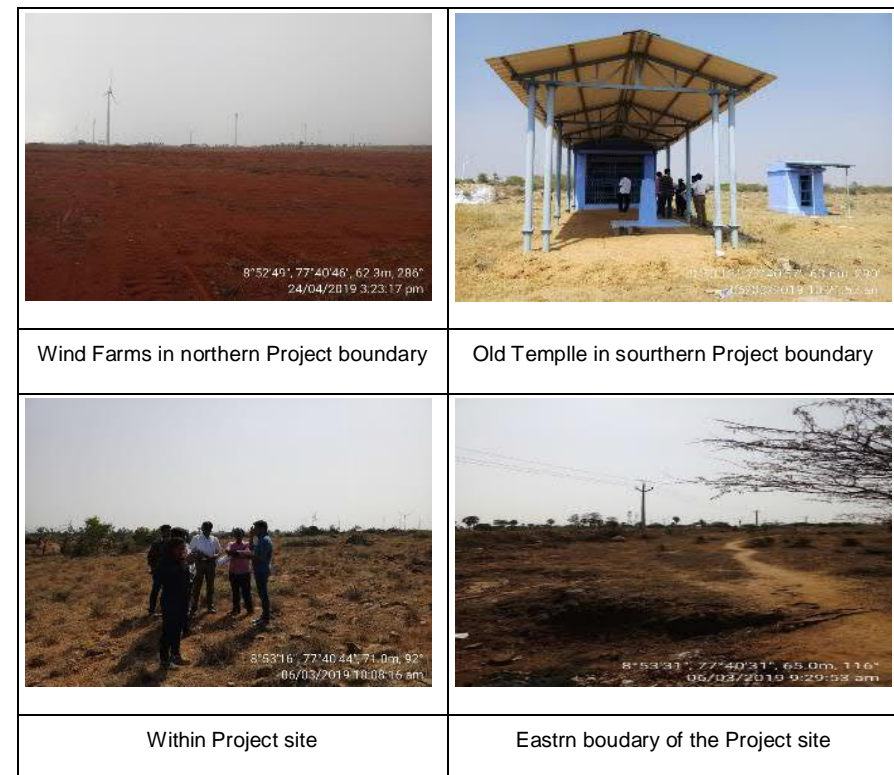
Area proposed for the Project was observed to be located on greenfield uncultivable land parcels in Pillayarkulam village. The Project site is surrounded by operational wind turbines to the north, east and south and farmland cultivated with cotton and Jowar (a variety of Sorghum). Most of the surrounding land is covered with natural scrub vegetation dominated by herbaceous plant species. Settlements in village Pillayarkulam are located approximately at 200 m towards north of the Project boundary and villages Parvathiyapuram and Kanarpatti are located approximately 1.3 and 1.7 km towards west of the Project boundary, respectively.

An orchard of Indian Gooseberry is located within the western boundary of the Project site. A small storage hut is also located near the orchard. There is a borewell installed within the southern portion of the proposed site boundary, which falls under the Survey 723 of the Topographical Plan, as prepared by the M/s S.J Agreement. Moreover, an 11 kilo-volt (kV) feeder line for supplying electricity to bore well was also noted in this portion. Towards the northern side of the site, a catchment area, which is now a dried depression, was also observed.

An open well, was also noted within northern portion of the site and was approximately (~) 4 m deep and had presence of water in it. Reportedly, water is available at a depth of ~250 feet (~76 m) at the site. A paved road named

Parvathiyapuram road which connects the State Highway # 44 to the Pillayarkulam village, runs parallel to the northern side of the proposed site boundary. This road further leads to Perusvil Temple and Primary Health Centre (PHC) both within Pillayarkulam village at an aerial distance of ~ 1 km from the proposed site boundary. A village temple namely Sodavil Temple, is located at an aerial distance of about 50 m towards north east direction of the proposed site boundary. Brick kiln was observed to be located towards northern direction from the proposed site boundary, at an aerial distance of about 100 m. A quarry site, possibly for limestone excavation, was located at an aerial distance of about 3.5 km from the site, towards the eastern direction. Additionally, an existing operational solar power plant was also noted to be located towards the north-east direction of the site, at an aerial distance of about 4 km.

