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FINAL REPORT

Environmental & Social Impact Assessment (ESIA) of 20 MW Solar Power Project at Gundlupet, Chamarajnagar District, Karnataka

Ref. No. 10017084; Final V.02/ February 2019

Prepared for:

M/s. CLEAN SOLAR POWER (TUMKUR) Pvt . Ltd.

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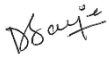
Draft V.01/First issue	February 2018						
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LIST OF ABBREVIATIONS

AC	Alternative Current
AWC	Anganwadi Centre
BPL	Below Poverty Line
BESCOM	Bengaluru Electricity Supply Company limited
CGWB	Central Ground Water Board
CGWA	Central Ground Water Authority
CSR	Corporate Social Responsibility
CTE	Consent to Establish
CTO	Consent to Operate
DC	Direct Current
E&S	Environmental and Social Risk
EIA	Environment Impact Assessment
EPFI	Equator Principles Financial Institutions
ESIA	Environment and Social Impact Assessment
ESMP	Environmental Social Management Plan
ESMF	Environmental and Social Management Framework
ESMS	Environmental and Social Management System
EHS	Environment, Health and Safety
FI	Financial Institutions
GRM	Grievance Redressal Mechanism
HFE	Hero Future Energies
HSE	Heath, Safety and Environment
IFC	International Finance Corporation
ICDS	Integrated Child Development Scheme
ILO	International Labour Organization

IUCN	International Union for Conservation of Nature
IPP	Independent Power Producer
Lpcd	Litre per capita per day
KLD	Kilo Litre per day
Km	Kilo meter
LA	Livelihood Assessment
LIA	Livelihood Impact Assessment
m	Meter
bgl	below ground level
MNRE	Ministry of New and renewable Energy
MOEF&CC	Ministry of Environment, Forest and Climate Change
PAP	Project Affected People
PCB	Pollution Control Board
PUC	Pollution under control certificate
PS	Performance Standard
R & R	Rehabilitation & Resettlements
SHG	Self Help Group
KSPCB	Karnataka State Pollution Control Board
WPA	Wildlife Protection Act
SOP	Standard Operation Procedures
SCADA	Supervisory Control and Data Acquisition
SPCB	State Pollution Control Board

EXECUTIVE SUMMARY

Background	M/s. Clean Solar Power (Tumkur) Pvt Ltd. a subsidiary company of Hero Future Energies (hereinafter referred as HFE)) is developing 20 MW solar power project at Kodagapura and Kulagana village of Gundupete Tehsil, Chamarajanagar District in Karnataka (hereinafter referred as site or project). Arcadis India Private Limited (hereafter referred as Arcadis) was appointed by HFE to undertake an Environmental and Social Impact Assessment (ESIA) study of solar power project in accordance with IFC's Performance Standards and national environmental laws and regulations. The ESIA study was undertaken in December 2017 to assess any potential impacts (both negative and positive) that may arise from the construction, operation and decommissioning of the solar plant. The goal of the ESIA is to enhance sustainability of vital ecosystem, to improve or restore ecosystem health and biodiversity. The Environmental and Social Impact Assessment (ESIA) study for the project has been undertaken in accordance with the scope of work assigned by Hero Future Energies (HFE). This ESIA report is based on International Finance Corporation's (IFC) Performance Standards (PS) on Social and Environmental Sustainability, 2012 and Indian environmental standards. Environment, Health and Safety Guidelines, Equator Principles; Relevant ILO conventions covering labour standards. The study will also assess the sustainability of the project w.r.t the local and national regulations relevant to the project.
Project Overview	The 20 MW solar power project is located at Kodagapura and Kulagana village of Gundupete Tehsil, Chamarajanagar District in Karnataka. Presently, the project is under construction phase and as reported, the project is being developed by HFE in private land parcels measuring approximately 102 acres. Power evacuation scheme has been executed between Clean Solar Power (Tumkur) Pvt Ltd. With Karnataka Power Transmission Corporation Limited on 12th May 2017. The power will be internally evacuated through 66 KV transmission line to the PSS (Pooling Substation) located in the solar plant then the power will be further evacuated using a 66 KV overhead transmission line to Grid substation (GSS) located at Kabbhalli village which is approximately 9 km away from site. The length of transmission line from PSS to GSS is 5.5 km. As per the DPR, this solar power plant is expected to generate about 38.6 million units (kWh) from plant for sale in the first year of operation. HFE has entered a 25-year Power Purchase Agreement s (PPAs) with Bengaluru Electricity Supply Company limited (BESCOM), A Government of Karnataka Enterprise. This project was selected in competitive bidding under State Bidding program.
Applicable IFC's Performance Standards	The following IFC's performance standards are applicable for this project: Performance Standard (PS)1: Assessment and Management of Environmental and Social Risks and Impacts, PS2: Labour and Working Conditions, PS3:

	Resource Efficiency & Pollution Prevention, PS 4: Community Health, Safety and Security. The following IFC's performance standards are not applicable for this project: PS 5: Land Acquisition and Involuntary Resettlement, PS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources PS 7: Indigenous Peoples, PS 8: Cultural Heritage
PS1: Social and Environmental Assessment and Management Systems	The project will have environmental and social impacts due to generation of onsite air emissions, noise, domestic wastes from site office and rest rooms, and generation of hazardous wastes from the construction site. HFE have developed Environmental & Social Management Framework (ESMF) which will be followed and implemented to manage the risks associated with its operations. This ESIA report includes evaluation of project specific environment and social risks arising from the project activities along with recommended mitigation measures. **Hence, PS1 is applicable.**
PS2: Labour and Working Conditions	Approximately 100 labours comprising of semi-skilled and unskilled labours, is estimated to be employed in the peak construction phase The PS2 applies to workers directly engaged by the client (direct workers), workers engaged through third parties (contracted workers), as well as workers engaged by the client's primary suppliers (supply chain workers). The project plans to maximize local involvement in the employment during the construction phase with back up of sourcing labour from outside the region, in case the labour requirements are not met locally. To this effect, labour accommodation provided during the construction phase of the project should follow the Guidelines of IFC Worker's Accommodation: Process and Standards while providing labour accommodation. **PS2 is therefore applicable for the project.**
PS3: Resource Efficiency & Pollution Prevention	The project involves use of resources like land and water. In case the solar panel contain any hazardous material, chances of ground water and soil contamination cannot be ruled out. Waste oil and other hazardous chemicals released from construction activities may result in contamination of ground and nearby surface water. **Hence, PS3 is applicable**
PS4: Community Health, Safety and Security	This Performance Standard is applicable to projects which entail potential risks and impacts to the health and safety of affected communities from project activities. The project will involve movement of vehicles on the National Highway (NH212) and connecting Begur town to project site in Kodagapura and Kulagana village. Therefore, traffic must be managed for the project vehicles to cross the road and enter the project boundary. Further, at the project site, appropriate access control is required to put in place. This control will include barricading of project site; safety signage; illumination and other measures to mitigate the risk of accidents for public during the construction phase.

	While solar power projects have a limited and controlled footprint, major issue is related to glare or reflection. Considering scale of project, substantial movement of heavy vehicles are also envisaged. **PS4 is therefore applicable for the project.**
PS5: Land Acquisition and Involuntary Resettlement	Reportedly, for the development of this project 102 acres private land has been procured based on willing to buy and willing to sell and at mutually agreed price. The land procurement has not resulted in any economic or physical displacement. Agricultural activities were practise based on rain-fall **Hence, PS5 is not applicable.**
PS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	No Reserved Forest (RF), identified bird area (IBA), National Parks, Wildlife Sanctuaries is located within 10 km radius from the project site. However, Bandipur National Park is located within approximately 11.86 km (aerial distance) proximity from site. However, during ecological survey, Habitat of the study as also found to modified and no sensitive species like, endemic species, Schedule I species or IUCN Red list species are recorded from the site. **Hence, PS6 is not applicable to the project**
PS 7: Indigenous Peoples	Private land is having been procured for the project, but no land belongs to ST community. **Hence, PS 7 is not applicable.**
PS8: Cultural Heritage	As observed during field visit there is no designated archaeological or cultural heritage site near the project site. **Hence, PS 8 is not applicable.**
Key Findings	• The site is in agricultural land, similar agricultural land parcels are observed in the site vicinity. • No Reserved Forest (RF), Protected Forest (PF), identified bird area (IBA), Wildlife Sanctuaries is located within 10 km radius of the project site, However, Bandipur National Park is located at an approximate aerial distance of 11.86 km from site. Forest department should be consulted in this regard. Care should be taken for management of the wildlife. • Reportedly, there was agricultural activities practised in most of the land parcels prior to selling. • Kodagapura is the nearest village settlement from the site, located at 1 km (approx.) in the south-western direction from the site. • There are no shading elements such as mountains or huge trees exists in the site. However, one hill exits at a distance of 2.74 km from site in north eastern direction. • Surface water body e,g, Gundal river exists in the vicinity of the project site • No resettlement and rehabilitation involved in the project.

	• Community is aware about the project and does not show any unwillingness for the project due to clean technology. Further, adequate disclosure has been made by HFEduring land acquisition process. • Based on the discussion with the community during consultation, it can be concluded that the local people are welcoming the project along with allied infrastructural development of the area ushered with the solar project. • The CSR plan focused on community development shall be implemented by the HFE • The sanitation condition, specifically in the school's present there need up-gradation. This needs to be addressed in the CSR Plan. • Due to the non-availability of employment opportunity, villagers aspire for employment generation and consecutive opportunity for them in or in allied activities of the project. • Piped water supply system through Overhead reservoirs exists in all the panchayat. Water is supplied to individual households against charges Rs. 25-50 per month/ household.
Conclusion	The solar power project is not likely to have significant adverse environmental impacts that are sensitive, diverse or unprecedented. It is envisaged to have moderate impact due to issues related to community safety during the construction period, insignificant impact due to generation of dust and fugitive emissions during construction phase only (short duration) and minor impact on resource utilization like land and socio-economic conditions of project area villages. There is no impact on cultural resources in the study area. The impacts anticipated during the operation phase is fugitive emissions from movement of project vehicles within the site (air environment), surface run off and onsite drainage of storm water (water environment), impact on soil due to storage and spillage of hazardous wastes used oil and transformer oil (land environment) as well as use of ground water (if any) resources during operation phase, which can be mitigated by adopting suggested mitigation measures. Based on the conclusion drawn from the ESIA study with respect to the intensity of impacts due to project activities on environment, resources, biodiversity, labours and community, the project can be categorized as Category B (as per IFCs categorization of projects), which specifies that this project is expected to have limited adverse environment and social impacts, which can be mitigated by adopting suitable mitigating measures

This Executive Summary should be read in conjunction with the full report and reflects an assessment of the Site based on information received by Arcadis at the time of reporting.

1 INTRODUCTION

1.1 Background

M/s. Clean Solar Power (Tumkur) Pvt Ltd. a SPV / 100 % subsidiary of Hero Future Energies (hereinafter referred as HFE)) is developing 20 MW solar power project at Kodagapura and Kulagana village of Gundupete Tehsil, Chamarajanagar District in Karnataka (hereinafter referred as site or project). Arcadis India Private Limited (hereinafter referred as Arcadis) was appointed by HFEto undertake an Environmental and Social Impact Assessment (ESIA) study of the project.

The project is under construction phase and as reported, the project is being developed by HFEin private land parcels measuring approximately 102 acres.

Evacuation scheme has been executed between Clean Solar Power (Tumkur) Pvt Ltd. with Karnataka Power Transmission Corporation Limited on 12th May 2017.

The power from the solar plant will be internally evacuated through 66 KV transmission line to the PSS (Pooling Substation) located in the solar plant then the power will be further evacuated using a 66 KV overhead transmission line to Grid substation (GSS) located at Kabbhalli village which is approximately 9 km away from site. The length of transmission line from PSS to GSS is 5.5 km.

Expected electrical energy generation for sale will be approximately 38.6 million units (kWh) in the first year of operation i.e. 1.93 Mn units per MW. This solar power plant is expected to generate about 38.6 million units (kWh) from plant for sale in the first year of operation.

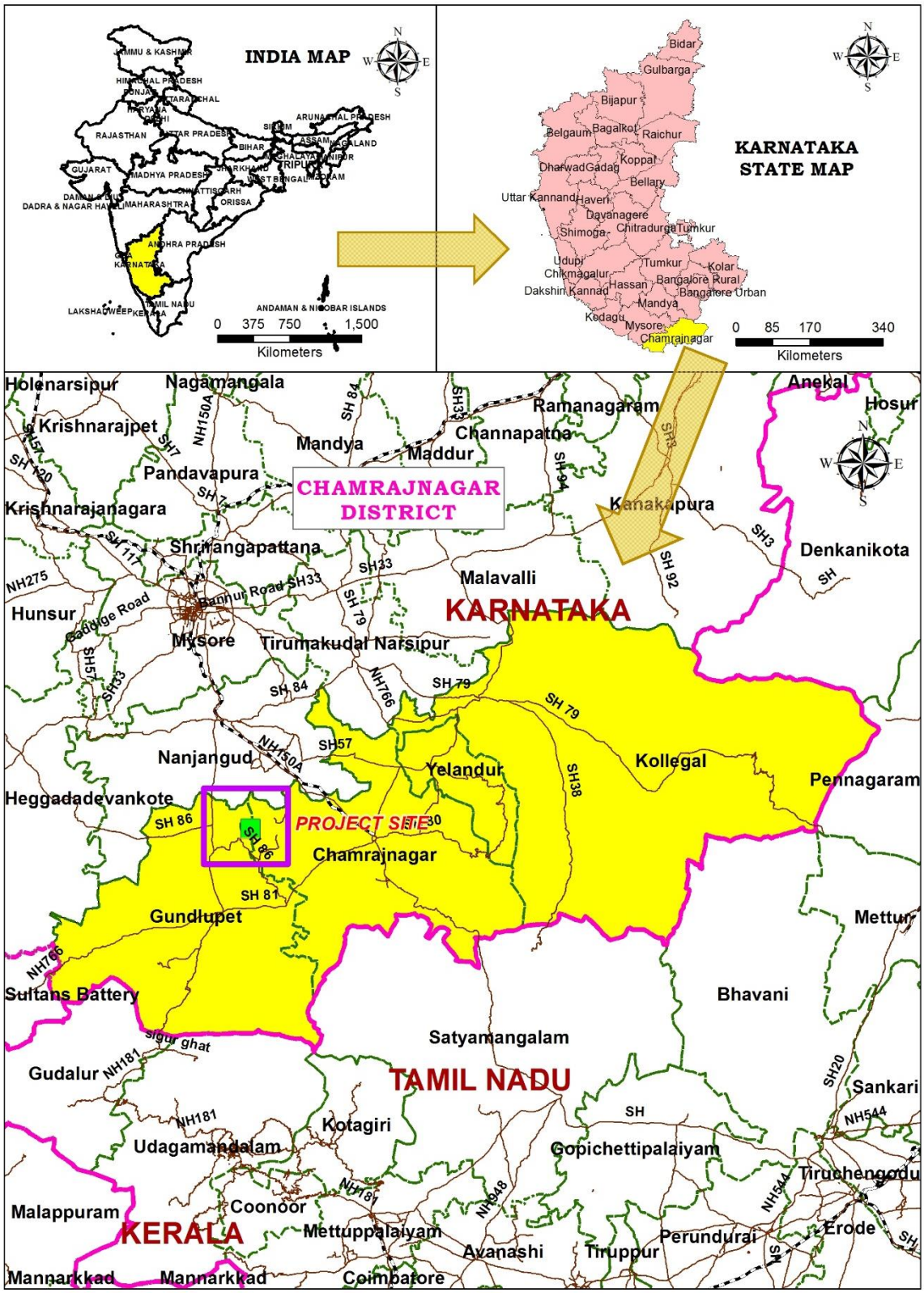
HFE has entered a 25-year Power Purchase Agreement s (PPAs) with Bengaluru Electricity Supply Company limited (BESCOM), A Government of Karnataka Enterprise. This project was selected in competitive bidding under State Bidding program.

This ESIA report has been prepared based on site reconnaissance survey, documentation review, consultation with stakeholders and in accordance with International Finance Corporation's (IFC) Performance Standards (PS) on Environmental and Social Sustainability, 2012; Environment, Health and Safety Guidelines of World Bank Group, Equator Principles; Relevant ILO conventions covering labor standards. The study has also assessed the requirement of the project w.r.t the local and national regulations relevant to the project.

1.2 Location of the Site

The site is located at Kodagapura and Kulagana village of Gundupete Tehsil, Chamarajanagar District in Karnataka. The location map is depicted in **Figure 1-1**

Figure 1-1: Project Location Map



1.3 Salient Features of Project

The salient features of the project are summaries in **Table 1-1.**

Table 1-1: Salient Features of Project

S. N.	Salient Features	Description
1	Project Owner	Clean Solar Power (Tumkur) Pvt Ltd.
2	Project Capacity	20 MW
3	Location of Site	Village: Kodagapura and Kulagana
4	Tehsil/Mandal	Gundupete
5	District	Chamarajanagar
6	State	Karnataka
7	Project Coordinates (TBM 1)	E 688817.630 N 1320653.518
8	Nearest Town	Begur
9	Nearest Railway Station	Mysore JN
10	Nearest Airport	Mysore Airport
11	Total Land Area	102 Acre.
12	Type of land	Private Land
13	Type of Land use (10 km radius from site)	Predominantly Agricultural
14	Present status of the project/project phase	Under construction
15	Power evacuation	66 KV transmission line
16	Location of PSS	In the site
17	Location of GSS	Kabbhalli
18	Transmission Line Length	5.5 km
19	Mode of Implementation	EPC (Engineering, Procurement and Construction)
20	Solar PV Technology	Multi Crystalline
21	Project Life	25 years

1.4 Key Permitting and Compliance Status

The status permits, approvals and consents for the project are summarized in below **Table 1-2**

Table 1-2: Status of Permits and Approvals

S. N	Permits/Approvals	Status	Remarks (if any)
1	Consent to operate from Karnataka State Pollution Control Board (KSPCB) under Water (Prevention & Control of Pollution) Act, 1974 and the Air (Prevention & Control of Pollution) Act. 1981	Not Applicable	As per CPCB notification No. B-29012/ESS(CPA)/2015-16; dated March 07, 2016 solar power project is categorized as white category. It is mentioned in the said notification that, there shall be no necessity of obtaining the Consent to Operate'' for White category of industries. An intimation to concerned SPCB / PCC shall suffice.
2	Hazardous Waste authorization as per Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016	Need to be obtained	For storage, transfer & recycling of transformer waste oil

S. N	Permits/Approvals	Status	Remarks (if any)
3	NOC from Village Panchayat	To be obtained.	HFE have applied for it.
4	Factory License under factories act 1948	Need to be obtained	With reference to the factories act 1948, the same is applicable because this solar plant generating, transforming or transmitting electrical energy and more than 10 workers are employed/working at site.
5	Labour License	to be obtained	
6	Power Purchase agreement	Available	PPA is provided in Annexure H
7	Evacuation Plan	Available	Evacuation scheme has been executed between Clean Solar Power (Tumkur) Pvt Ltd. With Karnataka Power Transmission Corporation Limited on 12th May 2017
8	Approval for extraction of Ground water	Needs to be obtained	Central Ground Water Authority (CWGB) approval for extraction of groundwater needs to be obtained in case HFE/project developer installed bore well for ground water extraction.
9	Land procurement	Completed	Reportedly, the 102 acres private land parcels were purchased through negotiations based on willing sale and willing buy basis
10	Environmental Clearance with reference to Environmental Impact Assessment (EIA) Notification 2006 & MoEF&CC Office Memorandum dated 30thJune'11.	Not Applicable	Solar power projects are not covered under the 2006 EIA notification and are, therefore, exempt from EIA process for obtaining environmental clearance.

1.5 Purpose of ESIA Study

The main purpose of the ESIA study is to identify, evaluate and manage environmental and social impacts that may arise due to implementation and operation of the project. The document has been made to comply with the requirements of IFC's Performance Standards, IFC EHS guideline as well as applicable local and national regulations. The objectives of ESIA study are:

- To identify and establish the baseline environmental and socioeconomic conditions, to analyse the environmental and social risk and impacts of the project and its associated components (facilities like transmission line, access road etc.)
- To prepare an inventory of biodiversity (flora and fauna) of project site prior to implementation of the project to evaluate the possible impacts on avifauna, if any.
- Review of the land sale process to assess any legacy or current/existing issues (like informal settlers, livelihood dependence, other usage etc.) on the purchased/ leased land through suitable survey using acceptable socioeconomic tools. This will help in assessing the impact of the project on the community/ villagers.
- Socio-economic survey involving consultation with local community, stakeholders, Land sellers, to identify the needs and problems of community with respect to the project activities.
- To suggest appropriate safeguards for the associated environmental and social risk, which may not lead to project investment and activities at risk.

1.5.1 Approach and Methodology of the ESIA Study

The approach and methodology applied for undertaking the environmental and social impact assessment study is as provided.

- Desktop review of project related documents
- Reconnaissance survey to understand site specific issues.
- Discussion with the local community in the project influenced villages to understand their perception of the project and identification of key issues.
- Baseline noise level, air, water, soil, ecology and biodiversity data collection of the site through primary and secondary data source surveys.
- Identification of environmental and social risks associated with the project (including associated facilities) during construction, operation and decommissioning stage.
- Preparation of an environmental and social management action plan (with timelines & responsibilities) & Environmental monitoring plan to manage these risk and impact.

1.5.2 Limitations

The study is based on the project planning information and document provided by the project proponent/ Client, stakeholder consultation and observation recorded during site reconnaissance survey. Any meaningful change in the activities may result in variation of outcomes. All the land sale deeds are unavailable with Arcadis team.

1.5.3 ESIA Team

Arcadis mobilized a diverse team of multidisciplinary experts for conducting the ESIA study. A number of these experts are accredited professionals by Quality Council of India to conduct regulatory EIA. Combination of these experts have provided consultancy services to over 52 no’s ESIA. The experts have been continuously working with funding agency and understand the modalities and procedures of evaluating and addressing environment and social risk associated with large scale investment.

2 PROJECT DESCRIPTION

The construction work was started on Nov 2017 and expected to be completed in Jan 2018 as reported by site representative of HFE.

The technical features of project are provided in **Table 2-1** and satellite imagery of the project site is shown in **Figure 2-1.**

Table 2-1: Technical Features of Project

Particulars	Description
Project Capacity	20 MW AC
Projected Energy Production per year	Approximately 38.6 million units (kWh) in the first year of operation
Type of system	Solar PV
Solar PV Technology	Multi Crystalline
Capacity of each Module proposed	315-320 Wp
Inverter Capacity	1000-1250 KW
Power Evacuation	66 KV transmission line
Name of the Customer of Power	Bangalore Electricity Supply Company Ltd.(BESCOM)
Project Life	25 years

Source: Detailed Project Report (DPR)

2.1 Present Status of Project

The site visit was conducted by Mr. Alok Adhikari and Mr. Santu Gorai of Arcadis on 6th December 2017. Representative from HFE Mr. Vinod Chowdary Gunnam accompanied Arcadis professionals during the site visit and are referred to as the 'Site representatives' in the report. During site visit it is found that project is under construction phase and land procurement has been completed by HFE.

Figure 2-1: Satellite Imagery (Google Map) Showing the Project Site

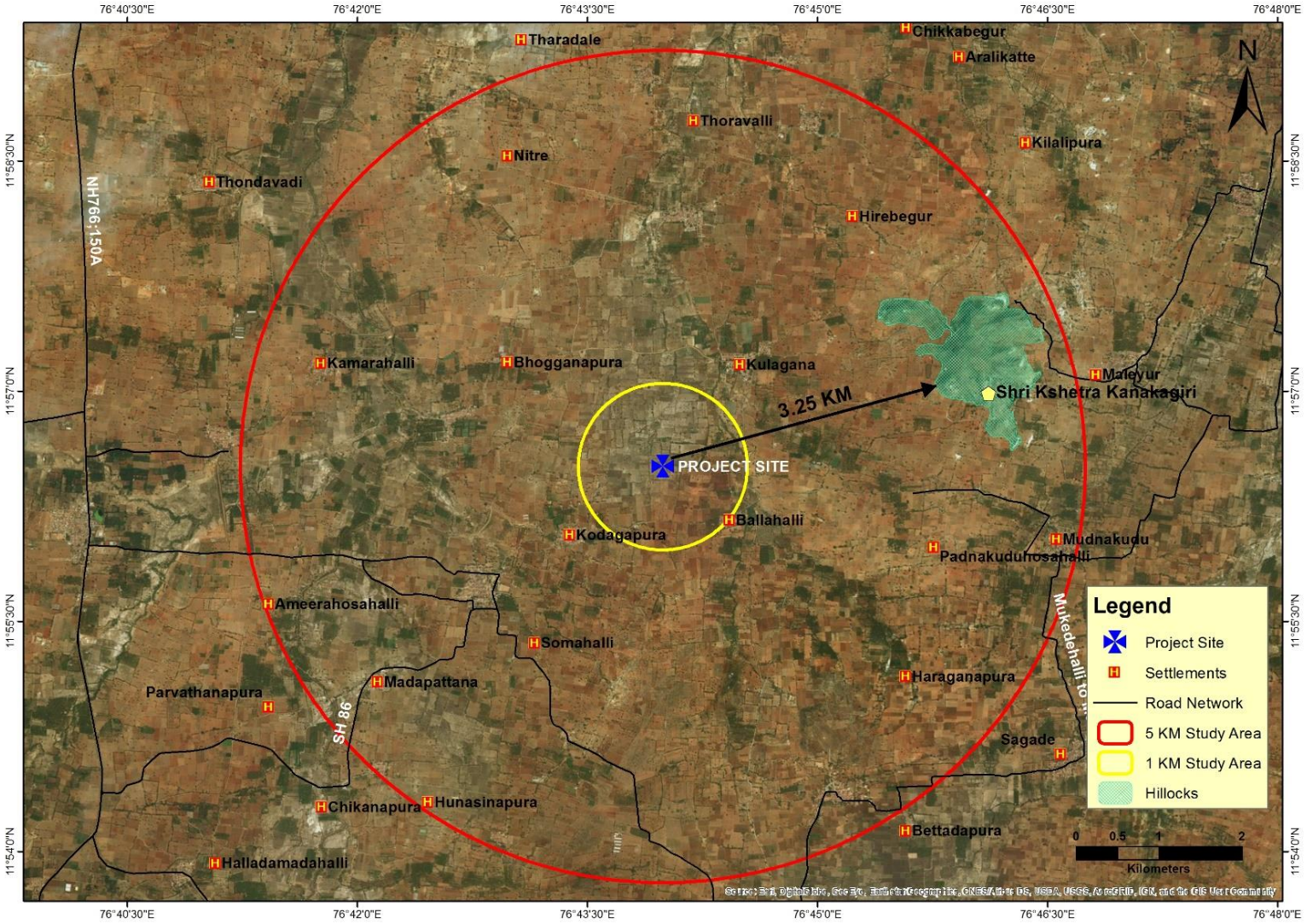
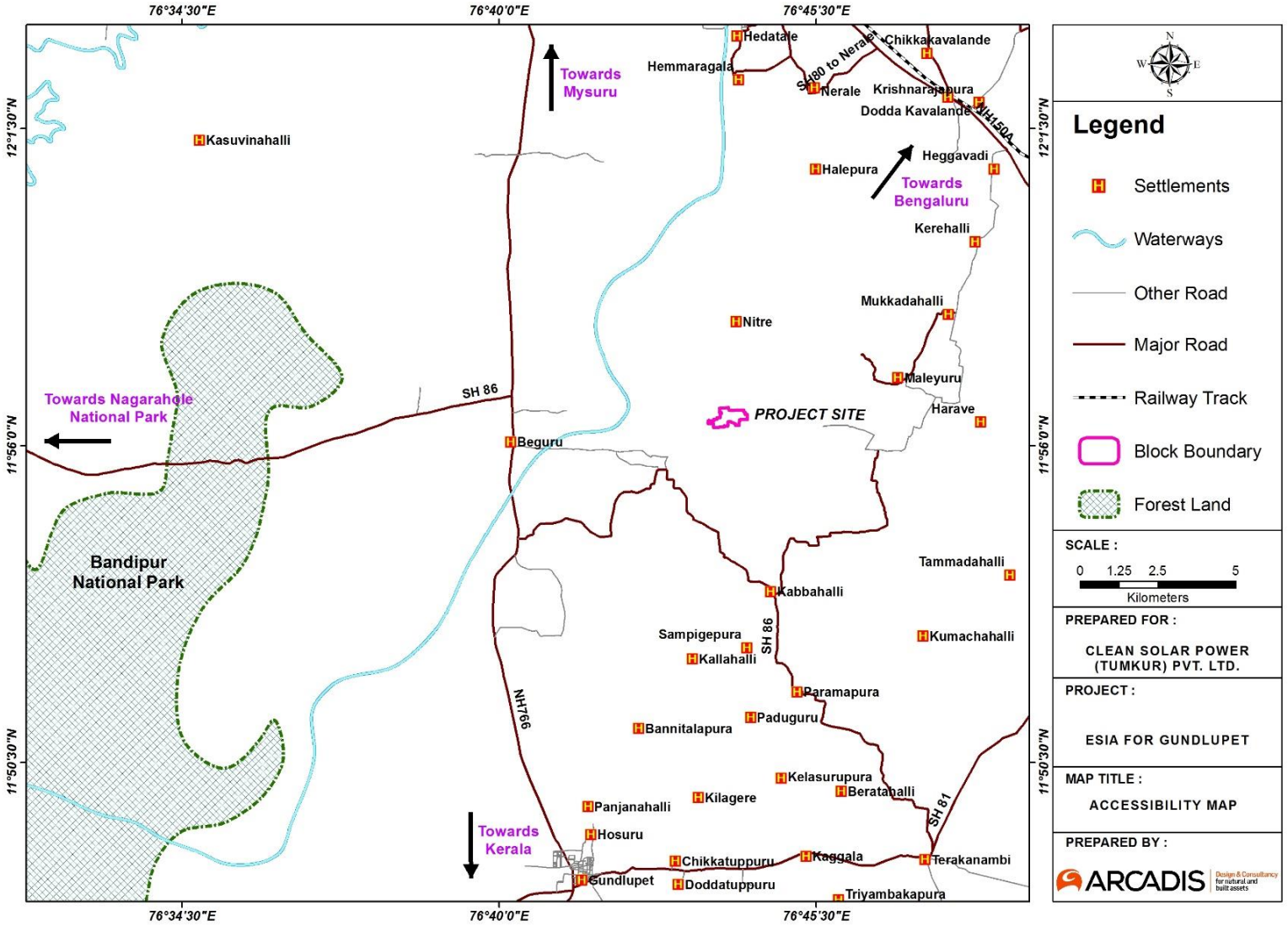


Figure 2-2: Accessibility of the Project Site



2.2 Site Suitability and Justification of Project

Following analysis describes the site suitability for a Solar PV power plant development, these analyses includes

- **Projected Energy Production per year:** As per the Detailed Project Report (DPR), site indicates that Approximately 38.6 million units (kWh) in the first year of operation. This is amongst the mid-range brackets of irradiation received on the Indian subcontinent, making the site well suited for the development of a solar PV plant.
- **Topography:** Desk based study followed by site visit indicates that the site is located in relatively flat terrain with some undulation in various direction.
- **Substation proximity:** The power from the solar plant will be internally evacuated through 66 KV transmission line to the PSS (Pooling Substation) located in the solar plant then the power will be further evacuated using a 66 KV overhead transmission line to Grid substation (GSS) located at Kabbhalli village which is approximately 9 km away from site. The length of transmission line from PSS to GSS is 5.5 km
- **Clean Technology:** CPCB has categorised solar power projects under White category which pertains to those industrial sectors which are practically non-polluting and having Pollution Index score up to 20.
- **Accessibility**: The site is located near to the existing village road/ and is accessible through State Highway (SH) 86, SH 81, National Highway (NH) 150 A NH 766 and existing village road are also used as access road to the site. Nearest railway station is Mysore Junction which is approximately at a distance 56.78 km away from the project site. The nearest airport is Mysore Airport at which is 51 km (approx.) away from site. The accessibility map is depicted in **Figure 2-2**
- **Geological and soil conditions:** As per CGWB report, the soils of the district are derived from Granitic gneisses and Charnockite rocks. Red soil is present in upland areas and also noticed at the contact of granites and schist. These soils are admixture of sand and silt. Organic matters in these soils are low and respond well for irrigation meaning and other management practices
- At the time of site visit, the site was devoid of any habitation and free from major structures that could impact solar resource

Considering above discussion, the site has been found to be feasible for a solar power plant development.

2.3 Environmental and Social Settings

The key physical features of the project site have been described below:

- Site is located in agricultural land and also surrounded by agricultural lands.
- There are no shading elements such as mountains or huge trees exists in the site. However, one hill exits at a distance of 2.74 km from site in north eastern direction.
- Few surface water bodies e,g, Gundal river exists in the vicinity of the project site
- Dense vegetation was observed around the site.
- No Reserved Forest (RF), Protected Forest (PF), identified bird area (IBA), Wildlife Sanctuaries is located within 10 km radius of the project site, However, Bandipur National Park is located at an approximate aerial distance of 11.86 km from site.
- Reportedly, there was agricultural activities practised in most of the land parcels prior to selling.

- Kodagapura is the nearest village settlement from the site, located at 1 km (approx.) in the South-western direction from the site,

2.4 Project Design, Technology and Component

This solar power project will be based on Multi Crystalline technology. As per the DPR, the system consists mainly of the following components:

PV Modules: A solar panel (photovoltaic module or photovoltaic panel) is a packaged interconnected assembly of solar cells, also known as photovoltaic: cells. The solar panel can be used as a component of a larger photo voltaic system to generate and supply electricity in commercial and residential applications. Because a single solar panel can only produce a limited amount of power, an installation will contain several panels. This is known as a photovoltaic array. A photovoltaic installation typically includes an array of solar panels, an inverter and interconnection wiring. Solar panels use light energy (photons) from the sun to generate electricity through the photovoltaic effect. The Wattage of SPV Modules for the proposed. system will be as per system capacity. The type of SPV Modules provided will be of crystalline Silicon type with efficiency of about 14 %.

Inverter: Solar photovoltaic is DC (Direct Current) source. The DC output has to be inverted to the grid Alternating Current (AC) by a power electronic device referred to as inverter or power conditioning unit. The synchronization happens automatically with available grid voltage & frequency and it starts to feed output from plant into grid. The second important job of the solar power inverter is to operate the PV system at its point (MPP) & extract maximum generation. The MPP is defined as the operating point where combine value of voltage & current result in maximum power output. This MPP fluctuates during interval depending upon the radiation, cell temperature & the cell type. It has to be tracked by the inverter controller unit.

The Inverter for the 20 MW SPV power plants will be a grid connect which will be a combined unit comprising of inverter and necessary protections

Mounting Structures: A number of PV panels connected in series and in parallel give a DC output out of the incident irradiance. Site conditions, prevailing seismic, wind and dead load, orientation and tilt of these panels are important design parameters as well as shading from surrounding obstructions.

Suitable number of Array frames shall be provided. The array frames proposed for the site would typically utilize design with a different tilt angle capability. This is typically achieved by changing the length of the rear support leg and the spacing between the front and rear footings. The array frames are made of MS galvanized/ Aluminum and is protected against the salt mist corrosion and other environment impacts and confirming to IS 2062. The array frames will have corrosion resistance.

The structure can be installed with a fixed inclination by selecting required angle slots available. The design will be such that any module can be replaced easily. The galvanized steel structure provides support for the photovoltaic modules, has longer life and gives the optimum angle of inclination depending on the system location .The Structure consists of a set of components that can be managed and mounted in the place where the installation is going to be realized. These structures are designed to survive adverse weather conditions with minimum maintenance. The structure shall be with all members to be compatible allowing easy installation.

Junction Box & Distribution Boards: A Junction Box is a passive device which takes the wires from several arrays and/ or solar panels and combines them into one main bus or feed. Fuses or breakers can be included as per requirement. The Array Junction Box will be used to combine the strings from the PV array to one point to avoid complex cabling & losses. The junction box will comply with IP 65 standard. All necessary safety protections shall be there in the enclosure.

The output from each Combiner Box can be fed to a DC distribution board. DC Distribution Board (DCDB) is designed to isolate the solar module part from the inverter for maintenance purpose.

The AC Distribution Board is kept between inverter & grid. The purpose of ACDB is multifold. First, it protects the inverter from any surge coming from the grid & improves the MTBF (Mean time between failures). Secondly, it blocks the free flow of fault current and it is used to isolate inverter from the grid for maintenance .

The enclosure for the junction boxes and distribution boards shall be dust and vermin proof. All the circuit breakers, connectors etc. shall be as per standards.

Power Evacuation Plan: The power from the solar plant will be internally evacuated through 66 KV transmission line to the PSS located in the solar plant then the power will be further evacuated using a 66 KV overhead transmission line to GSS located at Kabbhalli village which is approximately 9 km away from site. The length of transmission line from PSS to GSS is 5.5 km.

The exportable power from the plant shall be evacuated by step ping-up the power from 380 V to 66 kV through transformers.CTs, PTs, isolators, lightning arrestors, Circuit breakers and TVM for TRANSCO measurement will be arranged. Switchyard arrangement and other requirements will be in line with TRANSCO specifications and Grid Code.

Cabling: In order to have minimum losses in the solar photovoltaic power plant, cable selection is a critical activity of the design. The size of the cable is very carefully selected ensuring limited power & voltage. The selection of cable is done considering the short circuit current that can flow through cable, the cables used are multi-strand copper cables. The cables exposed to environment are double sheathed-UV protected ones. All the cabling will be carried out as per the standards

Transformers: It is proposed to use transformers of required capacity to step-up the generated exportable power at 380 V into 66 kV.

Structures: The structures will be made up of hot-dip galvanized steel and designed to withstand forces during normal conditions (viz. wind loads & dead load of switchyard components) and abnormal conditions (viz. short circuit, earthquake, etc.).

Safety Earthing System: A safety earthing system consisting of a buried GI flat conductor earthing grid will be provided for the switchyard and the Solar PV array system. The earthing system will be formed to limit the grid resistance to below 1 ohm. In the switchyard area, the touch potential and step potential will be limited to the safe values.

2.5 Resource Requirement

2.5.1 Land

The solar power is proposed on private land. The project site is an open vast area with mild undulations. Land in the project influenced area was predominantly used for rain-fed agriculture and grazing. Grazing activities are limited to post-monsoon months, when adequate vegetation is present. Agriculture in the area is totally dependent on rainfall and large portion of the land remains dry most part of the year. Also, irrigation facilities are very poor in the area. Advent of the new solar projects in the region will open opportunities for utilization of barren/ dry waste land which is left unused otherwise. Letter to KREDL for Land Conversion is given in **Appendix G**

Type of Land

The 102-acre land for HFE 20 MW solar power project is contiguous. The topography of the project site is largely plain in an open vast area with mild undulations. As observed during ESIA study the land in

the project influenced area is unused dry land with shrubs within the plot. The large portion of the land remains dry for most part of the year.

Land Scenario: It has been informed by the HFE representative, that due procedures were followed for the land acquisition process as per the government regulations (Land conversion, notification, consultations, local community consultations, Panchayat approval, etc.). HFE representative has also informed that the owners of private lands were offered a compensation amount which is double the circle rates. Letter pertaining to the use of agricultural land is provided in **Appendix G**

Land for Access Route: Land for access route would be decided and demarcated by HFE. The land for the 20 MW solar project is located at Kodagapura and Kulagana. Project site is connected with Begur main road and village approach roads. No human activities or structure was noticed in the project site. Hence it is assumed that no issue may rise for the access route in future.

An exclusive access to the construction site is usually required prior to mobilization of manpower and machinery. The land for access roads is also purchased. The construction of access road primarily involves removal of vegetation and modification of topography. However, since the land area is black cotton and laterite, hence only scanty vegetation is seen in the form of shrubs around the project site. The existing kutcha roads or village roads connecting to the nearest villages viz. Kodagapura and Kulagana village from the project site has been used as an access route.

The locals have access to the bus services at Begur, which connects to big cities like Mysore and Ooti beyond. There is no railway network in the study area. Nearest railway station is in Mysore, which is 50 km from the project site. It can hence be concluded that even in the presence of good approach roads, the communication facilities are not satisfactory in this region.

Land for Transmission line: Project layout would be done after completion of boundary marking.

The few pertinent factors for the route of the transmission line from PSS to GSS are as follows:

- One Pooling Substation (PSS) has been decided for the 20 MW Solar Power Project
- Identify route for movement of project vehicles which, should not include narrow village road and road passing through cluster of settlements.
- Transmission line should be planned without any habitation or cultivation field or without any hindrance along the route;
- House or community structures shouldn't be located under the transmission line;
- No vegetation area should fall under the transmission route.
- The transmission route should be devoid of any environmental sensitive area.

Right of Way (RoW) for the transmission route would be done after completion of boundary marking. No cultivation land nor any habitation should come on the way of transmission route.

Land Holding Pattern: The 102-acre land identified and being procured for the 20 MW. During consultation with the local community, it was understood that the average land holding size in the villages varies between 5 to 7 acres per household, most of which are lateit and barren.

Land Procurement Procedure: The 20 MW wind power project is at initial stage. As observed during ESIA study, it is assumed that lands in the study area may be both of government and private ownership. A general procedure for land procurement will be followed for solar/wind power projects

A brief general procedure of land purchase is given below:

- Based on micro siting land must be identified by the project proponent/ developer.
- The title of the property, ownership of land and registration documents needs to be checked and verified in the office of the sub-registrar of the circle in the proposed project area.

- A search of the records and documents that may affect the registration, ownership and title of the land may be carried out at the sub-registrar's office.
- If land records are found in proper order, the developer/ land team can proceed for negotiation with owners of private lands. In case of Govt lands, process should be initiated as per the rules and norms with the concerned departments and authorities.
- Compensation/ selling rates must be mutually agreed by both seller and buyer parties on good faith negotiation.
- Based upon the fixed rate through mutual agreement process for land transfer in favour of buyer should be initiated.
- Mutation and registration of the lands, through Agreement to Sale (ATS), must be made in buying company's name in the revenue records.
- A percentage on basic land value is charged (as per Sub Registrar Office of the circle) for transfer and conversion of the land.

As retrieved from the website portal of department of stamp & registration, Government of Karnataka the circle rates of the study area are provided in **Table 2.2.**

Table 2-2: Village Wise Govt. Circle Rate of Land in Study Area

Taluk & District	Village Name	Land type and unit		
		Wet (Assured Water Supply from Government Tanks/Canals), One Crop (Per Acre)	Dry, No Source of Irrigation, Other (Per Acre)	Bagayat, Dry (Per Acre)
GundlupeteTaluk, Chamarajnagar District	Kulagana	50000.00	30000.00	70000.00
	Kadagapura	45000.00	25000.00	60000.00

Source: Department of stamp & registration, Government of Karnataka

2.5.2 Water Requirement

During the project construction phase, water is required for preparing civil works/RCC foundations for module mounting structures, building control room and security rooms, and domestic purposes such as drinking and washing by the construction workers and staff. During operations, water will be required for cleaning of solar panels and for domestic purposes by the operations staff. The estimated quantities of water required during the construction and operation phases are presented below **Table 2-3**

Table 2-3: Water Requirement During Construction and Operation Phase

Phase	Activity	Consumption	Source
Construction	Varoius construction related activity	15 KLD	Bore well and through water tanker (Authorize vendor)
	Domestic use considering 135 lpcd for 100 labours	13.5 KLD	Bore well and through water tanker (Authorize vendor) RO water through authorize vendor for drinking purpose
Operation	Cleaning of solar panels	Reportedly 0.5 to 1 litre per module per month Considering 1 lit each for 68460 nos of modules, the	Bore well and through water tanker (Authorize vendor)

Phase	Activity	Consumption	Source
		water requirement comes around 68 KL per month.	
		2 KLD (approximate)	RO water through authorize vendor for drinking and bore well/tanker water for domestic purpose

2.5.3 Manpower Requirement

Construction Phase

About 100 labours comprising of semi-skilled and unskilled labours, is estimated to be employed in the peak construction phase which involves the foundation structural work, fencing, cleaning and erection of mounting structure. Some female workers are also expected to be engaged. The contractor workforce will comprise of both skilled and unskilled labours. Some workers may be sourced from the nearby villages depending on their skills and capabilities.

These (semi-skilled and unskilled) labours will be supervised and monitored by 10 skilled personnel from EPC contractor in the peak construction phase. HFE personnel will be deployed directly on site during construction.

Operational Phase

During operational phase, a few personnel is required onsite including security guards, operation and maintenance officer and site engineers etc.

Skilled personnel would be deployed by HFE on site during operation. Additionally, 15 labours, comprising of semi-skilled and unskilled, would be deployed for security, module cleaning, vegetation abatement, module tilting etc. As informed by HFE the number of unskilled and semi-skilled labours may increase to 20-25 when module tilting is happening twice a year.

2.5.4 Waste Water Treatment and Disposal System

During the construction phase, the waste water or sewage from site office toilets will be disposed in a septic tank followed by soak pit. Waste water (module cleaning) will be generated during operation phase is expected to be percolated in the soil or drained through storm water drainage channels which would be constructed along the periphery of the project. The domestic waste water would be managed through septic tanks followed by soak pit.

2.5.5 Logistics Arrangement

Labour Camp: Labour camp has been constructed for 50 nos. workers to accommodate migrant laborer's, further it can be developed for another 50 nos.

Project Vehicles: Project vehicles such as water tanker, tractors, JCB, and cars has been engaged to support various activities during construction phase and further efforts could be made to hire vehicles as per requirement

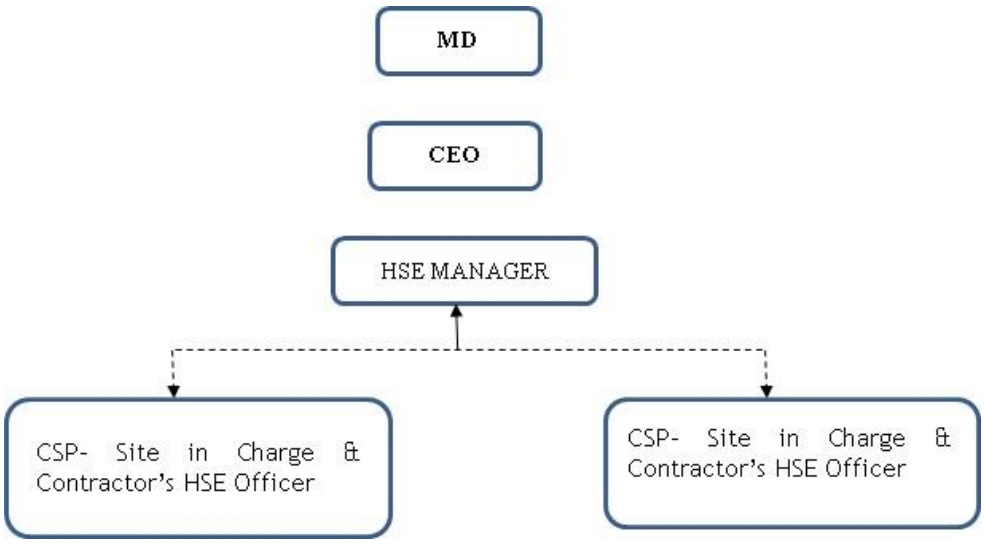
2.5.6 Organizational Structure

To ensure the smooth completion of various operations or activities of project during construction and operational phases, environmental and social management system of ***HFE*** will be implemented for the project.