Representatives of Site conditions are presented in **Figure 2 Photos of Project Site Setting and Surroundings.**



**Figure 2 Photographs of Site and its Surroundings**

## 2.4 Site Ownership

Total land required for the Project is 170.5 acres for the solar plan, 0.7 acres for the 17 transmission line towers and 4 km transmission line Right of Way (ROW). The land identified for the project is privately owned fallow land, cultivated land and scrubland.

As per the land aggregator approximately 170.57 acres of privately-owned land has been procured from sixteen (16) landowners through privately negotiated transactions by land aggregator. The land is for the main plant only and does not include land for the transmission line corridor. The land will later be transferred to the name of the Project Proponent.

A 4-km right of way will be procured for the transmission line. The relatively small land areas required for the poles will be procured through willing buyer-willing seller with landowners and transactions made at market rate. A right of way will need to be established under the transmission line and a 0.6 m wide easement is required at the lower end and a 3 m at the higher end for the transmission line infrastructure. Indicative land required for the transmission line corridor for the project is presented in **Section 2.3.3 of Volume II of ESIA Report**.

## 2.5 Project Alternatives

The proposed Project is located in Pillayarkulam village of Manur taluk (Sub-district), Tirunelveli district in the State of Tamil Nadu, India and 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 is mostly barren land which is not used for any other purpose (there are limited agricultural activities in the north and south of the site);
- No environmentally sensitive features such as water bodies, forests, archaeological sites are located in the immediate site surroundings; and
- No Indigenous Population (ST) is present in the study area.

According to a survey conducted by the World Energy Council, as the population increases and as the growing rate of electrification places huge requirements on energy supplies, the total primary energy demand of India is expected to increase by almost 150% by 2035.

Review of the Tamil Nadu Solar Energy Policy in 2019 indicates that they have to develop 9000 MW by 2022 from solar energy and also taken target to develop

infrastructure and financial assistance for development of roof top solar energy and solar parks.

Irrigation was noted to be a major consumer of electricity in state of Tamil Nadu, and with improved technology and irrigation facilities, electricity consumption is anticipated to increase in future. The proposed Project is an opportunity to utilize the solar potential of the area for power generation. A “No Project Scenario” assumes that the Project will not be carried out. A “No Project Scenario” will not address the issue of anticipated future power shortage. An alternative without the Project is undesirable, as it would worsen the power supply-demand scenario, which would be a constraint on economic growth. Additionally, continued use of traditional fossil fuel sources for power generation will have adverse effect on the environment.

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To achieve a feasible scheme, alternatives for the following Project components will be considered through the development and detailed design process.

- Alternate locate of the Project site;
- Alternative Power Production Method;
- Alternative Project Technology; and
- Alternative Transmission Line Route

## 2.6 Project Site Sensitivities and Constrains

During the scoping stage of the ESIA and initial site visit, key sensitives and constraint of the Project site were identified for consideration in the Solar Power Plant design process.

The sensitivity of the site was assessed and the habitats in the near vicinity of the Project show considerable evidence of transformation, with the overall floral and faunal species composition showing a divergent change from the natural state. The vegetation is dominated by plant species that provide benefits to local communities, with many non-beneficial species having been eliminated through settlement and cultivation practices. As a result, there are many species of non-

native origin present. Human activity has substantially modified an area's primary ecological functions and specified composition, and the habitats there conform to modified habitats as described in Performance Standard (PS) 6.

The Project is not located within the vicinity of protected areas, no highly threatened or range restricted floral or faunal species are considered likely to be present, and no large congregations of species are expected to occur. What remains of the habitats are representative of a widespread vegetation formation and are therefore not unique. Based on these observations, no critical habitats are expected to occur, and a critical habitat assessment following IFC PS6 is therefore not necessary.