From Constructions and O&M sites CWP-Ratlam's sub-contractors have their own designated HSE personnel onsite, who report the HSE related activities to the Site in charge of Clean Solar Power (Tumkur) Pvt . Ltd. as well as to the HSE Manager of the HFEas per requirement and implement the HSE related instructions at site. On monthly basis HSE review meeting is organized with MD, CEO & all Departmental HODs to discuss about the HSE issues (if any) concerned with the site.

During the current phase, project operation is managed by Project Site Manager whereas environmental, health and safety issues is monitored by EHS officer. The HSE organizational structure of ***HFE*** is shown in **Figure 2-3**

Figure 2-3: HSE Organizational Structure



Operational Phase

A dedicated Project Manager will be responsible for the implementation of the project. He will be the responsible authority on behalf of Clean Solar Power (Tumkur) Pvt . Ltd to the designated authority of Karnataka state board for this project. He will be assisted by the Project Engineer (Technical), Project Administrator and Head (Technical Services) with their respective staff. During the commissioning of the plant, training will be imparted to the Engineer, Supervisor and Operators. This operational training shall cover the following:

- The nature, purpose and limitations of all plant and equipment
- The detailed operating instructions on each section and equipment of the plant
- Normal start-up and shutdown program for the plant
- The emergency procedures and all related HSE issues according to the standards
- The basis for the training shall be the plant's O&M manual.

2.5.7 Implementation Schedule for the Project

The construction work was started on November 2017 and expected to be completed in January 2018 as reported by site representative of HFE.

3 APPLICABLE REGULATIONS, GUIDELINES AND STANDARDS

This section describes regulations, statutory guidelines and obligatory standards that are applicable to the social and environmental performance of the project.

3.1 National Regulations

In India the Ministry of Environment, Forests and Climate Change (MoEF&CC) is the apex administrative body for (i) regulating and ensuring environmental protection; (ii) formulating the environmental policy framework in the country; (iii) undertaking conservation & survey of flora, fauna, forests and wildlife; and (iv) planning, promotion, co-ordination and overseeing the implementation of environmental and forestry programmes. Several laws have been framed for protection of environment and for Occupational Health & Safety in India by the Central Government. The relevant regulation pertaining to the project activity has been discussed as under. The compliance to all environmental, health, safety and social regulation have been presented in **Table 3-1.**

Table 3-1: Applicable Environmental, Health, Safety and Social Regulations

S.N.	National Environment, Health & Safety Regulation	Agency Responsible	Requirement	Applicability /Remarks
1	The Air (Prevention & Control of Pollution) Act 1981	Karnataka Pollution Control Board (KSPCB)	With reference to the CPCB modified direction No. B-29012/ESS(CPA)/2015-16; dated March 07, 2016 solar power project falls in White category and it is mentioned in the notification that there shall be no necessity of obtaining the Consent to Operate'' for White category of industries. An intimation to concerned SPCB / PCC shall suffice.	Not Applicable but KSPCB should be informed and HFE should ensure the same. Also, the modified direction silent on CTE, hence, it is suggested that HFE should bring the matter with KSPCB
2	The Water (Prevention & Control of Pollution) Act 1974	Karnataka State Pollution Control Board (KSPCB)	With reference to the CPCB modified direction No. B-29012/ESS(CPA)/2015-16; dated March 07, 2016 solar power project falls in White category and it is mentioned in the notification that there shall be no necessity of obtaining the Consent to Operate'' for White category of industries. An intimation to concerned SPCB / PCC shall suffice	KSPCB needs to be informed and HFE should ensure the same.
3	Guidelines/Criteria for evaluation of proposals/requests for ground water abstraction (With effect from 16.11.2015)	Central Ground Water Authority	As per the Central Ground Water Authority (CGWA), Guidelines/Criteria for evaluation of proposals/requests for ground water abstraction (With effect from 16.11.2015). This guidelines for abstraction of ground water in Notified/Non-Notified areas needs to be followed Developer contractors needs to take NOC from CGWA	*Applicable since the developer/project proponent have installed bore well for ground water abstraction for construction/operational activities.*
4	Forests (Conservation) Act, 1980 and Rules 1981	Forest Department	The Forest Conservation Act and Rules mandate projects requiring diversion of forest land for non-forest purposes to seek Forest Clearance from the Ministry of Environment and Forests.	Not Applicable No forest land is involved for the development of this project. However, Bandipur National Park is located beyond 10km aerial distance but within 11.86 km,
5	Wild Life (Protection) Act, 1972. Wild Life (Protection) and Amendment Act, 2006	MoEF& CC	The Government of India enacted Wild Life (Protection) Act 1972 with the objective of effectively protecting the wild life of this country and to control poaching, smuggling and illegal trade in wildlife and its derivatives. The Act was amended in January 2003 and punishment and penalty for offences under the Act have been made more stringent. The Ministry has proposed further amendments in the law by introducing more rigid measures to strengthen the Act. The objective is to provide	Bandipur National Park is approximately 11.86 km away from site.

S.N.	National Environment, Health & Safety Regulation	Agency Responsible	Requirement	Applicability /Remarks
			protection to the listed endangered flora and fauna and ecologically important protected areas.	
6	The Biological Diversity Act 2002	MoEF&CC/National Biodiversity Authority	The Biological Diversity Act 2002 was born out of India's attempt to realise the objectives enshrined in the United Nations Convention on Biological Diversity (CBD) 1992 which recognizes the sovereign rights of states to use their own Biological Resources. The Act aims at the conservation of biological resources and associated knowledge as well as facilitating access to them in a sustainable manner and through a just process for purposes of implementing the objects of the Act it establishes the National Biodiversity Authority in Chennai.	Bandipur National Park is approximately 11.86 km away from site.
7	Environmental Impact Assessment (EIA) Notification 2006 & MoEF&CC Office Memorandum dated 30thJune'11.	MoEF&CC	The EIA Notification 2006 and thereafter the MoEF&CC Office Memorandum dated, 13th May 2011 exempts solar power project from obtaining prior Environmental Clearance from the regulatory authorities. But, under the provision of MoEF&CC office memorandum dated 30th June 2011, requisite permission is required to be obtained from competent authority for water and land usage.	Not Applicable. Solar power projects are not covered under the 2006 EIA notification and are, therefore, exempt from EIA process for obtaining environmental clearance.
8	Environment (Protection) Seventh Amendment Rules 2009	CPCB	Ambient air quality monitoring should be carried out and the concentration limits for the air quality parameters should be in compliance with NAAQS 2009. Activities in the project especially during construction should not result in exceeding National Ambient Air Quality Standards (NAAQS) for ambient concentrations of air pollutants (such as particulate matter). If violation of the Rules takes place, then the penalty will be decided based on the parent Air Act 1981.	No significant air emission is expected from the project except the operation of few DG sets
9	Noise (Regulation and Control) Rules 2000 amended in 2010	KSPCB	The Rules stipulate ambient noise limits during day time and night time for industrial, commercial, residential and ecologically sensitive areas. The rules apply both during the construction and operation of the project. Violation of the standards for assessing the noise quality due to the project will lead to penalty as under the EPA Act 1986.	Not applicable since no significant noise emission is expected from project activity during operation phase except generation of noise from inverter room
10	Hazardous Waste (Management, Handling and	KSPCB	These Rules outline the responsibilities of the generator, transporter and recycler/re-processor of the hazardous wastes for handling and management in a manner that is safe and	Applicable during construction & operation phase

S.N.	National Environment, Health & Safety Regulation	Agency Responsible	Requirement	Applicability /Remarks
	Trans-Boundary Movement) Rules 2008 Hazardous and Other Wastes (Management and Transboundary Movement) Amendment Rules, 2016.		environmentally sound. Project proponent need to obtain consent from State Pollution Control Board for generation and storage of hazardous waste like transformer oil, etc. irrespective of quantity of waste. As per the law the occupier and the operator of the facility should be liable to pay financial penalties as levied for any violation of the provisions under these rules by the State Pollution Control Board with the prior approval of the Central Pollution Control Board.	During the construction DG sets will be used for the civil work. As per the site observations, oil for DG sets is stored in containers. The operation phase of the project will result in generation of some quantities of hazardous waste, mostly in the form of waste/used oil released from transformer as well as broken solar panels. HFE needs to obtain consent/authorization from KSPCB for storage of transformer waste oil, All the hazardous waste generated due to the project should be stored and disposed as per the requirements of Hazardous and Other Wastes (Management and Transboundary Movement) Amendment Rules, 2016. i.e., on a paved surface in a designated area with adequate secondary containment, with adequate labelling and before it is disposed to an KSPCB approved vendor. Though not covered under the rule, the broken solar panels are recommended to be sent back to the manufacture or an authorised recycler.
11	Environment (Protection) Second Amendment Rules 2002	MoEF&CC	The DG sets installed during construction should comply with maximum permissible noise levels and noise control measures for diesel generators up to 1000 KVA capacity as specified in the Act.	*The power requirement during construction phase is met through 1 nos. DG set of 25 KV which will adhere to prescribed CPCB noise level limits and noise control measures.*
12	The Building and Other Construction Workers' (Regulation of Employment and Conditions of Service) Act 1996	Ministry of Labour and Employment	This Act provides for safety, health and welfare measures of buildings and construction workers in every establishment which employs or employed during the preceding year ten or more such workers. These measures include fixing hours for normal working day, weekly paid rest day, wages for overtime, provision of basic welfare amenities like drinking water, latrines, urinals,	*Applicable during construction phase* *Project proponent will ensure through its contractors that basic amenities are provided to the labours. Project proponent through its contractors should also ensure all vendors employed should*

S.N.	National Environment, Health & Safety Regulation	Agency Responsible	Requirement	Applicability /Remarks
			crèches, first aid, canteens and temporary living quarters within or near the work site. This Act also requires application of the following: Building or other construction workers' (regulation and Employment Conditions of Service) Central Rules 1998 & Workman's compensation Act, 1923 to buildings and other construction workers. These will be followed by contractor & developer during construction and operation phase.	*have valid labour license. Compensation to workers (own and vendors) should not be below daily wage rate as specified by Government. Muster roll must be maintained. Employee ID card should be issued (own and vendors). Safety, health and welfare measures of building and construction workers as mentioned in the act needs to be complied with.* *Failure to comply results in financial penalty /imprisonment of the principal employer along with vendor and closure of project*
13	Central Electricity Authority (Safety Requirements for Operation, Construction and Maintenance of Electric Plants and Electrical Lines) Regulations 2008, (CET)	Min. of Power, Central Electricity Authority	The Act is applicable for the solar power plant as the plant is going to be having electrical appliances and facilities installed for grid connected power generation. As per the act, all equipment's and system installed should comply with the provision of the statute, regulations and safety codes.	*Applicable both during construction and operation phase* *Project proponent under provisions of the CET regulations ensure that the health and safety requirements and provisions for transmission lines specified under the rules are complied.*
14	Workmen's Compensation Act, 1923 & Rules 1924	Labour Welfare Board, Karnataka	The Act requires if personal injury is caused to a workman by accident arising out of and in the course of his employment, his employer should be liable to pay compensation in accordance with the provisions of this Act.	*Applicable during construction phase* *Project proponent should ensure through its contractors in case of any accident/ injury/ loss of life the workmen should be paid a minimum compensation as calculated under this act both during construction and operation phase of the project. The reporting of accidents needs to be done in prescribed forms as per the act and the incident / accident register needs to be maintained accordingly. The Act also gives a framework for calculating amount of compensation and wages.*

S.N.	National Environment, Health & Safety Regulation	Agency Responsible	Requirement	Applicability /Remarks
15	The Contract Labour (Regulation and Abolition) Rules, 1971 Contract Labour (Regulation and Abolition), 1973	Labour Welfare Board, Karnataka	The Contract Labour (Regulations & Abolition) Act, 1970 requires every principal employer of an establishment to make an application to the registering officer in the prescribed manner for registering the establishment. The Act and its Rules apply to every establishment in which 20 or more workmen are employed on any day on the preceding 12 months as contract labour and to every contractor who employs or who employed on any day preceding 12months, 20 or more workmen. It does not apply to establishments where the work performed is of intermittent or seasonal nature. An establishment wherein work is of intermittent nature will be covered by the Act and Rules if the work performed is more than 120 days in a year, and where work is of a seasonal nature if work is performed more than 60 days in a year.	*Applicable during construction phase.* *All vendors employed including contractors should have valid labour license. Compensation to contract workers (own and vendors) should not be below daily wage rate as specified by Government of India. Muster roll must be maintained. Employee ID card must be issued (own and vendors). Safety, health and welfare measures of building and construction workers as mentioned in the act needs to be complied with. Failure to comply results in financial penalty.* *HFE through its contractors should also ensure that conditions like hours of work, fixation of wages and other essential amenities in respect of contract labour are provided and in compliance with the standards.*
16	Minimum Wages Act, 1948	Labour Welfare Board, Karnataka	This Act provide for fixing minimum rates of wages in certain employments and requires the employer to provide to every worker engaged in a scheduled employment to be paid wages at a rate not less than the minimum rate of wages fixed by such notification for that class of employees in that employment without any deductions except as may be authorized within such time and subject to such conditions as may be prescribed.	*Applicable during construction phase*
17	Factory License under factories act 1948	Central Government	With reference to the factories act 1948, the same is applicable because this solar plant generating, transforming or transmitting electrical energy and more than 10 workers are employed/working at site.	*HFE should obtain the same for this project*
18	The Child Labour (Prohibition and Regulation) Act, 1986	Labour Welfare Board, Karnataka	The Act prohibits employment of children in certain occupation and processes. The Act also specifies conditions of work for children, if permitted to work.	*EPC contractor should ensure that no child labour will be engaged at site for construction or operation works either directly or by the sub-contractors.*

S.N.	National Environment, Health & Safety Regulation	Agency Responsible	Requirement	Applicability /Remarks
				The clause prohibiting employment of child labour is already constituted by HFE in the subcontractor agreement.
19	Companies Act, 2013	HFE	According to Schedule 135 sub -section 1, the companies meeting the threshold criteria (Minimum net worth of rupees 500 Crore, Turnover up to "1000 Crore" and having a net profit of at least '5 crore') specified should spend in every financial year, at least 2% of the average net profits of the Company made during the three immediately preceding financial years in pursuance of CSR policy.	*The project will need to comply with the requirement as stated in the law.* CSR policy of HFE is in place & CSR activities will be implemented as per CSR policy of HFE.
20	Panchayat (Extension to Scheduled Areas) Act 1996	HFE	Provisions of this rules are: A state legislation on panchayats in the scheduled area should take care of the customs, religious practices and traditional management practices of community resources. Every village shall contain a Gram Sabha whose members are included in the electoral list for the panchayats at village level. Planning and management of minor water bodies are entrusted to the panchayats. The Gram Sabha's have roles and responsibilities in approving all development works in the village, identify beneficiaries, issue certificates of utilization of funds; powers to control institutions and functionaries in all social sectors and local plans. Every Gram Sabha to safeguard and preserve the traditions and customs of people, their cultural identity, community resources and the customary mode of dispute resolution	*The project will need to comply with the requirement as stated in the law.*

3.2 Environmental and Social Performance Standards of the International Finance Corporation

The International Finance Corporation (IFC) has laid down a set of eight Performance Standards (PS) and project developers need to comply with applicable PS while establishing the project in the event the project is financed by IFC or multinational funding institution. The provisions of the Performance Standards relevant to the solar power projects are summarized below **Table 3-2**

Table 3-2: IFC's Environmental and Social Performance Standards

Title of Performance Standard	Performance Standard (PS) requirements in brief	Applicability to project (Compliance)	Requirements
Performance Standard (PS) - 1 Assessment and Management of Environmental and Social Risks and Impacts	Conduct an Environmental and Social Impact Assessment (ESIA) of the project, appropriate to the nature of the project's environmental and social risks and potential impacts.	Arcadis has been appointed by HFE to undertake ESIA study to identify the environment and social risks that may arise due to the solar power project and recommend mitigation measures for the same as provided in Chapter 6 The PS 1 is applicable to projects with environment and/or social risks and/or impacts. The project is a solar power project and will have environmental and social impacts resulting generation of noise, construction activities etc. **PS 1 is therefore applicable for the project.**	HFE have developed an Environmental and Social Management Framework at the corporate level. HFE will adhere the following principals • Environmental and social policy • OHS policy • CSR policy • ESMF principles • Impacts & Mitigations • Supervations & implementation of ESMPs • Construction labour management • Stakeholder Engagement • Waste Management • Grivance Redressal
	Establish Environmental and Social Management Plans commensurate with the findings of the ESIA and consultation with affected communities	An Environmental and Social Management Plan has been prepared and incorporated in Chapter 7 of the ESIA report taking into consideration the potential social and environmental impacts or risks already identified & assessed in ESIA.	
	Establish Action Plans where specific mitigation measures and actions are required for the project to comply with applicable laws, regulations and the requirements of these Performance Standards	An ESMP has been prepared and incorporated in Chapter 7 of the ESIA report for implementation of mitigation measures in compliance with the statutory requirements and Performance Standards	
	Provide organizational capacity and contractor / employee training to enable project to achieve continuous environmental and social performance	Organizational structure with roles and responsibilities of the team within the organization is defined in Chapter 2.	
	Establish and maintain a timely process of community engagement, including a grievance mechanism, focusing on disclosure of information and consultation with local communities affected by project risks or adverse impacts that is free from external manipulation, interference or	Considering substantial land has been acquired from the community for the project activity, a community engagement plan needs to be developed and implemented as well as adequate reporting needs to be done. This should aim to inform the community project related adverse impacts or risks. The grievance redresses mechanism has been	

Title of Performance Standard	Performance Standard (PS) requirements in brief	Applicability to project (Compliance)	Requirements
	coercion to ensure relevant and understandable access to project information.	developed and presented in Sl. No 6.7.7. Also, HFE's Grievance Redressal Mechanism (GRM) is in place which is recommended for implementation in this project	
	Establish procedures to monitor and measure the effectiveness of the environmental and social management program, including internal reporting of the program's effectiveness to the project's senior management, disclosure of Action Plans (including material changes to such Plans) to affected communities, and external reporting to affected communities on the results of Action Plans, commensurate with the concerns of the affected communities	System of monitoring with periodic audits will be established at all the area villages	
PS 2: Labour and Working Conditions	Performance Standard 2 recognizes that the pursuit of economic growth through employment creation and income generation should be accompanied by protection of the fundamental rights of workers. The requirements set out in this Performance Standard have been in part guided by many international conventions and instruments, including those of the International Labour Organization (ILO) and the United Nations (UN).	The PS 2 applies to workers directly engaged by the client (direct workers), workers engaged through third parties (contracted workers), as well as workers engaged by the client's primary suppliers (supply chain workers). The project will involve employment of direct and contracted workers during construction and operation phases. **PS 2 is therefore applicable for the project.**	HFEshould ensure that adequate facilities and amenities are provided in the labour accommodation for construction workers including: adequate living/sleeping facilities and space per person; potable water that meets national standards and standards as laid down by ILO; toilets, washing and cleaning facilities; canteen/mess or fuel for cooking; locker/storage facilities; and facilities for management and disposal of garbage, sewage and other waste at the labour camp. The company will periodically review and monitor the condition of the labour camps at all the mentioned project sites. The worker accommodation standards as laid down by ILO is presented in Appendix B of the document. The company, as a part of oversight procedures will need regular monitoring of compliance to the aforesaid

Title of Performance Standard	Performance Standard (PS) requirements in brief	Applicability to project (Compliance)	Requirements
			guidelines/requirements and ensure that these are met at project sites. Internal audits and follow up on corrective actions will also need to be undertaken to assess efficacy of the oversight system at the project site.
	Establishment of a Human Resources Policy consistent with the requirements of this Standard that informs employees of their rights under national labour and employment laws.		HFE is having its fundamental HR policy for all the sites at corporate level. They or their appointed contractor, if any, should inform their employees about their rights under national labour and employment laws.
	Document and communicate to all employees' conditions and terms of employment.	Applicable during construction and operation phase at the project site.	HFE would engage labours directly or through contractors. However, the management of labourers should be supervised by HFEso that the engagement of workers is in accordance to applicable rules and regulations.
	Practice non-discrimination and equal opportunity in making employment decisions	Applicable during construction phase	HFE is already practicing non- discrimination & equal opportunity in employment. Equal opportunity should be given to both men and women depending on their skills and capacity wages, work hours and other benefits should be as per the national labour and employment Laws at the project sites.
	Provide a mechanism for workers to raise workplace concerns.	Applicable during construction and operation phase	Grievance Redressal Mechanism is framed under corporate level ESMF and the same will be implemented at project level. This is applicable both during construction and operation phase and should be supervised by Hero Future Energy.
	Provide workers with a safe and healthy work environment, considering risks inherent to the project sector	Applicable during construction and operation phase.	Provide workers with a safe and healthy work environment, considering risks inherent to the project sector
		In case the solar panel contain any hazardous material, chances of ground water and soil	During construction phase, water is sourced through vendor and supplied by tanker and

Title of Performance Standard	Performance Standard (PS) requirements in brief	Applicability to project (Compliance)	Requirements
PS 3: Resource Efficiency & Pollution Prevention		contamination cannot be ruled out. Waste oil and other hazardous chemicals released from construction activities may result in contamination of ground and nearby surface water. **Hence PS 3 is applicable for the project.**	reportedly during operation phase water will sourced through the bore well. Drinking water needs during the construction and operation phase will be met by packaged water purchased from approve vendors. Permission for ground water extraction should be obtained prior to extraction of ground water through borewell. The project, is expected to contribute to significant GHG avoidance beginning in FY 2017-18. No material impact on ambient air quality is expected on account of this project. However, temporary impacts on ambient air quality and noise levels may be expected during construction phase. HFE should implement measures during construction: for management of excavated earth and construction rubble; and minimization of fugitive dust emissions. Further, HFE should ensure through its contractors that other wastes (packing material, metal, debris, cement bags, drums/cardboards etc.) are collected, stored and disposed off to re-users or in appropriate authorized debris disposal areas. Impact on groundwater resources is expected on account of the project, Based on CGWB report, the site is located in semi critical zone w.r.t ground water resources. Significant concerns are related to ground water used for panel cleaning through bore well, Proper permission or approval from concerned authorities should be obtained except that the water sourcing requirement during the construction phase will need to safeguard the immediate and medium-term

Title of Performance Standard	Performance Standard (PS) requirements in brief	Applicability to project (Compliance)	Requirements
			needs of water by the local communities. The sub-contractors should ensure that the water made available to workers and employees' meets national potable water quality norms. The project site should have equipped with appropriate facilities for collection, treatment and disposal of sewage (septic tank and soak pit) which is used both during construction and operation phases should be provided.
	The project proponent should ensure that adequate control techniques are provided to minimize emissions or achieve a pre-established performance level and minimize pollution from project activities. The client will avoid the release of pollutants or, when avoidance is not feasible, minimize and/or control the intensity and mass flow of their release.	During the construction phase, the vehicles involved for hauling of equipment's and materials to the project site may increase the pollution level and dust in the air.	Project developer should ensure water sprinkling on the unpaved roads to reduce dust emission. All the project vehicles should have valid PUC.
	The client will implement technically and financially feasible and cost-effective measures for improving efficiency in its consumption of energy, water, as well as other resources and material inputs, with a focus on areas that are considered core business activities.	During construction and operation phase.	HFE should plan and implement pollution control measures. Practices like minimal release of waste, safe disposal of waste, wastewater management etc. should be considered in all phases of project life cycle.
PS 4: Community Health, Safety and Security	Performance Standard 4 recognizes that project activities, equipment, and infrastructure can increase community exposure to risks and impacts. In addition, communities that are already subjected to impacts from climate change may also experience an acceleration and/or intensification of impacts due to project activities. While acknowledging the public authorities' role in promoting the health, safety, and security of the public, this	This Performance Standard is applicable to projects which entail potential risks and impacts to the health and safety of affected communities from project activities. The project will involve transportation of large components, which may pose safety risks to the affected communities. Impacts due Electrocution and Firing due to short-circuit, Accidents during cutting, chipping and piling, Physical injuries, Trip and fall hazards or by diseases due to unhygienic condition etc.	The applicability will be both to the construction and operation phase at the project site villages of Gundlupete Tehsil. In addition to the movement of heavy machinery / vehicles during the construction phase, effects due to glare effect generated due to solar panels will pose an impact on the community if properly not mitigated. The Action Plan and any other relevant project-related information is to enable the influenced communities and relevant

Title of Performance Standard	Performance Standard (PS) requirements in brief	Applicability to project (Compliance)	Requirements
	Performance Standard addresses the client's responsibility to avoid or minimize the risks and impacts to community health, safety, and security that may arise from project related-activities, with attention to vulnerable groups.	**The PS 4 is therefore applicable for the project.**	government agencies to understand these risks and impacts, and will engage the influenced communities and agencies on an on-going basis consistent with the requirements of the PS.
	Evaluation of risks and impacts of the project on health & safety of the affected community during the project lifecycle and establish preventive/mitigation measures to reduce/minimize the impacts. Disclosure of action plans to affected community and the government agency.	During Construction Phase	The potential occupational hazards arising from the project activities and the impacts on health & safety of the affected community have been identified and assessed in this report
	Design, construct, operate and decommission of Structural elements or components in accordance with good industrial practice to reduce impact on community health & safety.	During Construction Phase	An occupation health safety plan has been formulated in this report. All steps to reduce the impact on the health and safety of the community to minimal will be taken.
	Minimization of impacts on the health and safety of the community caused by natural hazards that could arise from the land use changes due to project activities.	During Construction Phase and Operational phase	A management plan has been formulated as part of ESIA process to address the issue.
	Prevent or minimize the potentials for community exposure to communicable diseases during project activities	During Construction Phase	CSR Plan and activities has been provided as a part of ESIA.
PS 5: Land Acquisition and Involuntary Resettlement	PS 5 is applicable when there is physical and/or economic displacement due to acquisition of land for the project. This PS does not apply to resettlement resulting from voluntary land transactions (i.e. market transactions in which the seller is not obliged to sell, and the buyer cannot resort to expropriation or other compulsory procedures if negotiation fails). The impacts arising from such transactions	Private lands are being taken for the 20 MW Solar Power project. It was also told by the HFErepresentative that location falling on Private land for the 20 MW Solar Project are not resulting in any involuntary resettlement issue as the lands taken are being procured on good faith negotiations on willing to buy and sell basis and at mutually agreed price.	No actions required.