The ecological sensitivity of the Project area is therefore considered to be low. PS6 does not stipulate minimum requirements for developments within modified habitats, but states measures should be taken to minimise impacts on remaining biodiversity and implement mitigation as appropriate.

The Project is located in Pillayarkulam village, which falls within Manur Taluk under Tirunelveli District in the State of Tamil Nadu. It is spread over an area of 240 – 245 acres. The Project area is surrounded by a dried depression of an earlier catchment area towards the northern side, an open well towards the extreme north and fallow land towards the southern, eastern and western directions.

Majority of the labour and workforce for the Project was reported to be domestic and it was reported that the same would be recruited from within the area of influence and the gram panchayats within the same. The Project is a private sector initiative, will not involve any government land acquisition or resettlement, or rehabilitation or displacement related impact. The environmental impacts emanating from the site would be limited to the 2 kms Area of Influence (Aol). There are is an established highway and road network that will allow easy access to the project site and will not have any traffic related issues or impacts on communities beyond the Aol.

## 2.7 Project Design and Layout

Proposed project was informed to be established on 170.5 acres of land in Pillayarkulam village of Manur taluk (Sub-district), Tirunelveli district in the State of Tamil Nadu, India. As per the project layout provided, approximately 4.0 kilometres transmission line of 33Kv will be connected with Kanarpatti 440/230 110 kV substation for evacuation of 50 MW energy generated from the project. Basic project components for a solar power plant include: Solar PV array, transformer,

inverter, pooling substation, transmission line, associated infrastructure (office building, control room, guard room etc.).

## 3. Administrative Framework

### 3.1 Overview

This ESIA has been undertaken to meet local requirements to gain permission for the construction and operation of the Project. In addition, to ensure the Project's equity partner policies, standards and requirements are adhered to and met, the ESIA also has been completed to meet the following:

- Indian legislative requirements;
- Relevant international conventions;
- Relevant International Finance Corporation (IFC) Performance Standards (PS);
- Work Bank Group's (WBG) Environment and Social Guidelines; and
- WBG Environment, Health and Safety (EHS) General Guidelines.

### 3.2 Indian Legislative Requirements

As per the Environmental Impact Assessment (EIA) notification (2006) and its amendments, the Project does not require environmental clearance (EC) from the Ministry of Environment, Forest and Climate Change (MoEFCC) of the State Environment Impact Assessment Authority (SEIAA). Detailed local legal requirements are mentioned in **Section 3.2 and Section 3.3 of Volume III – ESIA Report** of the Project. Some of the major license or permits required from different government agencies are:

- According to the Final Document on Revised Classification of Industrial Sectors under Red, Orange, Green White Categories; February 29,2016; Central Pollution Control Board; Table G-5: Final List of White Category of Industries, Sl. No 79 Solar power generation through solar photovoltaic cell, wind power and mini hydel power (less than 25 MW) has been classified under White Category. There shall be no necessity of obtaining

the Consent to Operate” for White category of industries. An intimation to concerned SPCB / PCC shall suffice<sup>1</sup>.

- Project activities going to generate used oil or waste oil, oily rags, discarded air contaminated filters, empty chemical or paint containers during construction and operation facility. These wastes are considered as a Hazardous Wastes under the Hazardous Waste Management Rules, 2016. Hence Site has to obtain Hazardous Waste Authorization under rule 5 of the Hazardous Waste Management Rules, 2016.
- Under Chapter 1 of the Factories Act, 1948 a factory license is required as the Project will be generating, transforming or transmitting power. Site has to obtain Factory License as required under Factories Act, 1948.
- As per the guidelines issued by Central Ground Water Board (CGWB) in 2015, Cleantech will need to obtain a permit to abstract water from the on-site existing borewell. The application and permit should be for industrial and commercial use. Since Project will install and use a new borewell, the Project Proponent is required to obtain a No Objection Certificate (NOC) from CGWB as required in Guidelines published by CGWB in 2015.
- Private sector projects to obtain distribution Licenses from the State Electricity Regulation Committee and to have open access to the transmission lines. As per section 14 of The Electricity Act, 2003, Cleantech shall obtain license under the Electricity Act 2003. Project has to obtain distribution License from concern regulatory authority.