Title of Performance Standard	Performance Standard (PS) requirements in brief	Applicability to project (Compliance)	Requirements
	should be dealt with as under PS1, though sometimes, when risks are identified, the project proponent may decide to adhere to PS 5 requirement even in willing-buyer-seller cases	It was further informed by HFEthat there is no human habitation in the identified private land for the 20 MW solar project for Hero Future Energy. **Hence considering that livelihood is not impacted, PS 5 is not applicable.**	
	Avoidance or at least minimization of involuntary resettlement by exploring alternative project designs balancing environmental, social and economic costs and benefits; and by acquiring land through negotiated Settlements.	Not applicable	No resettlement of people is required.
	Compensation and benefits for displaced person as per Performance Standard	Not applicable	No locals will be displaced. However, proper compensation should be paid to the private land owner, whose land is Identified for project site, access road or transmission line tower construction.
	Disclosure of all relevant information and consultation with affected persons and communities in decision making process related to resettlement.	Not applicable	No resettlement has taken place due to the project activity
	Establish a grievance mechanism to record and resolve communities' concerns and grievances about the relocation and compensation	During the construction and operation phase	HFE have their own Environment & Social Management Framwork (ESMF) covering GRM Policy. It should incorporate procedures for lodging of grievances, processing of grievances, resolving grievances and closing of grievances. Grievance redressal mechanism will be implemented at site level. The grievances would be addressed through Suggestion Box, Community Meetings and Meetings with Authorities responsible for welfare and development of the village. There would be one Grievance Redressal Cell (GRC) on site.

Title of Performance Standard	Performance Standard (PS) requirements in brief	Applicability to project (Compliance)	Requirements
PS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	As a matter of priority, the client should seek to avoid impacts on biodiversity and ecosystem services. When avoidance of impacts is not possible, measures to minimize impacts and restore biodiversity and ecosystem services should be implemented. Given the complexity in predicting project impacts on biodiversity and ecosystem services over the long term, the client should adopt a practice of adaptive management in which the implementation of mitigation and management measures are responsive to changing conditions and the results of monitoring throughout the project's lifecycle.	The project location site Gundlepete, does not have any forest area within its 10 km radius. Project land is a non forest waste land. There is no national park, wildlife sanctuary, biosphere reserve within 10 km of the study area. As per Wildlife Protection Act 1972, there is no critically endangered, endangered. threatened or rare species of wildlife in the core & buffer zone Moreover, Scheduled I species (species provided highest degree of protection by Wildlife Protection Act, 1972) as well as Red listed (Vulnerable or Threatened categorised by IUCN) cannot be found in sight or in record in the study area. However, Bandipur National Park is located at an approximate aerial distance of 11.86 km from site. Forest department should be consulted in this regard. Care should take for management of the wildlife. Additionally, project activity is mostly restricted to project site only. Additionally, no effluent is going to be released during operational phase **PS6 is not applicable to the project**	PS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources The general measures for natural resource conservation and project impact mitigation will be followed. EHS practices will be ensured to minimize impacts on soil and water. Also there has been no cutting / felling of trees. Stretches of avenue plantation of trees, with multi – tier canopy, such as Ficus beghalensis, Tamarindus indica, Azadirachta indica and Ficus religiosa will be planted along the project boundaries and the road stretch leading to project site. Such practices will improve the scope for rejuvenating the degraded vegetationa and soil profile and contributing to ecological services also with a target of improving the micro – climate of the study area.
PS 7: Indigenous People	Performance Standard 7 recognizes that Indigenous People, as social groups with identities that are distinct from mainstream groups in national societies, are often among the most marginalized and vulnerable segments of the population. Indigenous People are particularly vulnerable if their lands and resources are transformed, encroached upon, or significantly degraded. Their languages, cultures, religions, spiritual beliefs, and institutions may also come under threat. Therefore, Indigenous People may be more vulnerable to the adverse impacts	To ensure that the development process fosters full respect for the human rights, dignity, aspirations, culture, and natural resource-based livelihoods of Indigenous Peoples; To anticipate and avoid adverse impacts of projects on communities of Indigenous Peoples, or when avoidance is not possible, to minimize and/or compensate for such impacts; To promote sustainable development benefits and opportunities for Indigenous Peoples in culturally appropriate manner; To establish and maintain an ongoing relationship based on Informed Consultation and	Based on the information given by the client no action is suggested

Title of Performance Standard	Performance Standard (PS) requirements in brief	Applicability to project (Compliance)	Requirements
	associated with project development than non-indigenous communities	Participation(ICP) with the Indigenous Peoples affected by a project throughout the project's life-cycle; To ensure the Free, Prior, and Informed Consent (FPIC) of the Affected Communities of Indigenous Peoples when the circumstances described in this Performance Standard are present; and To respect and preserve the culture, knowledge, and practices of Indigenous Peoples. Project Proponent has informed the ESIA team that no ST land will be taken, neither any of their assets are being affected for the 20 MW Solar Power Project in the proposed area. **PS 7 is not applicable for this project.**	
PS 8: Cultural Heritage	Performance Standard 8 recognizes the importance of cultural heritage for current and future generations. Consistent with the Convention Concerning the Protection of the World Cultural and Natural Heritage, this Performance Standard aims to ensure that clients protect cultural heritage during their project activities. In addition, the requirements of this Performance Standard on a project's use of cultural heritage are based in part on standards set by the Convention on Biological Diversity.	This PS is applicable when tangible forms of cultural heritage, unique natural features or tangible objects that embody cultural values and certain instances of intangible forms of culture are impacted or are to be used for commercial purposes. No notified cultural heritage site is located near the project areas. **Hence, PS8 is not applicable.**	The PS is not applicable as there is no impact anticipated on the cultural heritage of the proposed project site due to the project activities. No monument or structure of religious importance were observed within 5 KM. Chance finding procedure should be applied during construction phase for the proposed project. Though, no such evidential proof was found in the study area village

3.3 Categorization of Projects

3.3.1 Categorization of Projects as per IFC guideline

As part of its review of a project's expected social and environmental impacts, IFC uses a system of social and environmental categorization. This categorization is used to reflect the size of impacts understood as a result of the client's social and environmental assessment and to specify IFC's institutional requirements. The categories used by the IFC are:

- ***Category A Projects:*** Projects with potential significant adverse social or environmental risks or/and impacts that are diverse, irreversible or unprecedented;
- ***Category B Projects:*** Projects with potential limited adverse social or environmental risks or/and impacts that are few in number, generally site-specific, largely reversible and readily addressed through mitigation measures;
- ***Category C Projects:*** Projects with minimal or no adverse social or environmental risks or/and impacts, including certain financial intermediary (FI) projects with minimal or no adverse risks;
- ***Category FI Projects:*** Business activities involving investments in financial institutions (FIs) or through delivery mechanisms involving financial intermediation.

IFC therefore categories the project primarily according to the significance and nature of its impacts. IFC defines the project's area of influence as the primary project site(s) and related facilities that the client (including its contractors) develops or controls associated facilities that are not funded as part of the project (funding may be provided separately by a client or a third party including the government), and whose viability and existence depend exclusively on the project and whose goods or services are essential for the successful operation of the project; areas potentially impacted by cumulative impacts from further planned development of the project; and areas potentially affected by impacts from unplanned but predictable developments caused by the project that may occur later or at a different location. The area of influence does not include potential impacts that would occur without the project or independently of the project.

With respect to the intensity of impacts due to project activities on environment, resources, biodiversity, labors and community, the project can be categorized as **Category B** (as per IFCs categorization of projects), which specifies that this project is expected to have limited adverse environment and social impacts, which can be mitigated by adopting suitable mitigating measures.

3.4 EHS Guidelines of IFC

IFC has issued Environmental, Health, and Safety Guidelines in 2007. The key requirements stated in the EHS guidelines have been discussed in **Table 3-3.**

Table 3-3: IFC's EHS Guidelines

S. N	Relevant Requirements as Stated in EHS Guidelines	Section in ESIA Report where Addressed
I	**ENVIRONMENTAL ATTRIBUTES**	
i	Air Emissions and Ambient Air Quality	Please refer the section on ambient air quality in Sec 4.3.1 and 6.2.1
ii	Energy Conservation	Please refer the section on Resource Efficiency & Pollution Prevention in sec. 3.2
iii	Wastewater and Ambient Water Quality	Segregating or diverting clean water runoff to prevent it mixing with water containing high solids content, to minimize the volume of water to be treated prior to release. Refer mitigation measures for water under Table 7.1 and under section 6.2.5
iv	Water Conservation	Refer mitigation measures in Section 6.2.5 and Table 7.1
v	Hazardous Materials Management	Refer mitigation measures in Section 6.2.7 and Table 7.1
vi	Waste Management	Refer mitigation measures in Section 6.2.7 and Table 7.1
vii	Noise	Refer mitigation measures in Section 6.2.3 and Table 7.1
viii	Contaminated Land	Refer mitigation measures in Section 6.2.2 and Table 7.1
II	**OCCUPATIONAL HEALTH AND SAFETY**	
i	General Facility Design and Operation	Please refer the section on Project Design and Technology in Sec.2.4
Ii	Communication and Training	This has been provided in Section 7.1.1 as well as in Section 7.5.2 and 7.5.3.
iii	Physical/Chemical/Biological Hazards	Discussed in Section 6.2.10
iv	Personal Protective Equipment (PPE)	The logistic arrangement for the workers w.r.t. housing space, drinking water, food has been described in section 2.6.5 and 6.2.10. The Occupational health and safety aspects has been mentioned in sec. 6.2.10 and Table 7.1
v	Monitoring	Please refer Section 7.2
III	**COMMUNITY HEALTH AND SAFETY**	
i	Water Quality and Availability	Please refer Section 4.2.5 and 4.2.6
Ii	Structural Safety of Project Infrastructure	Detailed in Section 2.4
iii	Life and Fire Safety (L&FS)	Discussed in Section 6.2.10 and in section 7.5.1

S. N	Relevant Requirements as Stated in EHS Guidelines	Section in ESIA Report where Addressed
iv	Traffic Safety	Provided in Table 7.1 as well as in Sec. 7.5.8 Providing adequate road drainage based on road width, surface material, compaction, and maintenance. Vehicles should have PUC certificate. Refer mitigation measures for Transport and Traffic
v	Transport of Hazardous Materials	Provided in Table 7.1
vi	Disease Prevention	Provided in Table 7.1
vii	Emergency Preparedness and Response	Detailed in Section 7.5.1
IV	**CONSTRUCTION AND DECOMMISSIONING**	
i	Environment	Baseline environmental conditions have been described in chapter 4.
ii	Occupational Health and Safety	The logistic arrangement for the workers w.r.t housing space, drinking water, food has been described in Sec 2.6.5. The Occupational health and safety aspects has been mentioned in sec. 6.2.10. Proper training should be given to workers working on site. Personal protective gears should also be provided to the workers.
iii	Community Health and Safety	Measures to be taken to address the Community, Health and Safety issue has been addressed in Table 7.1 and the impacts during construction phase is given in Sec. 6.2.10 and management plan given in sec. 7.5.2, 7.5.3 and 7.5.6 Preliminary modelling should be carried out to determine whether more detailed investigation is warranted. Keep stationary source of noise such as DG sets (currently used only for back up) at farthest point from the settlements. During construction phase, safety flags on the roadsides should be displayed during work in progress. The solar project site location should also be fenced/ to prohibit public access to solar power. Follow periodic Grievance Redressal Mechanism framed for site and timely register complaints if any received by locals, investigate and resolve in the best possible manner.

3.5 Equator Principles

The Equator Principles comprise of a group of ten principles adopted by the Equator Principle Financial Institutions (EPFIs) in order to ensure that the projects funded by them are developed in a manner that is socially responsible and reflect sound environmental management practices. The applicability of each of the principles with respect to project is discussed below **Table 3-4**

Table 3-4: Compliance to Equator Principles

Equator Principle	Applicability	Project Information/Application
Principle 1: Review and Categorisation	As the project is seeking financing from EPFIs, the project has to be categorized based on the magnitude of its potential impacts and risks in accordance with the environmental and social screening criteria of IFC (Exhibit I)	Based on the IFC environmental and social screening criteria the solar power project is identified as a "Category B" project with potential limited adverse social or environmental impacts that are few in number, generally site-specific, largely reversible and can be readily addressed through mitigation measures
Principle 2: Social and Environmental Assessment	An Environmental and Social Assessment has to be carried out for the project that addresses relevant social and environmental impacts and risks of the project (illustrative list of issues as found in Exhibit II) and also propose mitigation and management measures relevant and appropriate to the nature and scale of the project.	This report presents the Environmental and Social Impacts Assessment (ESIA) carried out for the project. Land procurement has been completed by HFE prior to the development of this project the land parcels were devoid of settlements (as reported) hence does not trigger the requirement of Resettlement and Rehabilitation.
Principle 3: Applicable Social and Environmental Standards	This Principle requires the Environment and Social Assessment to refer to the applicable IFC Performance Standards and the then applicable Industry Specific EHS Guidelines including the project's overall compliance with, or justified deviation from, the respective Performance Standards and EHS Guidelines.	The ESIA report has been prepared including the requirements of IFC performance standards and EHS guidelines.
Principle 4: Action Plan and Management System	The action plan will describe and priorities the actions needed to implement mitigation measures, corrective actions and monitoring measures necessary to manage the impacts and risks identified in the Assessment	The management plan is given in Chapters 7 of this ESIA report.
Principle 5: Consultation and Disclosure	The project affected communities are required to be consulted in a structured and culturally appropriate manner.	Based on consultation with the land sellers, it was found that land procurement is being undertaken on willing to sale and willing to buy basis. Reportedly, the compensation given for the purchased land is above the existing government circle and market rates and no physical displacement is made for development of the project and the same was confirmed during consultation with land sellers.
Principle 6: Grievance Mechanism	Proponent is required to establish a grievance mechanism as part of the management system	Grievance redress procedure has been developed by HFE and the same will be implemented at project level. Proper complaints register should be maintained onsite. This is applicable during both construction and operation phase.
Principle 7: Independent review	An independent social or environmental expert, not directly associated with HFE is required to review the Assessment, action plans and consultation process documentation to assist EPFI's due diligence, and assess Equator Principles compliance.	Arcadis has been appointed as third-party expert to assess the environment and social impact of the project as per IFC safeguards through ESIA study.

Equator Principle	Applicability	Project Information/Application
Principle 8: Covenants	The covenants would be a part of the contract documents between HFE and financing agency as well as contractors and technology suppliers	E&S Covenants should be embedded within the contracts drawn between the contractors and technology providers and waste handlers. Periodic reporting should be done
	EPFIs will, for all Category A Projects, and as appropriate, for Category B projects, require appointment of an independent environmental and/or social expert, or require that the borrower retain qualified and experienced external experts to verify its monitoring information which would be shared with EPFIs.	Arcadis has been appointed as third-party expert to assess the environment and social impact of the project as per IFC safeguards as ESIA study. The requirements of the principle are also met by adhering to requirements of PS 1
	This should be prepared by the EPFI	Based on the audit and monitoring reports submitted by independent agencies the EPFI will report the findings publicly at least once a year

4 DESCRIPTION OF ENVIRONMENT

This chapter describes the existing environmental settings of the project area and its immediate surroundings. This includes physical environment comprising air, water and land components, biological environment and socio-economic environment. Attributes of the physical environment such as air, water and noise quality in the block and surrounding area were assessed primarily through monitoring and analysis of samples collected from the area. Air, water, and noise quality monitoring was conducted by Vison Labs (a NABL certified laboratory). Arcadis team were responsible for selecting the monitoring stations and supervision during on site monitoring which was conducted during the month of December 2017.

Information on geology, hydrology, prevailing natural hazards such as floods, and earthquakes have been collected from literature reviews and authenticated information made available by government departments. Primary surveys were carried out to understand and record the biological environment prevailing in the area and the same was verified by the forest officials and against published information and literature. The socioeconomic environment has been studied through consultations with various stakeholders within the site. Additionally, socioeconomic data have been obtained from the Census of India, 2011 report.

4.1 Study Area

To understand and assess the environmental and social risks associated with the project, the study area was divided into core area (5 km around the project site) and buffer area (10 km around the project site).

4.2 Baseline Conditions

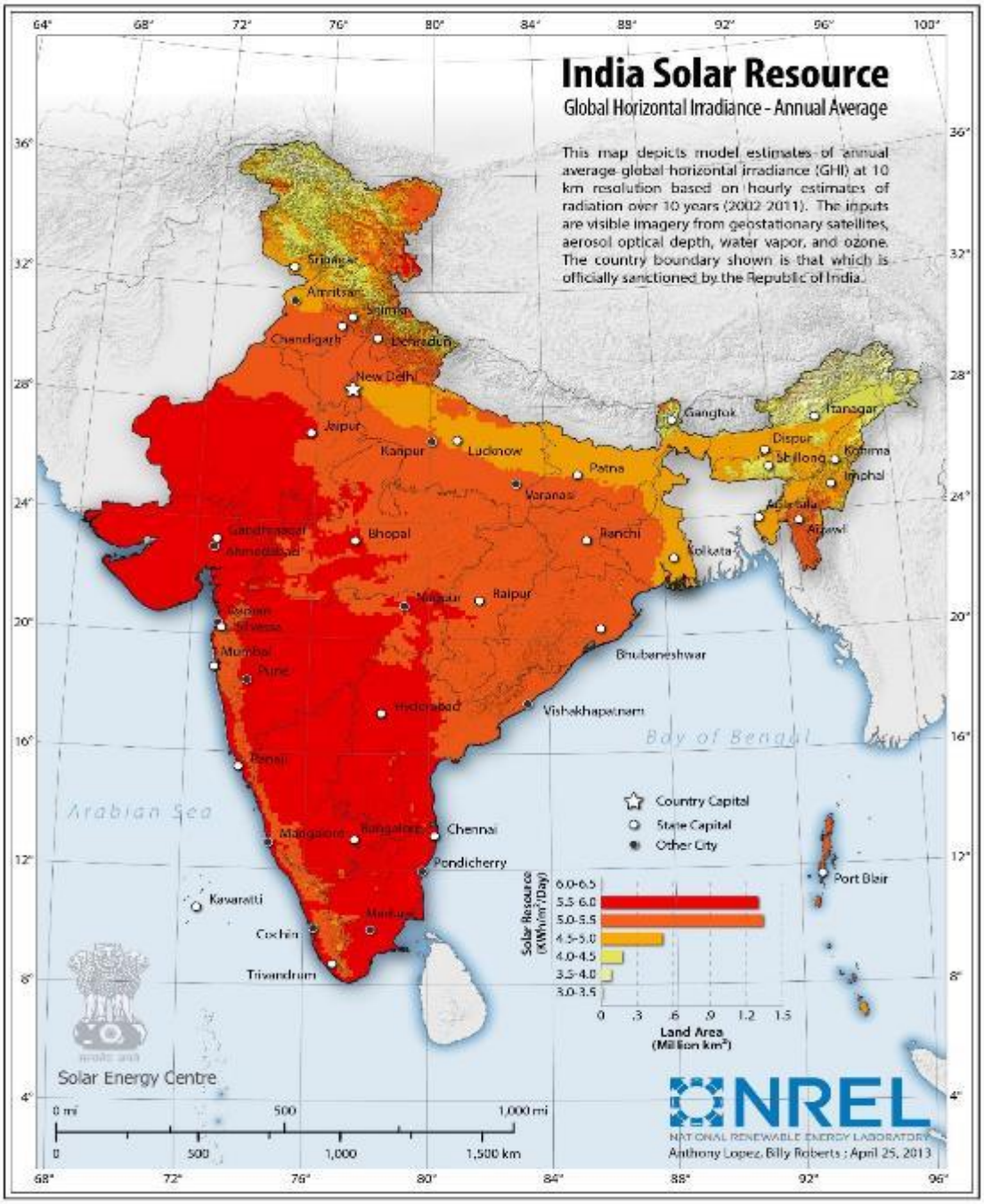
4.2.1 Climate and Meteorological Conditions

As per CGWB report (November 2008), the climate of C.R.Nagar district is quite moderate through out the year with fairly hot summer and cold winter. March to May is summer months, where mean maximum temperatures ranges from 32.6°C to 34°C. June to September is the southwest monsoon period, October and November is the post monsoon retreating monsoon season with clear bright weather and during December to February weather remains dry. The skies clouded or overcast during southwest monsoon. During October and November some of the depressions and cyclonic storms originates in Bay of Bengal, which passes through the district, causing wide spread heavy rains and high winds. The mean maximum temperature in the district is 34°C. and the mean minimum temperature is 16.4°C. during January month. Relative humidity ranges from 69 to 85% in the morning and in the evening, it ranges from 21% to 70%. The wind speed ranges from 8.4 to 14.1 kmph. The potential evapotranspiration in the district ranged from 106mm to 165mm/year.