### 3.3 International Conventions

A summary of each conventions and a description of why they are relevant to the Project, is provided in **Section 3.4 Applicable International Convention of Volume II of ESIA report.**

### 3.4 Lender Requirements

This ESIA has been developed in accordance with international financing requirements, namely the IFC Performance Standards, the World Bank EHS Guidelines. A summary of each requirement, and a description of why they are relevant to the Project, is provided in **Section 3.5 of Volume II of ESIA report.**

## 4. Stakeholder Engagement

### 4.1 Introduction

Stakeholder consultations are an important medium to understand and communicate with the stakeholders regarding the various Project related activities. It is a process which initiates a two-way dialogue between the Project proponent and the stakeholders.

The stakeholder consultations for this Project was undertaken during two (2) phases, once during the screening and scoping visit for the Project and subsequently during the baseline development and data collection phase. AECOM team carried out consultations in the Project village and other villages within the Project area.

A detailed forward-looking stakeholder engagement plan and grievance redressal mechanism has also been developed for the Project and provided in **Volume III- Technical Annexure of ESIA Report.**

### 4.2 Stakeholder Identification and Analysis

The Project consists of range of stakeholders with varied interests and influence in the Project. A stakeholder is ‘a person, group or organization that has a direct or indirect stake in Project because it can affect or be affected by the Project/ Project proponent actions, objectives and policies. Thus, they vary in terms of degree of interest, influence and control they have over the Project.

Primary stakeholders are those stakeholders who have direct impact or are directly impacted while those are indirectly impacted by the Project are secondary stakeholders. The details of Project associated impacts as gathered through the consultation process from the affected stakeholders have been elaborated in the subsequent section. For the study, consultations were undertaken with residents of villages who are directly associated with the Project by selling their lands. The consultations were focussed on understanding the land procurement process and the status of compensation for the cold land. Evaluation on whether the sale was undertaken under willing- buyer willing seller was also assessed during the course of the interview.

<sup>1</sup> Final Document on Revised Classification of Industrial Sectors under Red, Orange, Green White Categories; February 29,2016; Central Pollution Control Board;

Focus Group Discussions (FGDs) were held with the community members of the East Pillayarkulam and West Pillayarkulam to understand the prevalent socio-economic conditions and Project associated issues. Women community members were also identified and Focus Group Discussions (FGDs) were held with the women community members of the East Pillayarkulam and Kurunchi Nagar villages. The FGDs undertaken with the women community members were to understand the gender profile of the Project area, an understanding on the socio-economic situation of the women in the community as well as the health profile of the women of the Project area villages were undertaken.

Prevailing socio-economic conditions and Project associated issues were also assessed through interviews and discussions. Consultations were also conducted with the land aggregator to understand the status of the Project and land procurement related aspects.

The stakeholder analysis also looked to identify those stakeholders that are likely to be affected by Project impacts (actual or perceived) to ensure that the SEP and planned communication are appropriately tailored. A preliminary analysis of key stakeholder groups has been presented in **Table 5.4 of Volume II of ESIA Report**.

### 4.3 Stakeholder Engagement Activities

The AECOM team visited the Project site on 6<sup>th</sup> March 2019 (during Screening and Scoping Assessment) and 25<sup>th</sup> and 26<sup>th</sup> April 2019 (during detailed impact assessment) and were able to consult with community members from East Pillayarkulam, West Pillayarkulam and Kurunchi Nagar hamlets and six (06) land sellers for the Project.

### 4.4 Outcome of Engagement

The response to the Project has, on the whole, been positive with support expressed in all the meetings held. Key concerns raised by the residents of the local communities regarding Project and how the Project has addressed these and other concerns is outlined in **Section 5 of Volume II of ESIA Report**.

The minutes and list of attendees of the public meetings are presented in the Stakeholder Engagement Plant. Methods of engagement during Project operation are outlined in **Volume III – Technical Annexes of ESIA Report**.

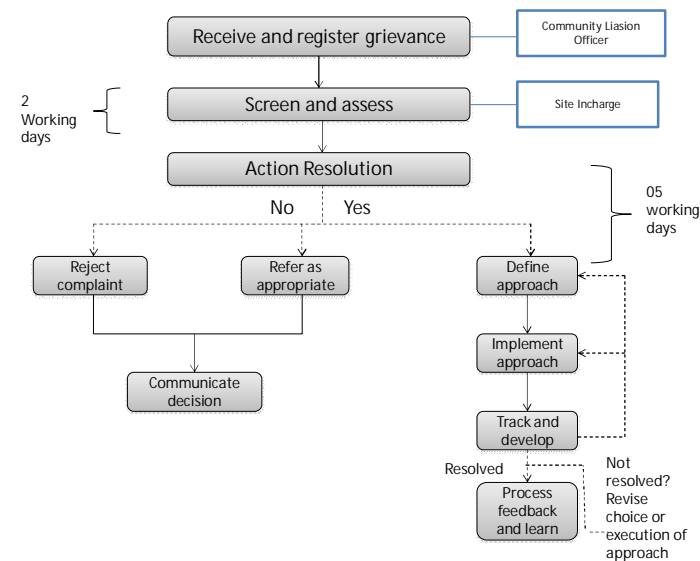
### 4.5 Grievance Mechanism and Feedback

A grievance mechanism will be established to respond to and resolve stakeholder concerns during future Project activities. Grievances may take the form of specific

complaints or concerns or perceived incidents and impacts. Grievances can be raised confidentially and without repercussion.

The grievance process involves the following steps: records the grievance, acknowledge the grievance, investigate the grievance, develop a response, communicate the response and establish agreement on next steps; and close-out process.

The consortium has already appointed a Community Liaison Officer (CLO) for the Project, who is responsible for grievance management. Grievances are passed through the CLO in the first instance, who will report these to the Project EHS Manager to address. Indicative Grievance Mechanism Structure is presented in following figure.



**Figure 3 Grievance Mechanism Structure (Proposed)**

## 5. Environment and Social Impact Assessment (ESIA) Process

### 5.1 Overview of the ESIA Process

The key objectives of the ESIA process are to assess the potential environmental and social impacts associated with the construction, operation and



decommissioning stages of the Project, and to identify measures that can be adopted to avoid, minimise or offset adverse impacts. The process also identifies ways to enhance any beneficial impacts of the Project.

## 5.2 Scoping

The aim of the scoping process is to identify Project effects that have the potential to be significant and to exclude (scope out) from the assessment those effects that are unlikely to be significant. During the scoping phase a summary of available high-level baseline information was collected, key potential environmental and social impacts and sensitive receptors and resources were identified, and the impact assessment methodology was defined.

## 5.3 Collection of Baseline Data

The “baseline” describes the existing environmental and social conditions of the Project. It is this baseline against which the potential effects of the Project can be assessed. Primary and secondary environmental and social data were collected in order to enhance understanding of the receiving environments. The full baselines for each assessment topic are presented in *Volume II of ESIA Report* and *supporting specialist annexes in Volume III of ESIA Report*.

## 5.4 Stakeholder Engagement

Periodic engagement has been undertaken with stakeholders throughout the ESIA process and stakeholders’ views were incorporated into the assessment process - see Section 4 of this document. The engagement process was aligned with the IFC’s PSs. The stakeholder engagement plan developed for the Project, presented in *Volume III – Technical Annexes of ESIA Report*, provides a full list of stakeholders that were consulted throughout the ESIA process.