As per CGWB report (November 2008),C.R.Nagar district receives rainfall from southwest monsoon from June to September and northeast monsoon from October to December. Overall on an average, there are 67 normal rainy days, which is minimum in Yalandur taluk with 63 days, maximum in Gundlupet taluk with 73 rainy days. As per the last three decades (1970-2000) rainfall analysis, the precipitation during southwest monsoon accounts for 61.17% of the total amount of rainfall and during northeast monsoon it is 31.88%. September is the wettest month in the year. Annual rainfall for the last three decades in Chamarajanagar- 799.3mm, Gundlupet-785.5mm, Kollegal-768.1mm and in Yalandur-894.1mm. Average rainfall in the district is 811.75mm. The analysis of the last ten years rainfall data (1997-2006) shows that the highest rainfall occurred in C.R.Nagar taluk with 731.80mm and the lowest at Gundlupet with 586.1mm. Deficiency in rainfall is observed in the four taluks for the

last ten years except during the years 2000, 2004, and 2005 where excess rainfall in the range of 3% to 40% was observed.

India's Solar Radiation Profile



Source: National renewable Energy Laboratory

4.2.2 Topography

As per CGWB report, Topography of Chamarajanagar district is undulating and mountainous with north south trending hill ranges of eastern Ghats. However major part of Kollegal taluk, part of C.R.Nagar and Gundlupet taluk is covered with hill ranges and dense forests and partly bad land topography.. The highest and lowest elevation is 2500 m and 96 m respectively within the study area. Agricultural

activities observed surrounding land parcels of the project site. The digital elevation map is depicted in below **Figure 4-1.**

Figure 4-1: Digital Elevation Map

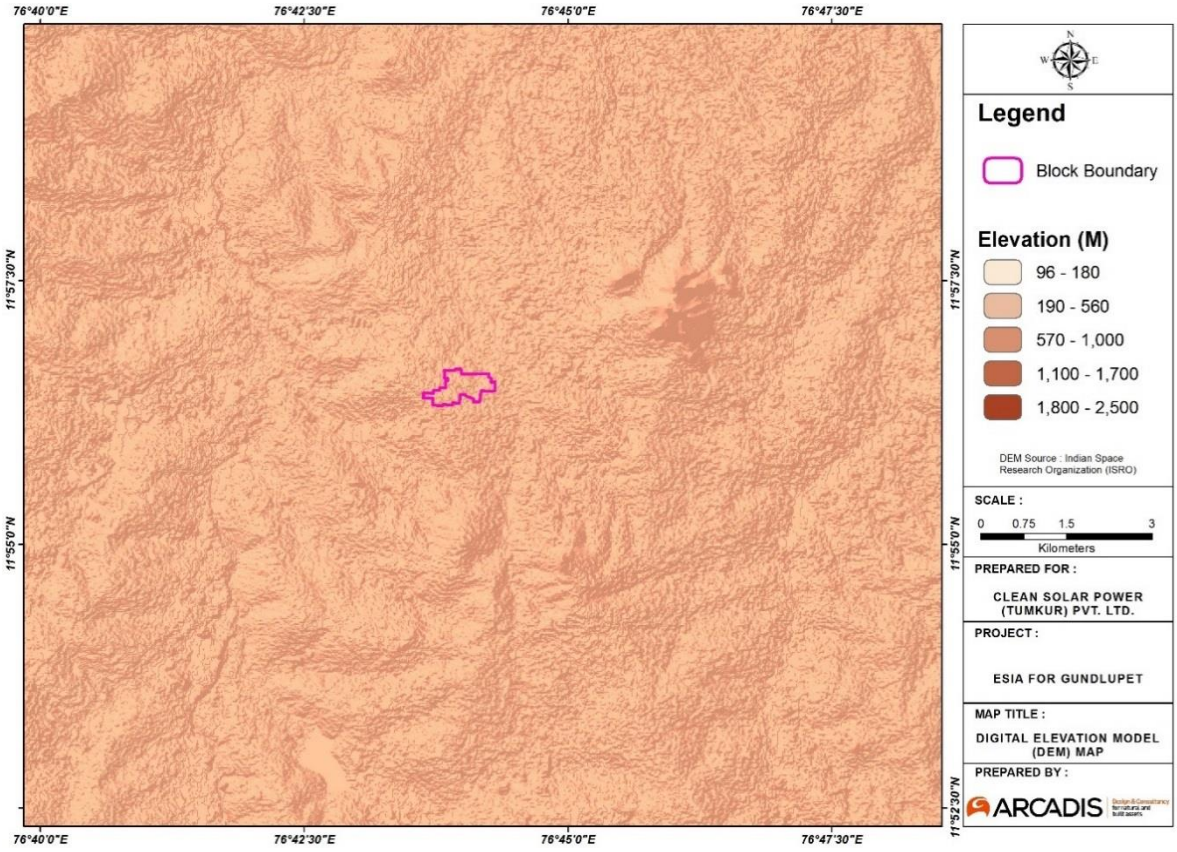
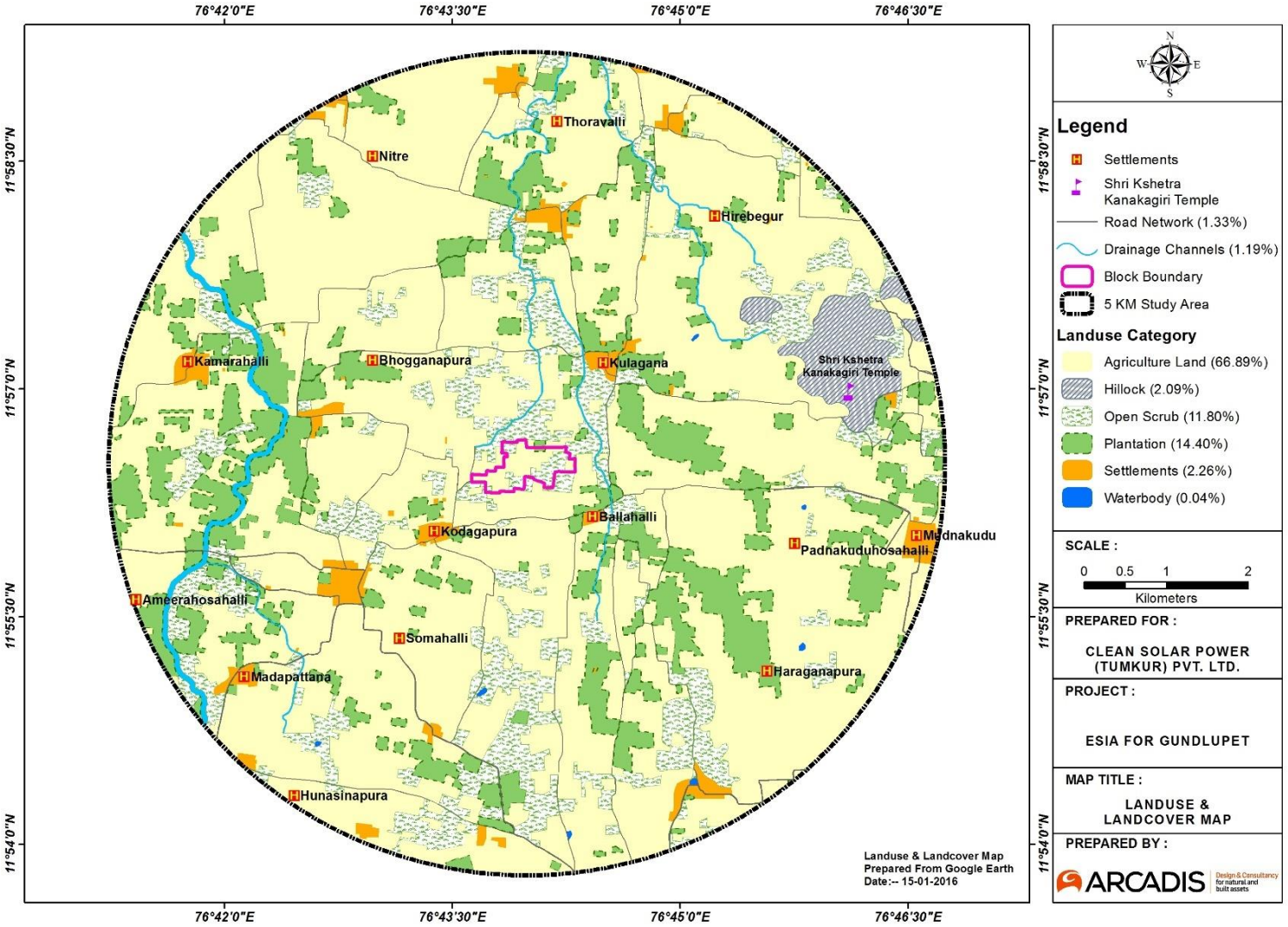


Photo 4-1: Topography of the Project Site

4.2.3 Land Use Analysis

The land-use and land-cover of the study area (10 km) has been interpreted from visual interpretation, google earth satellite imagery of the area, and subsequently by ground truthing verification during site visit. The land use within study area represent agricultural land (66.89%) followed by Hill 2.09% open scrub land (11.80%), plantation (14.40 %), settlement (2.26%) and water body (0.04%), road (1.33%) and drainage (1.19%). Land use map of the study area is depicted in **Figure 4-2.**

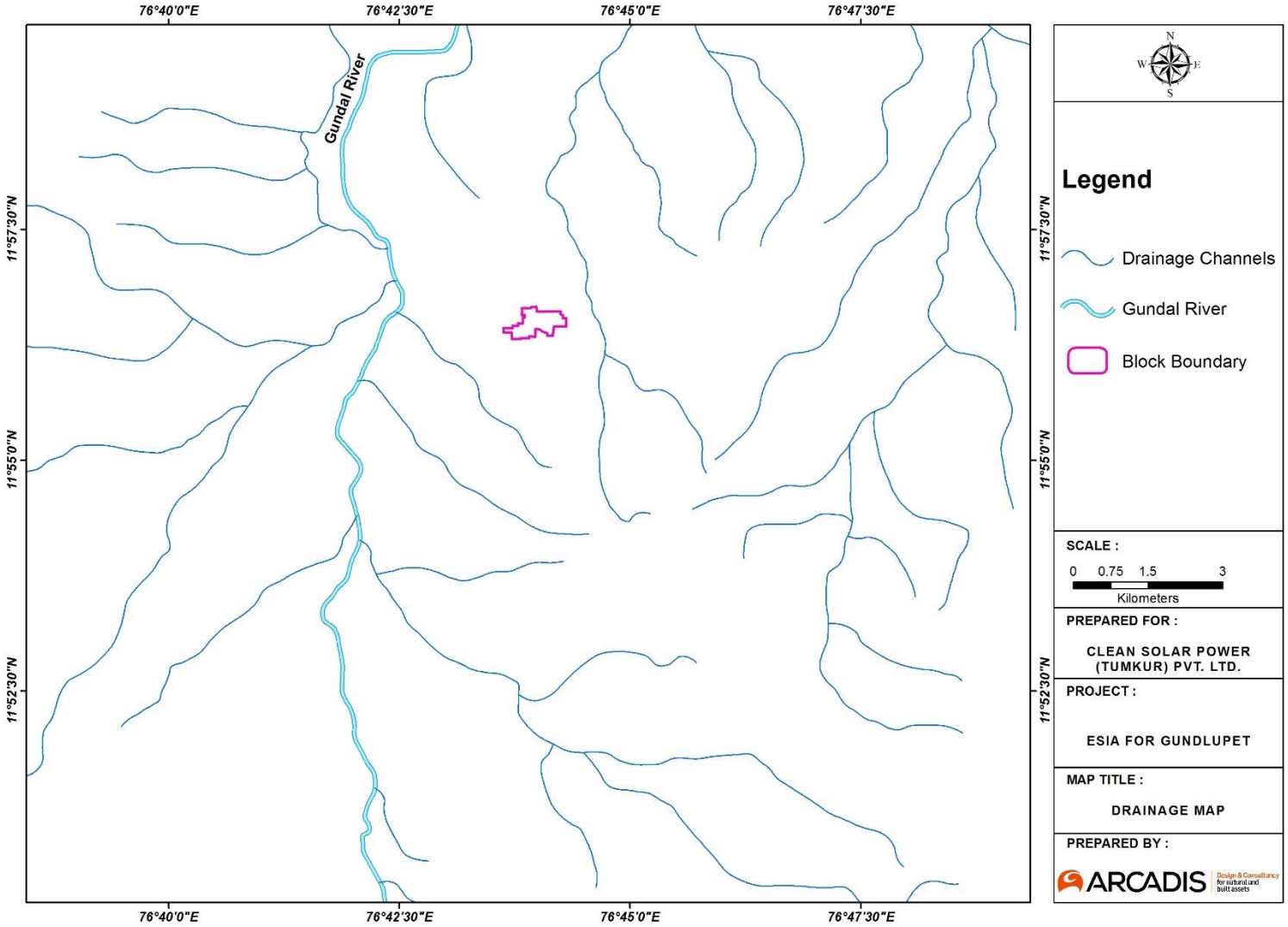
Figure 4-2: Land Use Map



4.2.4 Drainage

As per CGWB, the district the district falls in Cauvery river basin. There are no major rivers flowing in the district, however Cauvery the perennial river flows along the border of Kollegal taluk of C.R.Nagar district with its tributaries like Suvarnavathy and Chikkahole. Suvarnavathy rises near Gajjalahalli southeastern portion of C.R.Nagar and flows in the depression along the center of C.R.Nagar taluk with a north-south disposition in a northerly direction through C.R.Nagar and Yalandur taluks and joins the river Cauvery at Hampapura in Kollegal taluk. It has a catchment area of 1787 sq.km. with total course of about 88kms. in the district. The stream flows in rainy season only, effluent up to Umbale and influent to the rest of its course. Chikkahole is the tributary of Suvarnavathy, rises at Hasanur ghat range to the south of C.R.Nagar flows in northerly direction. A dam is constructed across this tributary about 12kms. away from C.R.Nagar. Suvarnavathy also dammed at Atgulipura in C.R.Nagar taluk. Besides this Gundal, Thattaihalla, Uduthore halla and Palar are the tributaries of Cauvery river drains parts of Kollegal taluk. The area is characterized by sub-dendritic to sub-parallel drainage pattern. The drainage density of the area varies from 0.25 to 3.58 km/km2. The density decreases towards Suvarnavathy river. The drainage map of the study area is depicted in **Figure 4-3.**

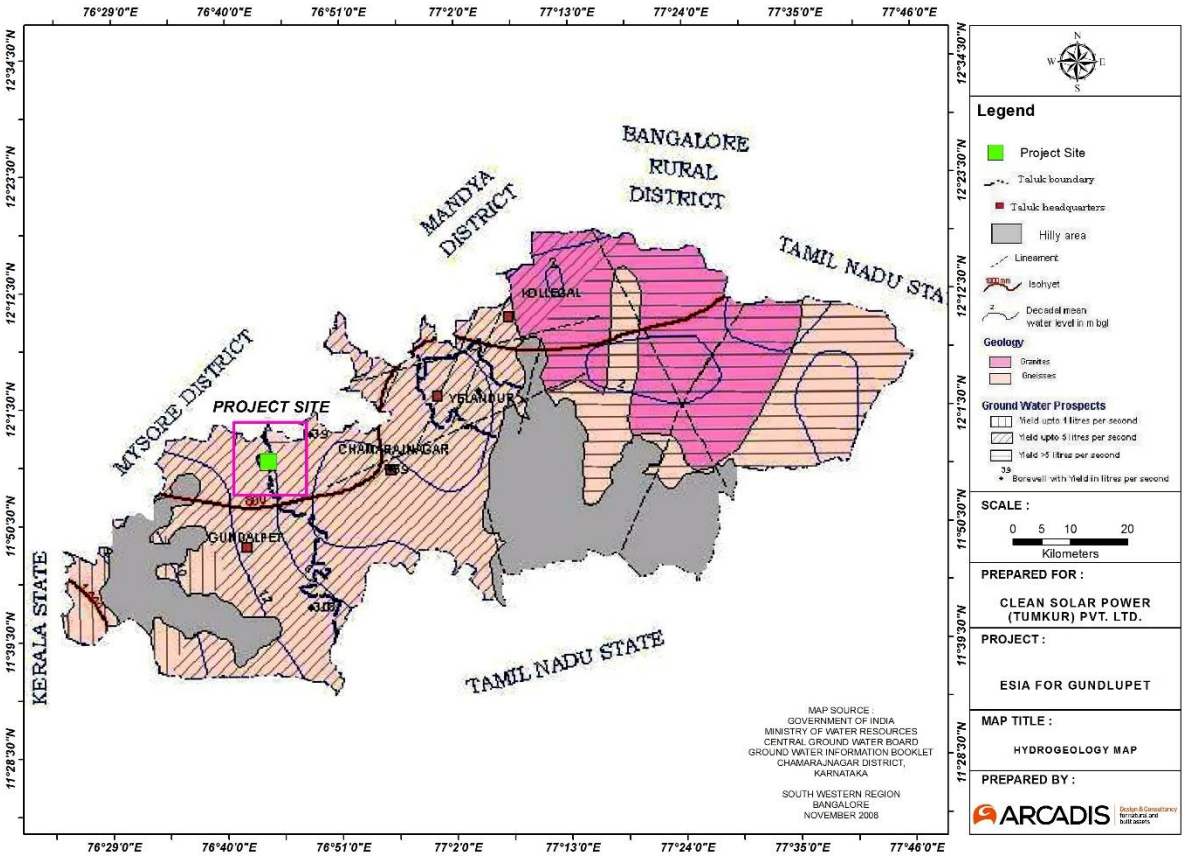
Figure 4-3: Drainage Map



4.2.5 Hydrogeology

With reference to the CGWB report, Hydrogeologically, the area forms the part of hard rock terrain comprising of peninsular gneiss, charnockites and alluvium. Among these charnockites are wide spread formation in C.R.Nagar and Kollegal taluks and part of Yalandur taluk, whereas entire Gundlupet taluk, parts of C.R.Nagar and Yalandur taluks occupied by gneisses. Alluvium of about 5.00m thickness is occurring along the major tributaries of Cauvery river like Suvarnavathy and Chikkahole etc. The valley fill area extends to very limited stretch with an average thickness of 6 to 18.00m below, which the basement is likely to be encountered. Occurrence and movement of ground water are controlled by the degree of weathering, fracturing, the geomorphological set up and precipitation.. The distribution of the geological formation is depicted in **Figure 4-4.**

Figure 4-4: Hydrogeology Map

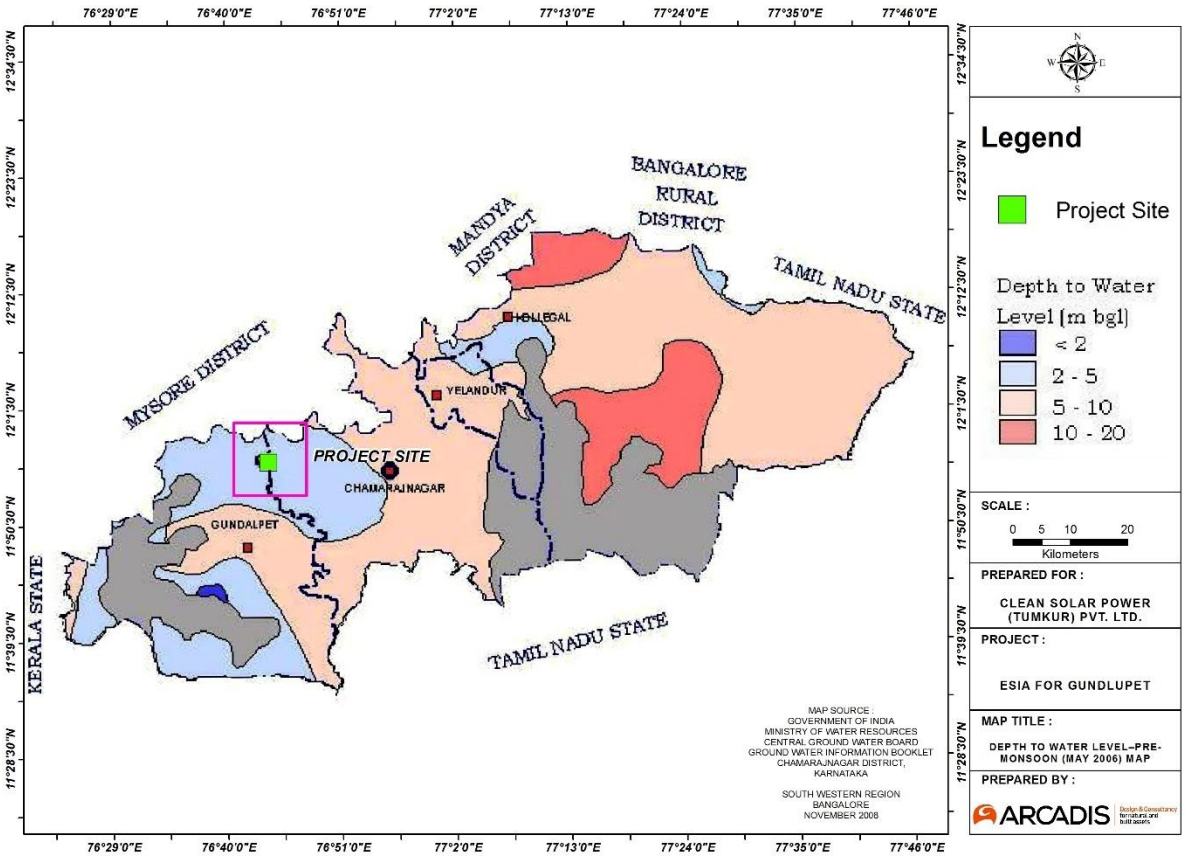


Source: CGWB report, Chamarajanagar district

4.2.6 Ground Water Resources

Depth to Water Level (Pre-monsoon): As per CGWB report, the average depth to water level during premonsoon is 4.77m. Pre-monsoon water level is in between 4.82 to 6.12m in most of the area the depth to water level during pre-monsoon (May) is depicted in **Figure 4-5.** It shows that the site located in such an area where the depth of ground is in the range of 2-5 m bgl.

Figure 4-5: Depth to Water Level During Pre-Monsoon

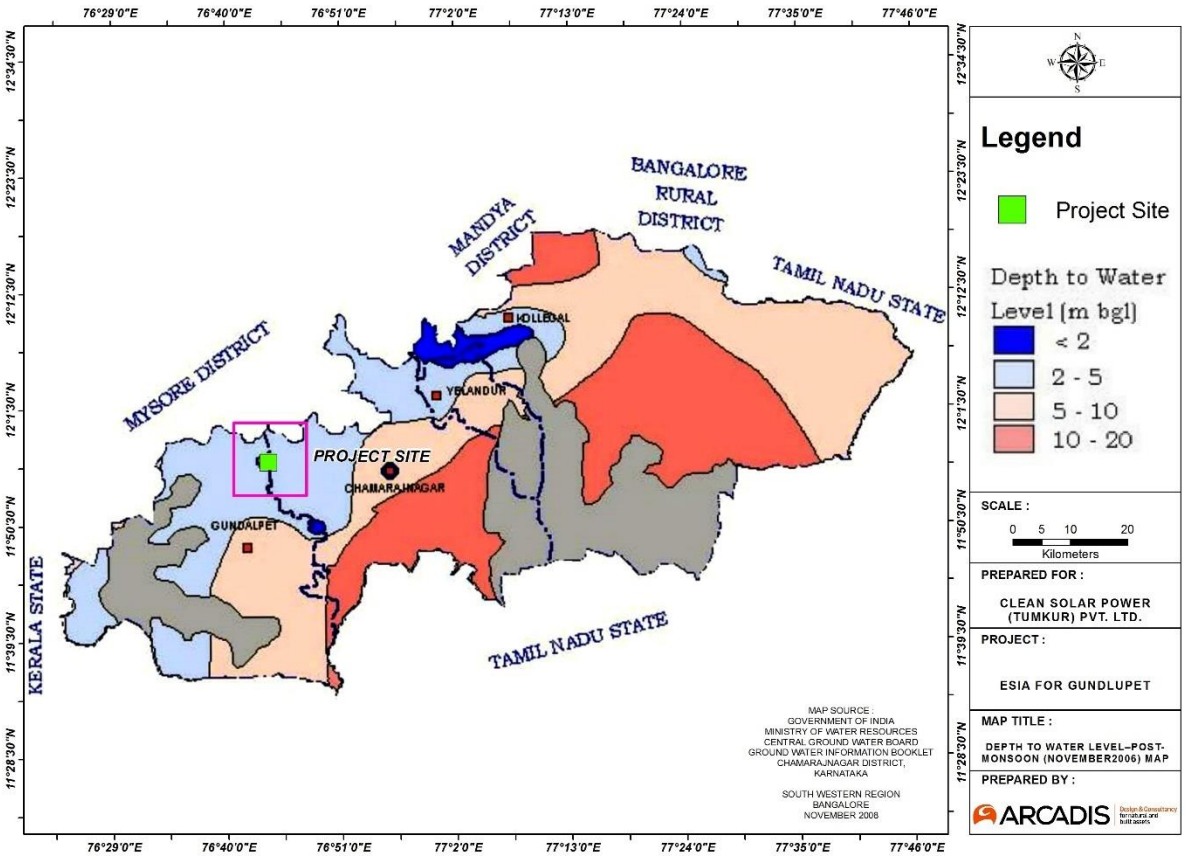


Source: District Groundwater brochure, Chamarajanagar district, CGWB, November 2008

Depth to Water Level (Post-monsoon):

As per CGWB, out of 16 National Hydrograph Stations (NHS) located in C.R.Nagar district, the depth to water levels recorded during May-2006 was in the range of 1.42 to 6.75m bgl. The depths to water levels in the national hydrograph stations (dug wells) recorded during post monsoon period (November 2006) were in the range of 0.01 to 7.97m bgl . The depth to water level scenario during post-monsoon is presented in **Figure 4-6**. It shows that the site located in such an area where the depth of ground is in the range of 2-5 m bgl.

Figure 4-6: Post- Monsoon Depth to Water Level Map

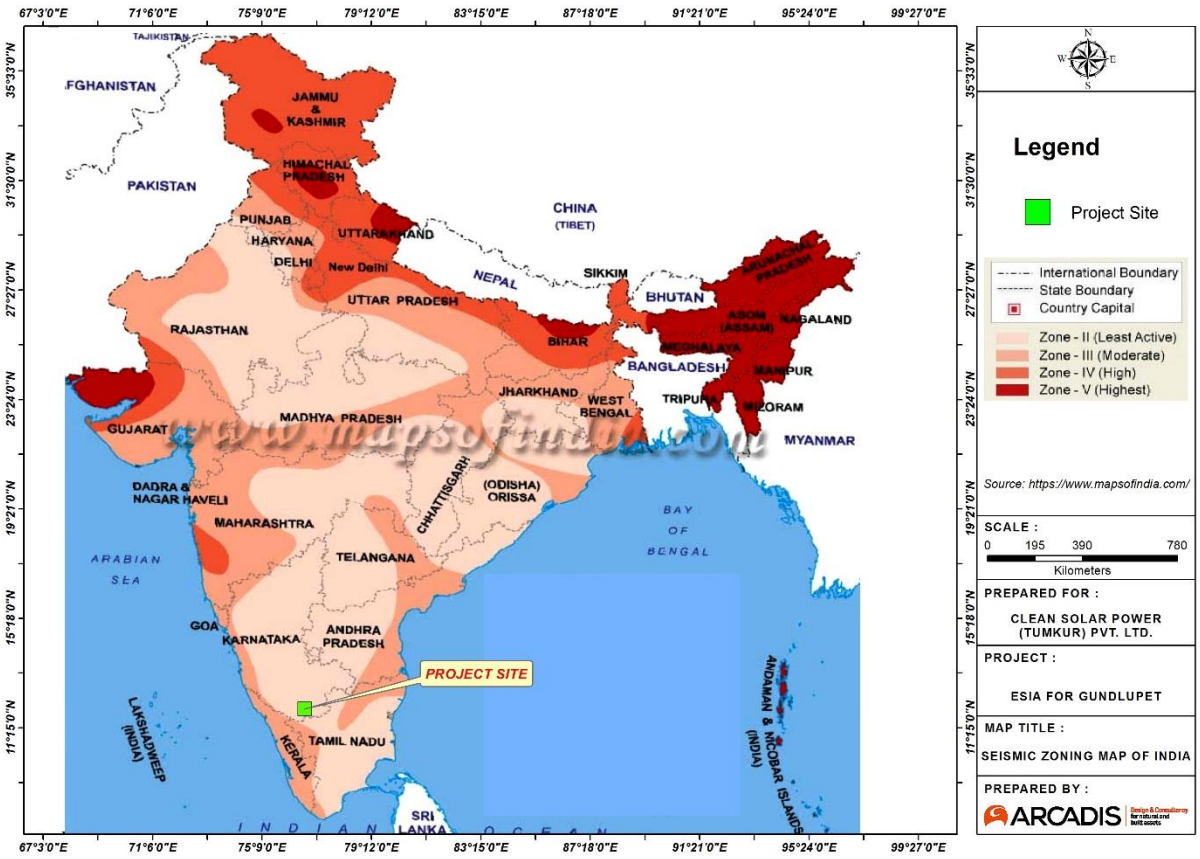


Source: District Groundwater brochure, Chamarajanagar district, November 2008

4.2.7 Seismic Hazard

The project site is located in seismic zones II as per the seismic zoning map of India, accordingly, implying that potential threats of damage due to earthquake are least active. The seismic zoning map of India has been shown in **Figure 4-7.**

Figure 4-7: Seismic Map

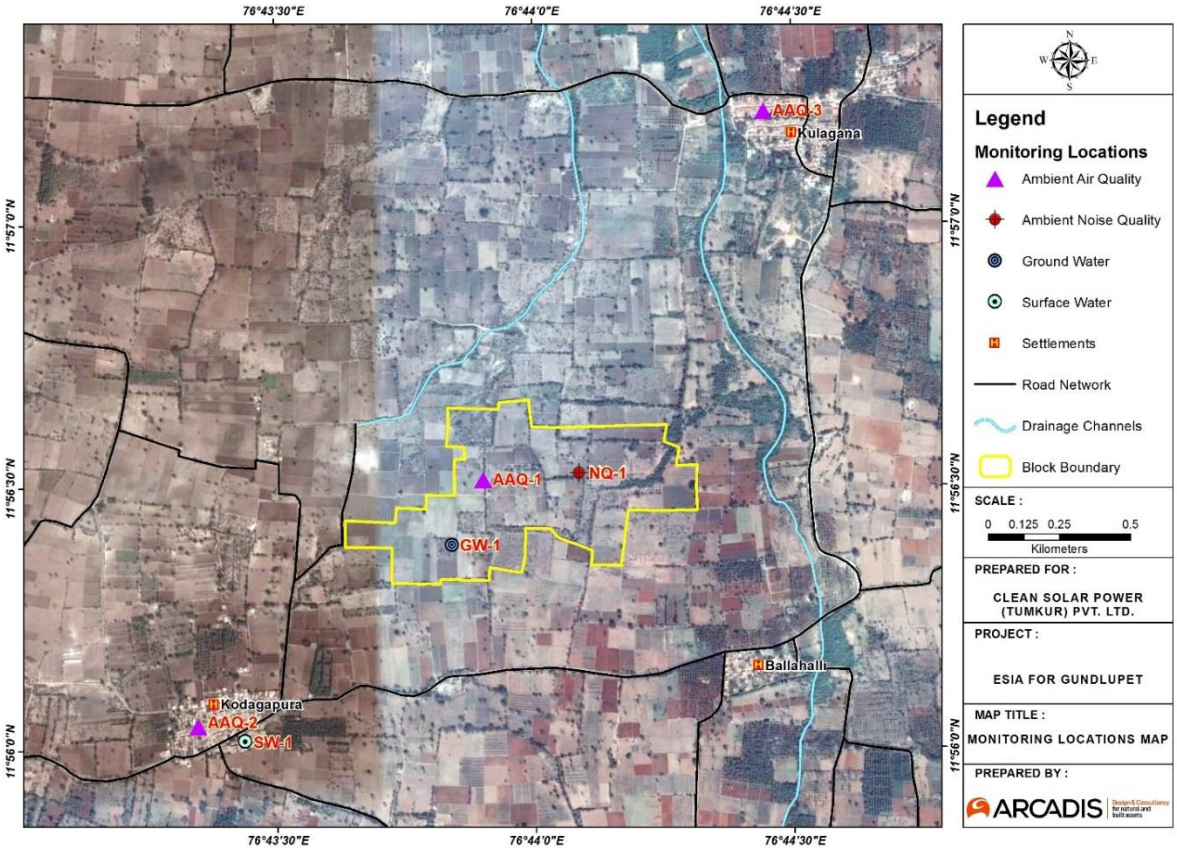


Source: www.isr.gov.in

4.3 Environmental Monitoring

Environmental quality monitoring was conducted in the month of December 2017. Details environmental quality monitoring locations are depicted in **Figure 4-8.**

Figure 4-8: Environmental Quality Monitoring Location Map



4.3.1 Ambient Air Quality

Ambient air monitoring was carried out at three locations (24-hourly sampling for particulate & gaseous pollutants and 8-hourly sampling for CO) with a frequency of once per week. Sampling and analysis was done as per the standard method prescribed by IS-5182. Monitoring stations were chosen on the basis of their proximity to settlements, and predominant wind direction. The details of the monitoring results are provided in below in **Table 4-1.**

Table 4-1: Ambient Air Quality Monitoring Results

Sl. No.	Parameter	Unit	Locations			NAAQS Limit	Analysis Method
			Project Site (AAQ-I)	Kodagapura Village (AAQ-2)	Kulagan Village (AAQ 3)		
1	Particulate Matter (PM_{10})	µg/m^3	48.5	42.6	40.1	<100	Respirable Dust Sampler method
2	Particulate Matter ($PM_{2.5}$)	µg/m^3	23.6	20.9	17.6	<60	(IS : 5182 P 23 - 2006)
3	Sulphur Dioxide (SO_2)	µg/m^3	7.2	6.0	5.5	<80	EPA - Quality Assurance Guidance Document 2.12

Sl. No.	Parameter	Unit	Locations			NAAQS Limit	Analysis Method
			Project Site (AAQ-I)	Kodagapura Village (AAQ-2)	Kulagan Village (AAQ 3)		
4	Oxides of Nitrogen (NO_2)	µg/m^3	19.7	13.8	12.4	<80	Improved West and Geake method
5	Carbon monoxide as CO	µg/m^3	<1.00	<1.00	<1.00	<2.00	(IS : 5182 P II - 2001)

Interpretation of Air Quality Results

On comparison of the ambient air quality values with NAAQ standards of CPCB, the monitoring values are well within the prescribed standards and no significant impact on the ambient air is anticipated due to project activity.

4.3.2 Ambient Noise Quality

The ambient noise monitoring was conducted at one location in the project site . The noise monitoring network was established based on the understanding of the project activities and professional judgment.

Noise meter were used to measure the ambient noise level in dB(A) were recorded for every hour continuously for 24 hours for the below mentioned monitoring stations and equivalent noise levels in the form of Leq day and Leq night. The obtained values were compared with the standard specified in Noise Pollution (Regulation and Control) Rules, 2000. The summary of noise quality results is presented in **Table 4-2** below.

Table 4-2: Noise Quality Monitoring Results

Sl. no.	Parameter	Unit	Results Project Site
1	Leq Day	dB(A)	54.1
2	Leq Night	dB(A)	41.6
CPCB standard (day-Night) dB(A) Category: Industrial Area			75-70

Interpretation of Noise Quality Results

On comparison of day and night equivalent values with Ambient Noise Quality Standards in respect of noise for Industrial area the obtained values are well within the prescribed standards of CPCB.

4.3.3 Surface Water Quality

The surface water monitoring was conducted in one location at Kodagapure Kere (surface water body). The analysis is done as per standard methods prescribed by IS 3025 and results are mentioned below **Table 4-3.**

Table 4-3: Surface Water Monitoring Results

S.No	Parameters/ Characteristic	Test Method	Units	Test Results	IS: 2296 Class C Specifications
1.	pH at 25 deg C	IS:3025 part 11 1983 RA-2012	-	7.96	6.5 – 8.5
2.	Color	IS: 3025 Part 4 1983 RA-2006	Hazen	50	300
3.	Conductivity at 25 deg C	IS: 3025 Part 14 1984 RA-2013	mS/cm	288	--
4.	Temperature	IS: 3025 Part 38 1989 RA-2003	deg C	25.5	--
5.	Turbidity	IS: 3025 Part 10 1984 RA-2002	NTU	6.42	--
6.	Dissolved Oxygen	IS: 3025 Part 38 1989 RA-2003	mg/L	4.6	4 min
7.	Chemical Oxygen Demand	IS: 3025 Part 58 2006	mg/L	10	--
8.	Total Suspended Solids	IS: 3025 Part 17 1984 RA-2012	mg/L	12.05	--
9.	Total Dissolved Solids	IS: 3025 Part 16 1984 RA-2006	mg/L	198	1500
10.	BOD (3 days at 27°C)	IS: 3025 Part 44 1993 RA-2009	mg/L	<02	< 3.0
11.	Total Hardness as $CaCO_3$	IS: 3025 Part 21 2009	mg/L	120	--
12.	Chloride as Cl	IS: 3025 Part 32 1988, RA-2009	mg/L	20	600
13.	Fluorides as F-	IS: 3025 Part 60 2008	mg/L	0.14	1.5
14.	Sulphate as SO_4--	IS: 3025 Part 24 1986,RA-2003	mg/L	3.2	400
15.	Alkalinity	IS: 3025 Part 23 1986, RA-2003	mg/L	110	--
16.	Total Nitrogen	IS: 3025 Part 34 1988, RA-2003	mg/L	4.26	--
17.	Cyanides as CN	IS: 3025 Part 27 1986, RA-2009	mg/L	<0.001	0.05
18.	Calcium as Ca	IS: 3025 Part 40 1991, RA-2009	mg/L	28	--
19.	Magnesium as Mg	IS: 3025 Part 46 1994, RA-2003	mg/L	12	--
20.	Sodium as Na	IS: 3025 Part 45 1993, RA-2009	mg/L	9.4	--
21.	Potassium as K	IS: 3025 Part 45 1993, RA-2009	mg/L	0.5	--
22.	Iron as Fe	IS: 3025 Part 53 2003, RA-2003	mg/L	0.04	50
23.	Lead as Pb	IS 3025 Part 47 1994	mg/L	<0.001	0.1
24.	Copper as Cu	IS 3025 Part 42 1992	mg/L	<0.001	1.5
25.	Arsenic as	IS: 3025 Part 37 1988, RA-2003	mg/L	<0.02	0.2
26.	Phenolics as C_6H_5Oh	IS: 3025 Part 43 1992, RA-2003	mg/L	<0.001	0.005
27.	Boron	IS 3025 Part 57 2005	mg/L	<0.001	--
28.	Total Chromium as Cr	IS 3025 Part 52 2003	mg/L	<0.001	0.05

S.No	Parameters/ Characteristic	Test Method	Units	Test Results	IS: 2296 Class C Specifications
29.	Zinc as Zn	IS 3025 Part 49 1994	mg/L	<0.001	15
30.	Total Phosphorus	IS 3025 Part 31 1988, RA-2003	mg/L	<0.02	--
31.	Mercury as Hg	IS 3025 Part 48 1994	mg/L	<0.001	--
32.	Oil and grease	IS 3025 Part 39 1991	mg/L	<1.0	0.1
33.	Coli form Organisms	IS 15185 : 2002	MPN/100 ml	110	Should not exceed 5000
34.	Faecal Coliform	IS 15185 : 2002	MPN/100 ml	14	--
35.	Pesticides	USEPA	µg/L	<0.001	<0.001

Interpretation of Surface Water Quality Results

Surface water quality characteristics were assessed with respect to IS 2296 (class c) specification. The surface water quality results show that all obtained values meets the conformity as per requirement of IS 2296 (class c).

4.3.4 Groundwater Quality

Results of physico chemical analysis of ground water samples from one location at **Project Site** was studied to have an idea of the quality of ground water in the study area. Analysis were done as per standard methods prescribed by IS 3025 and results are presented in the **Table 4-4.**

Table 4-4: Groundwater Analysis Results

S.No	Parameters/Characteristic	Test Method	Units	Test Results	Drinking Water Limits As per IS: 10500:2012
1.	pH at 25^0C	IS:3025 part 11 1983 RA-2012	--	7.80	6.5 - 8.5
2.	Turbidity	IS: 3025 Part 10 1984 RA-2002	NTU	1.30	5 - 10
3.	Conductivity at 25^0C	IS: 3025 Part 14 1984 RA-2013	µMho/cm	973	--
4.	Total Suspended Solids	IS: 3025 Part 17 1984 RA-2012	mg/L	2.68	--
5.	Total Dissolved Solids	IS: 3025 Part 16 1984 RA-2006	mg/L	670	--
6.	Colour	IS: 3025 Part 4 1983 RA-2006	Hazen	<05	5.00
7.	Taste	IS:3025 part 08 1984 RA-2002	-	Agreeable	Agreeable
8.	Odor	IS:3025 part 05 1983	-	Unobjectionable	Unobjectionable
CHEMICAL PARAMETERS					
9.	Total Alkalinity as $CaCO_3$	IS: 3025 Part 23 1986, RA-2003	mg/L	360	--

S.No	Parameters/Characteristic	Test Method	Units	Test Results	Drinking Water Limits As per IS: 10500:2012
10.	Chlorides as Cl-	IS: 3025 Part 32 1988, RA-2009	mg/L	60	250 - 1000
11.	Sulphates as SO_4-2	IS: 3025 Part 24 1986,RA-2003	mg/L	29.7	200 - 400
12.	Nitrates as NO_3	IS: 3025 Part 34 1988, RA-2003	mg/L	6.3	40 - 100
13.	Phosphates as PO_4	IS: 3025 Part 31 1988, RA-2003	mg/L	<0.02	--
14.	Total Hardness as $CaCO_3$	IS: 3025 Part 21 2009	mg/L	330	200 – 600
15.	Calcium as Ca	IS: 3025 Part 40 1991, RA-2009	mg/L	72	75 – 200
16.	Magnesium as Mg	IS: 3025 Part 46 1994, RA-2003	mg/L	36	30 – 100
17.	Sodium as Na	IS: 3025 Part 45 1993, RA-2009	mg/L	67.4	--
18.	Potassium as K	IS: 3025 Part 45 1993, RA-2009	mg/L	1.2	--
19.	Flourides as F-	IS: 3025 Part 60 2008	mg/L	0.66	1 - 1.5
20.	Iron as Fe	IS: 3025 Part 53 2003, RA-2003	mg/L	0.12	0.3 - 1
21.	Phenolic Compounds	APHA 22nd Edition 5330D	mg/L	<0.001	0.001 - 0.002
22.	Cyanide as CN-	IS 3025 Part 27 1986	mg/L	<0.001	0.005
23.	Residual Chlorine as Cl-	IS 3025 Part 26 1986	mg/L	<0.001	0.2
24.	Cadmium as Cd	IS 3025 Part 41 1992	mg/L	<0.001	0.01
25.	Total Chromium as Cr	IS 3025 Part 52 2003	mg/L	<0.001	0.05
26	Lead as Pb	IS 3025 Part 47 1994	mg/L	<0.02	0.05
27.	Arsenic as	IS: 3025 Part 37 1988, RA-2003	mg/L	<0.01	0.01
28.	Zinc as Zn	IS 3025 Part 49 1994	mg/L	0.041	5 - 15
29.	Manganese as Mn	IS: 3025 Part 24 2006	mg/L	<0.001	30 - 100
30.	Copper as Cu	IS 3025 Part 42 1992	mg/L	0.086	0.05 - 1.5
31.	Nickel as Ni	IS 3025 Part 54 2003	mg/L	<0.001	3.0 - 5.0
32.	Boron	IS 3025 Part 57 2005	mg/L	<0.001	1.00
33.	Anionic Detergents	IS 13428 Annex K	mg/L	<0.001	0.20
34.	Mineral Oil	APHA 22nd Edition 2012	mg/L	<0.001	0.01
35.	Aluminium as Al	IS 3025 Part 55 2003	mg/L	<0.001	0.03
36.	Mercury as Hg	IS 3025 Part 48 1994	mg/L	<0.0002	0.00
37.	Pesticides	USEPA	µg/L	<0.001	<0.001

Interpretation of Ground Water Quality Results:

- The values of tested parameters meet the requirement of IS 10500-2012 limit.

4.4 Ecological Environment

Ecology & biodiversity study was carried out during first week of December 2017, with the aim to assess the existing ecological resources of the project site and the study area. Primary baseline survey was conducted to assess the nature of the existing habitat, local flora and fauna, ecological sensitivity if any, locations of wetlands / water bodies, and land use pattern. Apart from that, published/ unpublished secondary information were also collected from Forest Working Plan of Kollegal Forest division, previous ecological literature reviews of site surveys, journals and local residents of the area.

These information will further enable to gauge potential ecological impacts that can be generated from the project activities. Understanding of the significant risks and impacts is important to implement mitigation measures or suggest changes if the associated risks are huge. Such mitigation measures will help reduce the impacts and also develop ecological monitoring parameters.

Main objectives for Ecological surveys:

Flora

- Identification of floral species, endangered as well as endemic species (if any), important habitats, forests area within the study area;
- Surveys to identify local, widespread floral species, any endangered or endemic species and protected species in the study area;
- Identification of aquatic flora near the water bodies found in the study area;
- Identification of any notified area under international conventions, national or local legislation for their ecological, landscape, cultural or other related values within the study site.

Fauna

- Identification of fauna (terrestrial, aerial and aquatic) by direct sighting and through secondary means like, nests, roosts, pug marks, droppings, etc.
- Identification and classification of species recognised as critically endangered, endangered, threatened etc. as per IUCN Red list and scheduled species as per WPA (1972).
- Identification of areas important for breeding, foraging, nesting, resting or over wintering areas include migratory corridors/ avian migratory routes.
- Identification and assessment of aquatic fauna near the study area.

4.4.1 Methodologies for Ecological Surveys

Desktop Review

A desktop review (published document) was conducted to determine the land use and land cover (Topo sheet, satellite imagery and map of Cauvery Wildlife Sanctuary), vegetation type (Champion and Seth, 1962), floral and faunal assemblage in the study area through secondary data (Forest Working Plan of Kollegal Forest division) .

In order to provide representative ecological status for the project a study area is defined for ecological study. As solar power plants have no moving part or emission, most of the project related impact (if any) will be confined to the project site only and access roads. Therefore project development area and 100m around the project site was considered as the “high risk zone” or “core study area”, and 5-km

radius surrounding the project site is considered as the “buffer zone” or the zone of influence of the project.