## 5.5 Assessment of Impacts

Impact identification and assessment starts with scoping and continues through the remainder of the ESIA process. The principal steps are:

- **Impact prediction:** to determine what could potentially happen to resources/receptors as a consequence of the Project and its associated activities;
- **Impact evaluation:** to evaluate the significance of the predicted impacts by considering their magnitude and likelihood of occurrence, and the sensitivity, value and/or importance of the affected resource/receptor;

- **Mitigation and enhancement:** to identify appropriate and justified measures to mitigate negative impacts and enhance positive impacts; and
- **Residual impact evaluation:** to evaluate the significance of impacts assuming effective implementation of mitigation and enhancement measures.

Based on the Project description and the baseline characteristics, an impact interaction matrix for pre-construction, construction, operation and decommissioning phases has been prepared for the Project. Impacts have been categorized based on environment, ecological and social aspects. More details on the impact assessment criteria and the results of the impact assessment and mitigation measures are presented in **Section 7 of Volume II of ESIA Report**.

## 5.6 Alternatives

As mentioned in Section 2.5, the key environmental and social constraints identified during scoping influenced the Project design early in the ESIA process. This allowed the majority of significant impacts to be avoided. Detailed Project alternatives are discussed in **Section 6 of Volume II of ESIA Report**.

## 5.7 Assessment of Cumulative Impacts

Cumulative impacts are a result of effects that act together (including those from concurrent or planned future third-party activities) to affect the same resources and/or receptors as Project under consideration (e.g. the combined effect of other similar Projects in the general area). An effect to a resource in itself may not be considered significant but may become significant when added to the existing and potential effects eventuating from similar or diverse developments in the area.

Cumulative impact assessment is presented in **Section 7.7 of Volume II of ESIA Report**.

## 5.8 Management Plans

Following the assessment of impacts, an Environmental and Social Management and Monitoring (ESMM) framework is developed. This sets out how the impact mitigation and management measures will be put into practice through a suite of specific plans. The ESMM framework includes defining the responsibility, timing and reporting requirements associated with each measure. Please refer **Section 8 of Volume II of ESIA Report** for detailed management plans.

## 5.9 Disclosure

This report was prepared by AECOM for the benefit of its client, Cleantech. AECOM's client may release the information to third parties, who may use and rely upon the information at their own discretion. However, any use of or reliance upon the information by a party other than specifically named above shall be solely at the risk of such third party and without legal recourse against AECOM, its parent, its subsidiaries and affiliates; or their respective employees, officers, or directors; regardless of whether the action in which recovery of damages is sought is based upon contract, tort (including the sole, concurrent, or other negligence and strict liability of AECOM), statute, or otherwise. This information shall not be used or relied upon by a party that does not agree to be bound by the above statement. Any information provided in the present report shall not be considered or construed as legal advice.

## 5.10 Assumption and Technical Difficulties

This ESIA report was prepared by AECOM in accordance with the agreed upon scope of work and generally accepted scientific practice in effect at the time of AECOM's assessment of the proposed Project area. The statements, conclusions, and opinions contained in this report are only intended to give approximations of the environmental and social condition of the site.

Environmental and social assessment for the Project is largely based on the documents made available, discussions held with project representatives and observations from the site survey conducted. Professional judgement and subjective interpretation of facts has been applied for this study. All information and inferences presented herein are based on the specifics currently available within the limits of the scope of work, information provided by the client or its representative and existing secondary data.

Any change in project location, orientation and proposed project activities is likely to result in variation of the impacts. It is to be noted that any technological advances during construction and execution of the project will alter the extent and severity of impacts on the surroundings.