Baseline Survey

Baseline survey was carried out to determine the existing ecological conditions and was designed to fill any data gaps, and to facilitate an adequate assessment of the project’s impacts upon ecology and the development of appropriate mitigation measures. Survey was conducted in first week of December 2017 for habitat survey, flora & faunal assemblage, in the study area. Baseline survey has two parts-

(i) Secondary data collection and (ii) Primary data collection

Secondary Data Collection

Secondary baseline data regarding sensitive ecological habitat (National Park, Sanctuary, Ecological Sensitive Area, Migratory Corridor, habitat of endangered, vulnerable and range restricted species etc.), flora & fauna in the study area, forest cover was collected from Forest Working Plan of Kollegal Forest division; and other published and unpublished documents. Stakeholder consultations (Forest Department, Local People etc.) were also carried out to understand the major flora & fauna in the study area, pressure on forest resources, presence of any Schedule I species.

Primary Survey

Habitat Survey

Different habitats identified by desktop review and reconnaissance visit were visited. Data regarding the type and quality of habitat with reference to flora and fauna that it supports and might support is collected.

Flora Survey

The primary floral survey was conducted to record site specific floral species and its diversity. At the time of the survey, xerophyte scrub like vegetation was recorded from the proposed project site. Further data were gathered from secondary sources like governmental department records, forest officials and local residents. None of the species recorded falls in the IUCN red list category.

Faunal Survey

To assess the presence of fauna in the project site, a walk-through survey area was carried out. The project site and the nearby areas were visited to find out the presence of faunal species in the area either by direct sighting or through secondary clues like scat, scale etc. The faunal survey focused mainly on three group’s viz. mammals, avifauna and herpeto fauna of the study area. Data related to the other faunal species were also noted, based on the direct sightings and from authentic secondary sources like standard field guides.

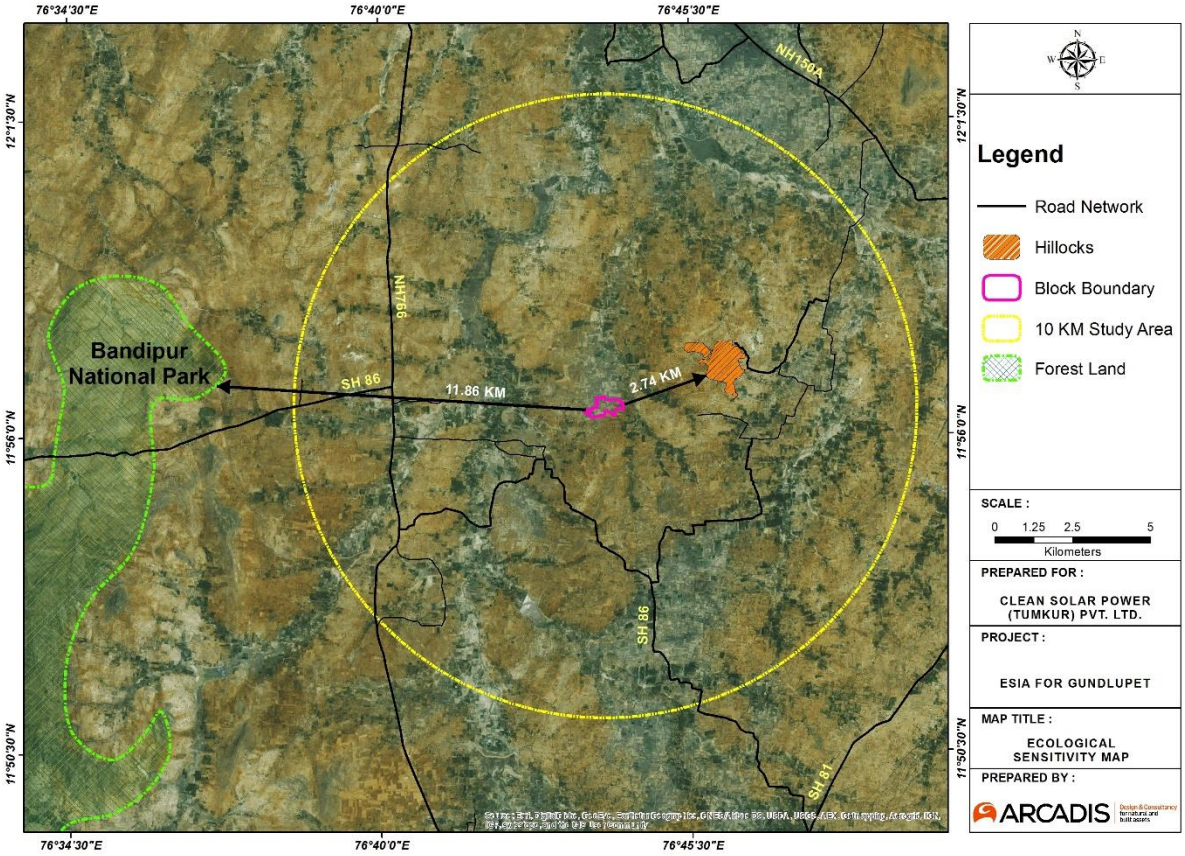
4.4.2 Habitat Survey

According to the Biogeographic provinces of India published by Wildlife Institute of India (Rodgers, Panwar and Mathur, 2002), the project site falls under the Biogeographic Province – 6A-Deccan Peninsula-Central Highlands.

The site survey also included understanding of important habitats in the area. A “Habitat” according to IFC is defined as a terrestrial, freshwater or marine geographical unit or airway that supports assemblage of living organisms and their interactions with the non-living environment. As per IFC,

habitats are divided into - Natural, Modified or Critical 1 the purpose of implementation of IFC Performance Standard-6 (Biodiversity Conservation and Sustainable Management of Living Natural Resources). Critical habitats are subsets of Natural habitats. Ecological sensitivity map of the project site is provided in **Figure 4-8**

Figure 4-9: Ecological Sensitivity Map

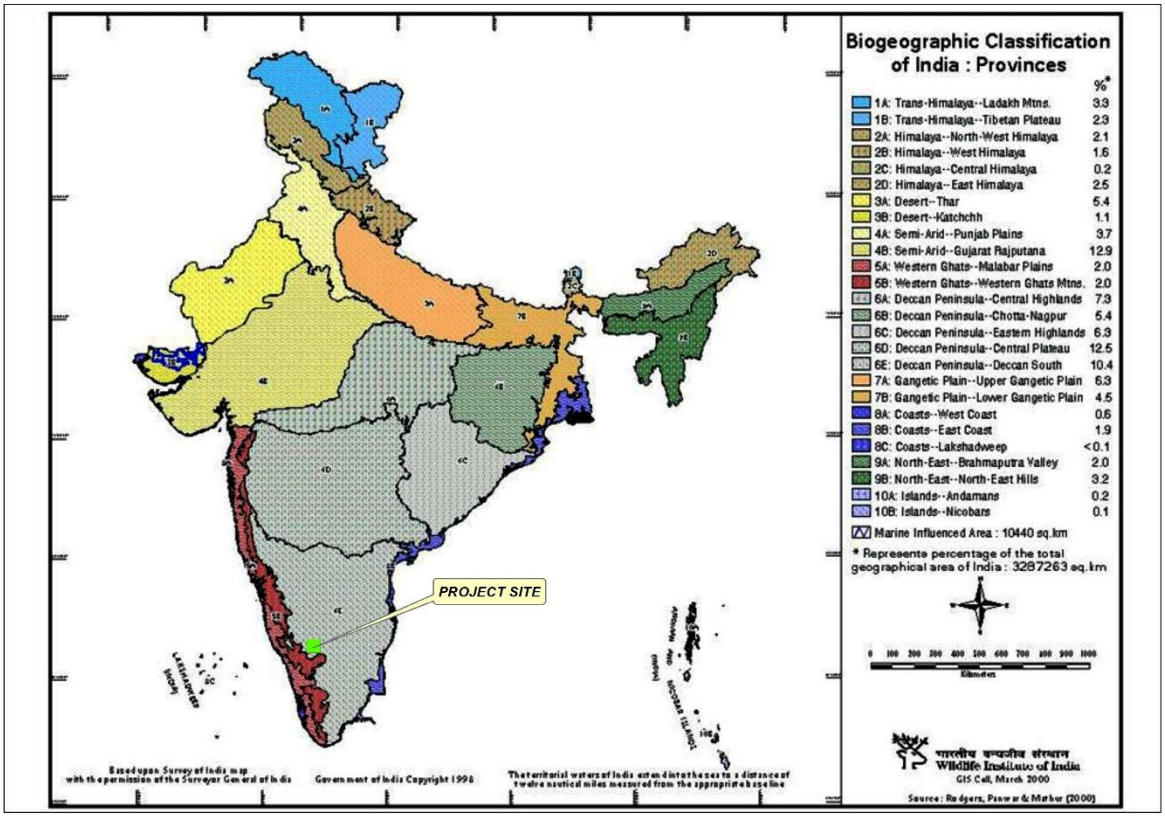


[1] *Natural Habitats- These are the areas composed of viable assemblages of plant and/or animal species of largely native origin, and/or where human activity has not essentially modified an area's primary ecological functions and species composition.*

Modified Habitats- These are the areas that may contain large proportion of plant and/or animal species of non-native origin and/or where human activity has substantially modified an area's primary ecological functions and speciescomposition. It may include areas managed for agriculture, forest plantations, reclaimed coastal zones and reclaimed wetlands.

Critical Habitats- These are the areas with high biodiversity value, including (i) habitat of significant importance to critically endangered and/or endangered species; (ii) habitat of significant importance to endemic and/or restricted range species; (iii) habitat supporting globally significant concentrations of migratory species and/or congregatory species; (iv) highly threatened and/or unique ecosystems; and/or (v) areas associated with key evolutionary processes. Critical habitat can be subset of Natural or Modified Habitat.

Figure 4-10: Biogeographic Zones of India



Types of Habitat in the Study Area

<u>Agricultural Field & Orchards</u>

During survey, the cropping pattern in the surrounding area reveals that the common crops in the study area are saccharum officinarum, oryza sativa, Triticum diococcum, Pennisitum glacaum, zia mays which are mainly depend on rainwater and tube well, borewell in non monsoon season. In addition to these crop lands, various weeds are entered like Cynodon dictylon, Euphorbia hirta, Cyperus rotundus, Digitarea species and Alycicarpus are also contributing to primary production. Apart from that commercial crops like groundnut, sunflower and several vegetables like, red chillies, brinjal, bhendi, leafy vegetable crops are also grow in this region Gundlupete.

As mentioned above, along with agricultural fields, mango orchards were observed in the study area. This type of habitat mosaic of agricultural fields and orchards with shady mango trees and grassland in between is good habitat for birds. Presence of orchards may attract fruit eating bats.

<u>Rocky Barren and Scrub land</u>

Project site can be classified as rocky barren scrub land with shrubby vegetation to be majorly seen. Surface is mostly covered by hard rocks with hardly any large vegetation or scrub. Nooks and crevices or rocks are covered by dry grass and lithophytic plants like *Selaginella bryopteris.* There is hardly any fertile topsoil and bare rock surface is devoid of any nutrients or moisture, so these plants grow in fissures in rocks where soil or organic matter has accumulated. These plants are adapted to survive in drought like conditions. For most of the year these plants maintain a dry dehydrated morphological state to survive dry season. Only after rainfall or during monsoon these plants rehydrates and becomes green.

Forest & Natural Vegetation

There is no national park, wildlife sanctuary, biosphere reserve within 10 km of the study area. As per Wildlife Protection Act 1972, there is no critically endangered, endangered, threatened or rare species of wildlife in the core & buffer zone. With reference to the vegetation of the district, it has different types of forest vegetation's such as ever green forests, shoal forests, dry deciduous forests, and scrub jungles. Dry deciduous & shrub type of forests is observed the study area. Natural factors include factors such as the altitude, the soil conditions, the quantity and regularity of the rainfall. As per primary survey details, fair agro- vegetation cover is seen outside the study area. Growth of grasses in the study area is more in rainy season. Apart from rainy season, study area looks dry as most of the trees shed their leaves and it starts from December to May. Eucalyptus plantation is being observed along agriculture bunds and both sides of the road. However, there are no reserve forests, protected forests or revenue forest within the core zone. Project land is a non forest wasteland. The areas under cultivation were colonized mainly by weeds while the wastelands were colonized mainly by non palatable xerophytes and succulents.The prominent and abundant species include Dodonaea viscosa, Tarenna asiatica, Erythroxylon monogynum, Agave americana, Lantana camara, Chromolaena odorata, Acacia leucophloea, Prosopis juliflora and others. There are only a few trees of Neem, Tamarind and White babul.The vegetation types located within 5 km radius of the project road are Thorn Scrub, Dry Deciduous. Outside forest land natural vegetation is mostly replaced by scrubby vegetation and agricultural fields only in few fertile lands.

Faunal Profile

There is no national park, wildlife sanctuary, biosphere reserve within 10 km of the study area. As per Wildlife Protection Act 1972, there is no critically endangered, endangered, threatened or rare species of wildlife in the core & buffer zone.

Table 4-5: Mammals Found in the Forest of Gundlupete Forest Division beyond the Study Area

Sl. No	Common Name	Scientific Name	Schedule WPA 1972	IUCN Status	Occurrence in the Study Area
1	Elephant	*Elephas maximus*	II	Least Concern	rare
2	Tiger	*Panthera tigris*	I	Least Concern	rare
3	Leopard	*Panthera pardus*	II	near threatened	rare
4	Common Fox	*Vulpes bengalensis*	II	Least Concern	rare
5	Wild Boar	*Sus scrofa*	III	Least Concern	rare
6	Blacknaped Hare / Indian Hare	*Lepus nigricollis*	III	Least Concern	rare
7	Indian Flying Fox	*Pteropus giganteus*	III	Least Concern	rare
8	Jackal	*Canis aurens*			
9	Sambar	*Cervus unicolour*	I	Least Concern	rare
10	Common mangoose	*Herpestes edwardsi*	II	Least Concern	rare
11	Gaur	*Bos gaurus*	II	Least Concern	rare
12	Wolf	*Canis lupus*	II	Least Concern	rare
13	Pangolin	*Manis crassicaudata*	II	Least Concern	rare

Avifauna

Bird species such as egrets, black drongo, red vented bulbul, green bee eater, barn swallow, ashy crowned sparrow, common myna, paddy field pipit, laughing dove were found in large numbers from the survey.

The species of birds recorded in the project area during site visit is listed in the **Table 4-6.**

Table 4-6: List of Avifauna Sighted in the Project Area

Scientific name	Common name	Family	WPA Schedule
Accipiter badius	Shikra	Accipitridae	IV
Acridotheres tristis	Common Myna	Sturnidae	IV
Acrocephalus agricola	Paddyfield Warbler	Sylviidae	IV
Acrocephalus stentoreus	Clamorous Reed Warbler	Sylviidae	IV
Actitis hypoleucos	Common Sandpiper	Scolopacidae	IV
Aegithina tiphia	Common Iora	Aegithinidae	IV
Alauda gulgula	Oriental Skylark	Alaudidae	IV

Acacia latronum *(Hottejali)*

Azadirachta indica *(Neem)*

Calotropis gigantean *(crown flower)*

Tectona grandis *(teak)*

4.5 Socio Economic Environment

This section describes the socioeconomic condition in the study area and relates the village level socioeconomic conditions with tehsil and district level. The objective of analysis of information at village, tehsil and district level is to identify the existing facilities and gaps at village level which can be considered as need of the study area.

The proposed site for Solar Project within Gundlupete tehsil (sub district) of Chamarajnagar district in the state of Karnataka at approximately 50 km south of Mysore city. The project site is well connected by NH-212 with the adjacent district headquarters and other major towns. The project site is located at two villages namely Koligara and Kodagapura villages in Gundlupete tehsil. Site visit was undertaken along with primary and secondary data collection from various sources. Interviews were also undertaken with project proponent (Hero Future Energy).

4.5.1 Objective

The main objective of the consultations was to develop an understating of the community in general of the project affected area. Through the consultative process the areas which the project is impacting the individuals and the community, is also perceived. Along with that, the feasible mitigation measures of the impacts are also identified.

The observations made in this section are intended to capture the status of the project and, therefore, briefly mention the 'way ahead' to successfully complete the ESIA study. The understanding of the project profile was carried out with the project proponent and details of the same will be included in the ESIA report.

4.5.2 Methodology

The assessment of socio-economic environment was carried out based on the primary survey with the help of framed questionnaire to conduct community consultation (as presented in **Appendix J**) Secondary data includes Census 2011, information available on the official website of Chamrajanagar district,[2] statistical data website of Karnataka[3] statistical abstract Directorate of Economics and Statistics, Government of Karnataka, District Census Handbook, and other available data on official Government websites.

The following methodology was adopted for the gathering information and carrying out the assessment:

- Consultations with Panchayat members filling up of a questionnaire to gather Village level information
- Stakeholder consultation with Stakeholders E.g. Panchayat Head, Teacher community, youth group, Farmer, Health worker, ICDS worker and Religious leader.

4.5.3 Study Area

Table 4-7: List of Villages within the Project Area

State	District	Mandal/ Tehsil	Gram Panchayat	Village
Karnataka	Chamrajnagar	Gundlupete	Koligara	Koligara
			Somahalli	Kodagapura

Source: Census 2011/primary consultation

[2] http://chamrajnagar.nic.in/distprofile/dtprof.html

[3] http://des.mp.gov.in/Default.aspx.karnataka.gov.in

4.5.4 Demographic Profile

The demographic profile in terms of total population, number of households, household size and sex-ratio of the selected villages surveyed in the study area are discussed in the section below.

Table 4-8: List of Villages within the Project Area

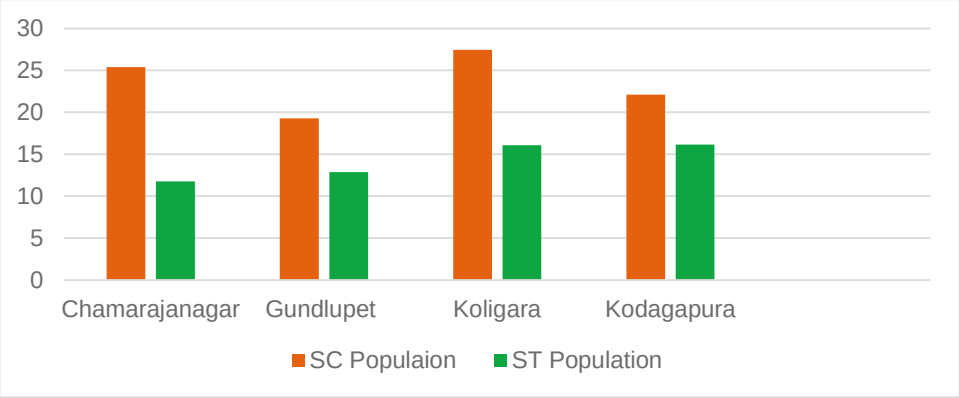
Particular	Total Population	Ave. HH Size	Male Pop.	% Male	Female Pop.	% Female	Sex Ratio
District level							
Chamrajnagar	1020791	4	512231	50.17	508560	49.83	992
Taluk level							
Gundlupete	223070	4	111109	49.80	111961	50.20	1007
Study area villages							
Koligara	3105	4	1584	51.01	1521	48.99	960
Kodagapura	3517	4	1770	50.30	1747	49.70	987

4.5.5 Schedule Caste (SC) & Scheduled Tribe (ST)

Koligara Village: As per census 2011, the SCs and STs of the village constitute 27.47% and 16.05% of the total population. It noteworthy to mention that Koligara village has quiet notable amount of ST population.

Kodagapura Village: As per census 2011, the SCs and STs of the village constitute 22.12% and 16.18% of the total population. It noteworthy to mention that Kodagapura village has quiet notable amount of ST population.

Figure 4-11: SC & ST Population

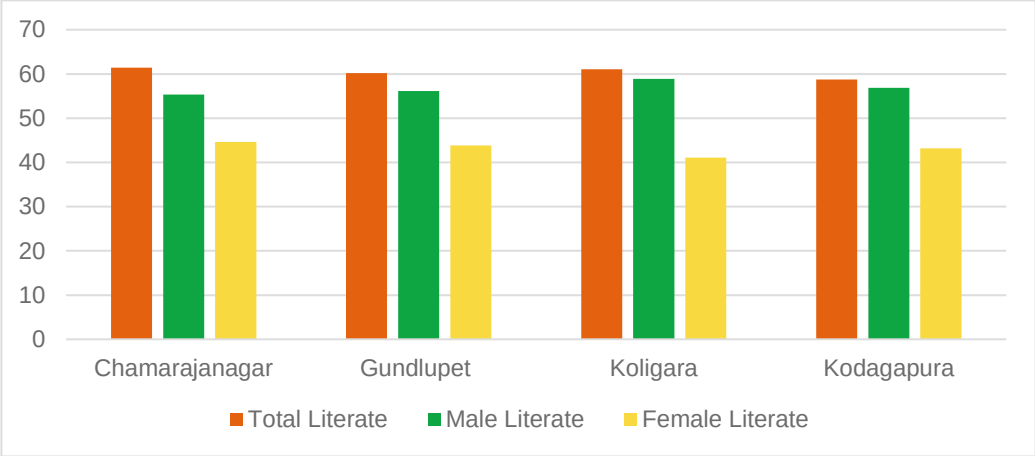


4.5.6 Literacy

Koligara Village: As referred in Census 2011, 61.04% of Koligara village population (above the age of 6 years) are literate. About 51.92% and 48.08% of the male and female (above the age of 6 years) population of Koligara village respectively are literate.

Kodagapura Village: As referred in Census 2011, 58.72% of Kodagapura village population (above the age of 6 years) are literate. About 56.84% and 43.16% of the male and female (above the age of 6 years) population of Kodagapura village respectively are literate.

Figure 4-12: Male Female Literacy

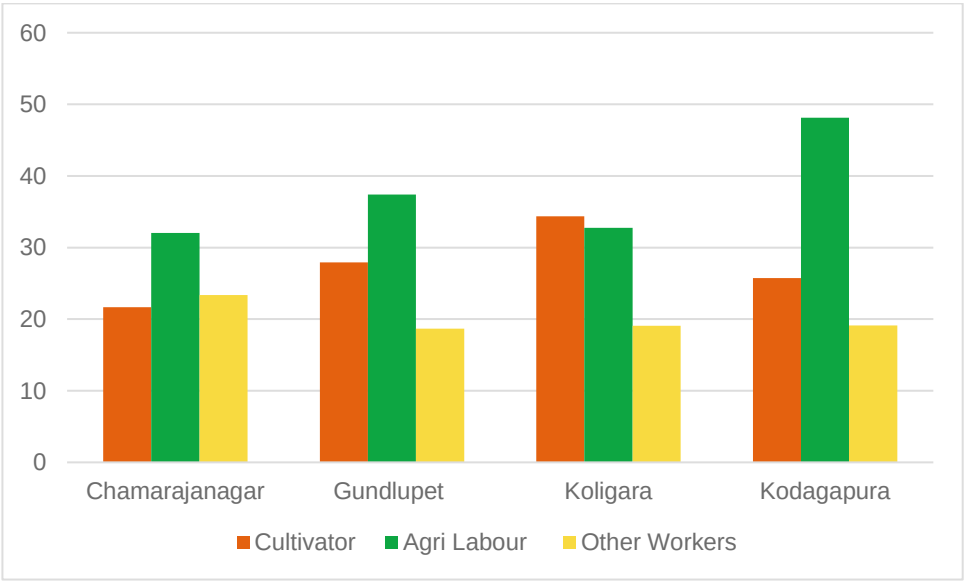


4.5.7 Workers and Occupation

Koligara Village: During consultation with different stake holder and observed most of the population in Koligara sustains on agriculture and allied activities. According to Census 2011 the percentage of cultivators among the total working population of the village is about 38.38%. Around 32.73% of the total work force are agricultural labourer.

Kodagapura Village: During consultation with different stake holder and observed most of the population in Kodagapura sustains on agriculture and allied activities. According to Census 2011 the percentage of cultivators among the total working population of the village is about 25.72%. Around 48.13% of the total work force are agricultural labourer.