## 6. Impact Assessment Summary

The ESIA identified both potential positive and adverse impact, as illustrated in the **Table 2**. The table summarises the potential impacts of the Project phases (pre-construction, construction, operation and decommissioning) before and after

mitigation measures. Mitigation measures that are included in this Report become set project commitments, which will be implemented by Project Proponent as part of the Environmental and Social Management Plan (ESMP).

**Table 1 Impact Assessment Summary**

Impact Description	Impact Nature	Significant of Impact	Overall Impact after mitigation
<b>Pre-construction and Construction Phase</b>			
Ambient Air Quality	Negative	Moderate	Minor
Ambient Noise Quality	Negative	Moderate	Minor
Soil Quality	Negative	Moderate	Minor
Ground Water Resource and Quality	Negative	Moderate	Minor
Surface Water Resources and Quality		Minor	Insignificant
Waste Storage and Disposal	Negative	Moderate	Minor
Impact to Occupational Health and Safety of Workers	Negative	Moderate	Minor
Impact to local Community Health and Safety	Negative	Moderate	Minor
Ecology Impacts – Habitat Loss/Degradation/ Fragmentation	Negative	Moderate	Minor
Land Sellers and Land Users	Negative	Moderate	Minor
Impacts on Local Economy and Employment Opportunities	Positive	Minor	Minor
Labour Rights, Welfare and Working Conditions	Negative	Moderate	Minor
Cultural Heritage and Access	Negative	Moderate	Minor
<b>Operational Phase</b>			
Aesthetic and Visual Impacts	Negative	Minor	Insignificant
Soil Quality	Negative	Minor	Insignificant
Groundwater Quality and Availability	Negative	Major	Minor
Surface Water Quality	Negative	Moderate	Minor
Occupational Health and Safety Hazards Impacts	Negative	Moderate	Minor
Habitat Loss/Degradation/Disturbance	Negative	Moderate	Minor
Ecological Impact – Contamination of Environment/Food Resources	Negative	Major	Minor

Impact Description	Impact Nature	Significant of Impact	Overall Impact after mitigation
Upgradation of Local Infrastructure	Negative	Moderate	Minor
Cultural Heritage and Access	Negative	Moderate	Minor
<b>Decommissioning Phase</b>			
Environment and Occupational Health and Safety Impact	Negative	Moderate	Minor
Impact on Land due to Improper Handling of Waste	Negative	Major	Minor
Ecological Impact: Contamination of Environment/ Food Sources	Negative	Major	Insignificant
Loss Employment	Negative	Moderate	Minor
Impact on Community Health – Improper Disposal of Waste	Negative	Moderate	Minor
Impact on Community Health – Generation of Dust	Negative	Moderate	Minor

## 6.1 Summary of Positive Project Impacts

Positive impacts are associated with economy and livelihoods, through the creation of jobs during construction and operation stages. There will be on the job training and capacity development opportunities. Enhancement measures have been proposed to maximise the potential positive benefits.

The generation of power will lead to an increase in the generation capacity of Tamil Nadu state, representing a significant benefit to the macro economy of the country.

Finally, as part of the Project the Project proponent will invest in a Corporate Social Responsibility (CSR) programme which will ensure that Project affected communities directly benefit from the Project.

## 6.2 Potential Adverse Impacts

Due to the nature of a solar plant, its construction and operation, the majority of the potential environmental and social impacts occur during the construction phase. As described in the table above there were several potential impacts from routine Project activities of major or moderate significance. All of these potential impacts have been addressed through mitigation and management measures of the ESIA report, and the potential impacts have been reduced to minor or negligible significance. Please refer detailed assessment report **Section 7 of Volume II – ESIA Report**.

There is always the potential for unplanned events such as spills and traffic accidents. These have been identified and preventative measures will be put in place to reduce the likelihood of these occurring. Please refer **Section 7.7.5 of Volume II of ESIA Report**.

## 7. Environment and Social Management & Monitoring Plan

### 7.1 Introduction

To effectively manage social and environmental issues identified during the impact assessment, an environmental and social management and monitoring (ESMM) framework has been developed (**Section 8 of Volume II of ESIA Report**). The framework identifies and outlines appropriate mitigation and management plans (as identified in Section 6.2 to 6.5 above) that will be needed to achieve acceptable levels of environmental and social performance, through both construction and operation of the Project.

### 7.2 Management Plans

Project level Management Plans are developed for management of environmental and social aspects of the during the life cycle of the Project. Following management plans developed:

- Environment Management Plan
- Waste Management Plan
- Occupational Health and safety Plan
- Traffic Management Plan
- Environmental Monitoring Plan
- Emergency Preparedness and Response Plan
- Stakeholder Engagement Plan
- Grievance Redressal Mechanism

Detailed Management Plans are presented in **Volume III – Technical Annexes and Section 8 of Volume II of ESIA Report**.

### 7.3 Monitoring Plan

Regular monitoring of environmental aspects during the Project operations phase is important to assess the status of environment with respect to baseline

conditions. The monitored data can serve as an indicator for any change in environmental quality due to the Project activities, and further to take adequate mitigation measures to safeguard the environment.

Monitoring indicators have been developed for each of the activity considering the mitigation measures proposed. Monitoring results would be documented, analyzed and reported internally. Monitoring requirements (including monitoring frequency) have been presented in **Table 8.1 and Table 2.2 of Volume II of ESIA Report**.

## 8. Conclusion and Recommendations

This Environmental and Social Impact Assessment study for the proposed 10.7 MW solar power Project in Tirunelveli district in the State of Tamil Nadu, India has been undertaken in accordance with IFC's Performance Standards and World Bank's Environment Health and Safety (EHS) Guidelines.

The ESIA study aimed to identify and evaluate potential environmental and social impacts associated with all aspects of the proposed Project. The conclusion and recommendations of this study are result of on-site inspections, evaluation of impacts identified by specialists, and the process of stakeholder consultation.

The Project is assessed to generate limited environmental and social impacts during Project operations, which will not extend beyond Solar PV Foot Prints, and occupational health and safety. 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.

With reference to the IFC environmental and social screening standards, the Project falls under '**Category B**' as the environmental and social impacts are limited to the Project area, largely reversible and can be readily addressed through the proposed and readily addressed through mitigation measures by implementing adequate management programs.

The rationale for categorization is:

- Solar power is a clean technology using a renewable energy source for generation of electricity;
- No harmful emissions are expected from the construction of Project or the Project operations;
- The Project site is not located in an ecologically sensitive area and does not involve forest land;

- The operation phase of the Project will have limited environmental and social impacts, which are mainly related to use of water for washing the modules and occupational health and safety hazards which can be readily addressed with mitigation measures; and
- Land procurement for the Project was on a 'willing buyer-willing seller' basis with prices equal to or higher than the prevailing market rates.
- The Project did not entail any physical displacement, significant economic impact on the Project Affected Persons (PAP)s or any impact on the cultural heritage or indigenous population of the Project area.
- Any adverse environmental and social impacts may be readily addressed through mitigation measures as outlined in the Environmental and Social Management Plan (ESMP).

Mitigation measures for identified potential impacts on various environmental and socio-economics of the Project area have been specified through:

- Follow up of best practice for resource utilization, stakeholder engagement, and grievance management;
- Planning & designing of Solar Power plant, access route, drainage, traffic movement etc.;
- Application of standards for Health and Safety; and
- Clearances and permits required for each sub activity

Project proponent is recommended to implement the proposed Environmental and Social Management Plan (ESMP). The ESMP describes implementation mechanism for recommended mitigation measures together with monitoring to verify overall Project performance. The implementation of the mitigation measures including monitoring schedule will provide a basis for ensuring that the potential positive and negative impacts associated with the establishment of the Power Plant are taken care off.

This ESIA study together with mitigation measures and follow up of recommendations on management actions will help the Project Proponent in complying with the environmental standards and meet the IFC performance standards.