Figure 4-13: Workers and Occupation



4.5.8 Wages

As given through circular of notification of Labour Department Karnataka Govt., Minimum Wage rule w.e.f April 1, 2017 to March 31, 2018the minimum wage for Contract Labours in all sector is Rs. 316, Rs. 305, Rs. 298 and Rs.296 for highly skilled, skilled, semi- skilled and unskilled labourers respectively.

Table 4-9: List of Villages within the Project Area

Scehduled Employment CONTRACT LABOUR	Basic Wage (INR)
CATEGORY	
Highly Skilled	316.00/day
Skilled	305.00/day
Semi-Skilled	298. 95/day
Unskilled	296.95/day

Source: http://labour.kar.nic.in/labour/notificationsonminimum.htm

4.5.9 Livelihood Source

Agriculture and cropping pattern: As per Census 2011, about 21.67% and 32.03% of the working population is directly dependent on agriculture, as cultivators and agriculture based labourers respectively in Chamrajanagar district. In Gundlupete tehsil about 27.92% and 37.39% of the total population are cultivators and agricultural labourers respectively. Thus, agriculture continued to play an important role in the economic growth of the region of the upcoming solar power project.

During observation it was noticed that extremely low ground water level and minimum irrigational facility adding with the rising cost cultivation is gradually declining brief is given in Error! Reference source not found..

Table 4-10: Production & Productivity and Price of Major Crops

Yield Season	Irrigation Facilities	Condition	Cropping Pattern
Winter	Groundwater	Rain fed	Pulses, Sunflower, Sugarcane, Groundnut, Cotton
		Irrigated	
Monsoon		Rain fed	Paddy, Jawar, Maize
		Irrigated	

Source: Primary Consultation in the Study Area Villages

Major crops cultivated	Yield (q/acr)	Rate/q
Pulses	18-20	800 -1000
Jawar	20-25	1500 – 1700
Paddy	6-8	1500 – 2000
Maize	4-5	1200 – 1300

Source: Primary Consultation in the Study Area Villages

4.5.10 Livestock

The livestock population of the study area consists mainly of mulch animals. Cows, Sheeps and goats are seen during field visit. During consultation, it was reported that the villages have notable number of livestock population and small ruminants (around 70-80% HH) i.e. sheeps, cow and goats. Animals are grazed at open fields surrounding the cultivation fields. Open fields are often used as grazing lands. Farmers mostly use agricultural waste after harvest as fodder for livestock.

4.5.11 Local Employment and Migration

During consultation with the community in the study area it was observed that, cultivation, daily wage labour in agriculture and other sectors (as porter) are important sources for livelihood in the study area villages. Also, the same has been reported in Census 2011. A notable part of the population migrates to big cities like Mysore, Bengaluru or Ooti to work as daily wagers, labourers etc. Major livelihood in this area is agriculture.

4.5.12 Gender Empowerment Status

The female work participation in Karnataka is notably lower than that of male. The women workers in the state are still not better placed, specifically by financial status because the workforce is concentrated in activities which are unorganized, informal, seasonal, insecure, menial and poorly paid. There is also significant wage disparity between the male and female workforce.

There is also significant wage disparity between the male and female workforce. During consultation it was informed that in agricultural sector Male Wagers normally receive Rs. 250- 300/ day, whereas the female workers receive Rs. 150- 200/ day.

Aprox 25% and 37% of the total working population in Koligara and Kodagapura village are female. Following the Census, 2011, the average literacy rate of female both at district and mandal level is found much lower than the male.

During consultation with the women participant it was observed that, early marriage and child marriage, minimal participation of women in household or economic decision making and lesser economic freedom is common in the area. The women are entirely responsible for household chores and additionally engaged as agriculture labor, harvesting, feeding the cattle, and taking care of livestock. Female laborer's are engaged in cultivation, sowing, weeding, plant protection, grading, kitchen gardening, cleaning of grains, harvesting, feeding the cattle, irrigating fields, taking care of livestock, growing vegetables etc.

4.5.13 BPL Families and Vulnerability

As per consultation with the community members as well as Panchayat Members during visit of Arcadis ESIA Team a few BPL family reported to be present in the study area villages viz. Koligara and Kodagapura in Gundlypete Tehsil.

Vulnerable group is *"Groups that experience a higher risk of poverty and social exclusion than the general population. Ethnic minorities, migrants, disabled people, the homeless, those struggling with substance abuse, isolated elderly people and children all often face difficulties that can lead to further social exclusion, such as low levels of education and unemployment or under employment."*

During community consultation, it was observed that along with BPL families some vulnerable group like landless family, physically handicapped and widow are present in the study area villages, given in **Table 4-11.**

Table 4-11: Vulnerable Groups in Study Area Villages

Village Name	Vulnerable group				
	Women headed Family	Lone Widow	Physically Handicapped	Landless HH	BPL famlies
Koligara village	5	70	50	20	300
Kodagapura village	25	25	20	30	350

Source: Primary Consultation in Study Area Villages

The project proponent should identify vulnerable community members as above mentioned during land procurement process. Project proponent should also avoid or minimize land purchase from the vulnerable groups especially women (widow)/ disabled persons headed house hold and marginal farmers. The project proponent may also have required to focus on providing employment opportunity to the vulnerable community members and the implementation of programme under CSR activity for them.

4.5.14 Land Holding

During discussions with the local community in the study area, it was understood that the average land holding size varies between 5-7acre in Kodagapura and 4-5 acre in Koligara per household.

4.5.15 Irrigation

As information revealed during consultation with the community. Bore wells are the only sources for irrigation in both the villages (Koligara and Kodagapura).

4.5.16 Amenities and Infrastructure

To understand the present standard of living of the villagers, the major amenities of the study area was observed.

Medical Facilities:

Project area villages: Access to health services is limited only to some of the study area villages. Somahalli village have a Ayurvedic Hospital (AH). As observed, the Ayurvedic Hospital works as a life

line for most of the villages in the study area. In emergency cases, people travel about 5 km away to avail Madapatna government hospitals. General diseases that is observed to be prevalent in the study area villages is cough & cold, diseases borne out of mosquito-bites like malaria etc

It was informed by the community members that ambulance facilities are available on call to emergencies nos.108. Details of the health scenario given in **Table 4-12.**

Consultation with Doctor at Ayurvedic Health Centre in Somahalli Village

Table 4-12: Study Area Village Wise Medical Facility Resources

Study Area Villages	Medical Infrastructure Scenario
Koligara village	The village has no health sub centre (HSC). Auxiliary Nurse & Midwife (ANM) visit the centre once in a month. The villagers avail the primary health centre (PHC) at Madapatna in the times of need. For better treatment, they must travel up to the district town Chamrajanagar. Villagers also go to local quacks in the time of need.
Kodagapura village	The village has no health sub centre (HSC). Auxiliary Nurse & Midwife (ANM) visit the centre once in a month. The villagers avail the primary health centre (PHC) at Madapatna in the times of need. For better treatment, they must travel up to the district town Chamrajanagar. Villagers also go to local quacks in the time of need.

Source: Primary consultation at study area.

Education:

It is noted that all villages in the study area have access to primary education, though secondary schools are restricted to a few villages only. Higher secondary schools and colleges for under graduate studies are not located within the village and students travel to Madapatna or Gangadashersha for the same.

The schools also don't have sufficient proper sitting arrangements (e.g. chairs & benches) for all students. Drinking water and sitting arrangements are main areas of concern that needs improvement in most of the schools of the study area.

The project proponent may consider the above for betterment of the situation through CSR activities.

Govt. Primary School, Kodagapura Village

Drinking Water Facility:

It was informed by both Panchayat Samiti and community that piped water supply system through reservoirs (overhead tanks) exists in all the study area villages. Water is supplied through taps at central locations of different localities. Though piped water supply system through overhead reservoirs exists in all the villages. Water is supplied to individual households against charges Rs. 25 per month/ household.

Hand Pump at Barseta Desh Village

During consultation with the community, water is extracted from ground through bore wells for drinking water consumption in many of the villages. Hand pumps are also seen to be used in all the villages.

Sanitation:

Majority of households of the study area have their own sanitation facilities in form of sanitary latrines in the study area villages. Though very little percentage of the study area practice open defecation. It was observed during the field visit, sanitary toilets construction at individual households has been started under Swachh Bharat Mission scheme.

Cooking Source:

A little section of the population in the surveyed villages use fire wood, cow dung, and crop residue as fuel for cooking. Majority of the study area populace use LPG as cooking medium.

Communication and Transportation facilities:

Private and Govt. Buses are the major mode of transportation in the study area. Self-owned motor cycles and bicycles are frequently used private transport for the villagers. During site visit, it was observed that there is good road connectivity. Access roads within the study area village- are bituminous, concretized as well as kuchcha. Telephone connectivity is also available. Hence, it can be summerised that communication facilities are satisfactory from the site area.

Transportation facilities in study area villages

Power supply:

Households of all study area villages were observed to have electricity connections in the proposed project area. It was told by the local people that electricity is available almost 24 hours. Tariffs are being charged for these connections.

4.5.17 Common Property Resources (CPR)

During consultation with Panchayat members and villagers, it was noted that villages have some Common Property Resources (CPR) like community ponds, temples, other ICDS centres, community halls, cremation ground etc. as presented in **Table 4-13**. In terms of CPR, the likely impact from the project development was also observed and discussed with the villagers.

Table 4-13: Common Property Resources[4]

Study Area Village Temple	Common Property Resources (CPR)			
	Temple	Communitte Hall	Cremation Ground	Well/Pond
Koligara village	1	1	1	-
Kodagapura village	3	1	1	1

Source: Primary Consultation at Study Area Villages

Temple, Kodagapura Village

4.5.18 Archaeology and Cultural Heritage Sites

As observed during field visit there is no structure of archaeological and cultural heritage on the proposed project site. No monument or structure of religious importance were observed within 5 Km radius of the study area village.

4.5.19 Stakeholder Consultation

Consultation with land owners and community members were held separately at each study area villages. Consultation was carried out with representative of Project Proponent, Village Panchayat Members, Anganwadi Workers, and other community members from village. Details of consultation is appended here below.

Table 4-14: Consultation with Different Stakeholders

Stakeholder type	Name & Designation	Department/Address	Date
Panchayat Samity	• Mahadevamma, President • S.P Chandrashekher, Vice Presendent • Jagdish, Member • Samba Lingappa	Somahalli Panchayat	6/12/2017
Primary Health Centre	• Dr. Veeranna (MO)	Kodagapura, Somahalli	6/12/2017
Primary School	• Ajitha (HM)	Kodagapura Village	6/12/2017
	• Srikanth (Asst. Teacher)		
	• K. Nagarathwa		

[4] *Source: Primary Consultation at study area village*

Stakeholder type	Name & Designation	Department/Address	Date
	• K.N Kalavati		
Anganwadi Center	• Mrs. Jayaamma	Koligara Village	6/12/2017
Community	• Majho Swami • Mahadev Appa • Maduya • Patta appa	Kodagapura	6/12/2017
Labourers	• Tarik Anwar • Jamaluddin • Jahangeer Alam • Jahan Ali • Maniral Islam • Hazabul • Jahiden Karin • Hasanuddin • Jahiruddin • Aminul	Project Site	6/12/2017

Source: Primary Consultation at study area village

Public consultation was held with the locals, Anganwadi workers, primary health center, teachers and panchayat members of various villages (Details given in **Appendix J**) Discussion was based on a set questionnaire including project specific negative and positive impacts, socio-economic resource, and demographic profile of the villages. Expectations of local's w.r.t the project development was also discussed.

4.5.20 Consultation with Land Owner of Solar Project

A common land acquisition/ procurement process is followed for the entire 20 MW solar project area. Consultation was done with a few land sellers for understanding the likely livelihood impact Solar Power Project.

During consultation with the land sellers it was revealed, the sellers feel that land was taken from them for a greater cause, which they appreciate. They aspire employment and other betterment livelihood support avenues from the upcoming project. As informed, they are satisfied with the compensation amount they have received and have plans to invest the amount in creating more earning opportunities including utilising the same for children's education. Details of the lands given by them and remaining with them is given in **Table 4-15**.

Table 4-15: Details of Land Information as Informed by Consulted Land Sellers (RUMSL Solar Project)

Mandal & District	Village	Land Owner Name	Private land given (Acr)	Land remaining (Acr)
GundlupeteTehsil, Chamarajanagar District	Kodagapura	Vaya Mallappa	13	6.5
		Shive Ramappa	1.4	3
		Guru Mallappa	2.5	2
		Siva appa	2.5	8
		Ravi	4	12

Mandal & District	Village	Land Owner Name	Private land given (Acr)	Land remaining (Acr)
		Guru Raja appa	6.5	4
		Guru Murthi appa	6	3
		Rajendra Prasad	4.5	2
		Mahadeva Shetty	2.15	2
		Prabhu swamy	3	3
		Mahadev	4	3

Source: Primary Consultation at study area village

Key Findings of Consultation

Some notable key findings of different level stakeholder consultation are appended below:

- Agriculture is the major livelihood resource in the area. Quiet a notable amount of population is involved in agriculture, a major part of which are agriculture labourers.
- The main crops are paddy, Tur dal, maize, Cotton and vegetable.
- Rain-fed agriculture pattern are practiced in project area.
- The main source for irrigation is bore wells.
- Female literacy rate is much lower than male literacy rate.
- There is no health facility in the study area villages, locals rely on quacks.
- Common health problems like fever, joints pain and tuberculosis are present in the village.
- Drinking water and sitting arrangements are main areas of concern that needs improvement in most of the schools of the study area`
- No monument or structure of religious importance were observed within 5 Km radius of the study area village.
- Majority of households of the study area have their own sanitation facilities in form of sanitary latrines in the study area villages.
- Water is supplied to individual households against charges Rs. 25 per month/ household from Panchat

Consultation with teacher at Primary School Kodagapura

Consultation with Land Owners

Consultation with Sarpanch Somahalli Panchayat office

Consultation with Project Proponent

Consultation with Labourers at Project Site

Toilet facilities for Labourers at Project Site

Consultation with ICDS Center, Koligara Village

Consultation with Villagers

5 ANALYSIS OF ALTERNATIVES

The section gives analysis of alternatives with respect to the project. The following scenarios have been considered:

- Current or No Project Scenario
- Alternate methods of power generation;
- Site suitability and justification for the project

5.1 Current or No Project Scenario

There is a need to bridge the gap between the demand and supply, HFEable/non-conventional sources of power to supplement the conventional sources. The project intends to contribute towards bridging this demand supply gap being a non-conventional source of power generation.

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

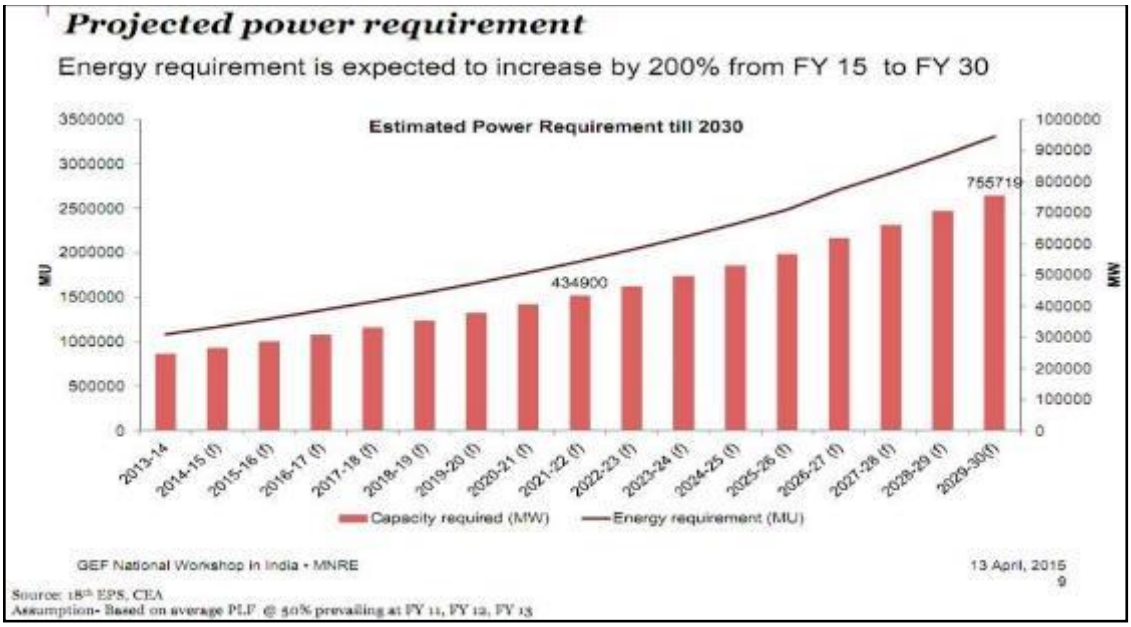
5.2 Energy Security

In 2007 the Ministry of Environment Forests and Climate Change (MoEF&CC), Ministry of Power (MoP) and the Bureau of Energy Efficiency (BEE) issued a paper entitled ‘India: Addressing Energy Security and Climate Change’. In India the need for expanding the role of domestic HFEable Energy (RE) sources is a logical next step. Solar power is already in a position to provide a significant portion of India’s planned capacity addition up to 2030, with simple regulatory and grid modernization initiatives. Unlike oil, coal or LNG, solar power is not subject to fluctuating fuel prices which drain India’s limited foreign reserves, and in addition, solar power helps in reducing the carbon footprint of the economy. In the **Figure 5-1,** India’s projected power requirement until 2030 has been indicated.

This project is a step towards achieving energy security in India.

As per DPR, HFEcarries an illustrious legacy of the Hero Group, a USD 5.6 billion conglomerate. Astrategic decision of the Group is to enter the domain of power generation from clean and non-polluting sources of energy.The young company is an Independent Power Producer (IPP) with growth plans to invest progressively in Wind, Solar and Hydro sector over the years. As the Indian economy continues its growth trajectory, HFE is poised to provide clean power to industries, businesses, educational institutes, non - profits and governmental organizations at competitive rates. HFE has commissioned first 210 MW wind power projects in Rajasthan, Maharashtra, Karnataka and Tamil Nadu within a short span of 3 years following its incorporation. It has also commissioned 30 MWs of solar PV project in Madhya Pradesh and 10 MWs in the state of Karnataka.

Figure 5-1: India's Projected Power Requirement



5.3 Alternate Methods of Power Generation

There are various non-renewable and renewable energy sources which can be utilized for power generation. Each option has its own advantages and disadvantages. Based on the site conditions, availability of resources, environmental & social concerns and project cost suitable option for power generation need to be selected. Comparison of advantages and disadvantages of various non-renewable and renewable energy is represented in table given below.

Table 5-1: Comparison of Advantages and Disadvantages of Various Non-renewable and Renewable Energy

Source of Energy	Advantages	Disadvantages
Coal	• Relatively cheap form of energy availability in large scale worldwide • Easily transported to power stations • Reliable for of energy with steady output • Coal is available in India	• Non-renewable energy source • Large water requirement • High emission and generation of fly ash • Source of greenhouse gases • Mining of coal causes impacts on land and surrounding environment.
Oil & Gas	• Oil and gas can be easily transported by pipes or ships. • Natural gas is the "cleanest" of the fossil fuels	• Non-renewable energy source • Working environment risks to staff and environment • Burning oil and gas releases can cause pollution & health impacts • Releases GHG and hence causes global warming and climate change • India imports majority of Oil and Gas requirement and hence high dependency of raw material outside the country
Nuclear	• Nuclear fuel does not create greenhouse gases when making energy.	• Expensive, especially in capital costs, maintenance costs

Source of Energy	Advantages	Disadvantages
	• Only a very small amount of nuclear fuel is needed to make a lot of energy. • Does not produce significant atmospheric pollutants.	• The waste produced from nuclear energy is radioactive and Safe long-term disposal of nuclear waste can be difficult.
Solar	• Energy from the sun is exhaustive & free. • Solar energy does not create greenhouse gases.	• Only specified places are right for solar power. • Solar energy cannot be produced at night
Wind	• Wind power does not create greenhouse gases. • The energy used to build one of the large turbines is repaid in 3-6 months. They last for 25 years.	• Need a lot of turbines to make electricity. • Location specific resource • Wind turbines can only be used where it is windy. On days where there is little wind, less energy will be generated.
Hydroelectric	• Hydroelectricity creates no greenhouse gases. • Energy from water is free and will not run out. • Hydroelectric energy is more reliable than wind or solar power.	• Hydroelectric power needs enough water to turn the turbines. • Dams are expensive to build. • Building large dams can cause damage to water courses which affects people and wildlife and it can be difficult to find the right site. • Small dams for local buildings on weirs do not have these problems.
Biomass	• Biomass fuel is cheap and could use rubbish that we might otherwise throw away. • Biomass fuels will not run out. • Biomass crops that are grown absorb the same amount of pollution whilst they are growing as they release when they are burned, so do not create extra greenhouse gases in the atmosphere.	• Growing biomass crops needs a lot of space and could replace growing valuable food crops. • Biomass fuels that are not grown (such as waste products) create greenhouse gases when burned.

The conventional sources of power generation have high environmental cost when compared to non-conventional sources like solar, wind, hydro, etc. its construction periods are longer with higher environmental risks from emissions. On the contrary power source from solar energy is most eco-friendly. It does not have any kind of emissions during operation. While wind power requires high wind zones to be set up and micro siting along with detailed meteorological analysis is required, site selection for solar power is relatively easier. Solar power energy is a clean power project with no emissions and feasible for the project area keeping in mind the good solar potential in Karnataka throughout the year.

5.3.1 Alternate Routes for Transmission Lines

The power from the solar plant will be evacuated through 66 KV transmission line to Grid substation (GSS) located at Kabbhalli village which is approximately 9 km away from site. The length of transmission line from PSS to GSS is 5.5 km.

Reportedly, the route for the transmission line has been selected keeping in mind the following factors:

- Transmission line route is planned to avoid any habitations along the route
- No house or community structures are located under the transmission line

- Areas requiring extensive clearing of vegetation have been avoided
- Selection of the transmission route avoids any environmental sensitive site like schools, health centres, etc.
- Right of way/access roads will be shared with the common user of the substation.

The shortest possible route after considering the above factors will be selected for the transmission lines. Consideration of all the above factors will reduce the environmental and social footprint of the transmission line.

5.4 Conclusion

Various factors are considered such as solar resource potential at the project site, favorable environmental and social settings, lowest GHG emissions in the project life cycle. Availability and suitability of solar power potential, land and other allied infrastructure availability and various government supporting policies. Considering these factors, it can be concluded that the site is the good location for development of solar power project.

6 ENVIRONMENTAL & SOCIAL IMPACT ASSESSMENT

6.1 Approach & Methodology

Primary impacts are assessed for a radius of 1 km around the project site and secondary impacts are assessed within the study area (10 km radius from project site). Also, 100 m RoW along the tentative transmission line route is also considered for impact assessment. IFC's safeguard policies require that (i) impacts are identified and assessed early in the project cycle; (ii) plans to avoid, minimize, mitigate, or compensate for the potential adverse impacts are developed and implemented; and (iii) affected people are informed and consulted during project preparation and implementation. IFC emphasizes on the use of a screening process as early as possible, to determine the appropriate extent and type of environmental assessment so that appropriate studies are undertaken commensurate with the significance of potential impacts and risks.

The methodology adopted to assess the significance of impact associated with project activities during construction and operational has taken following criteria into consideration. Details of screening criteria are given in **Table 6-1.**

Table 6-1: Screening Criteria for Environmental and Social Impact Assessment

Impact	Distribution of impact	Duration of Impact	Intensity
Low/ Short	Influence of impact within the project site boundary and RoW of Transmission line (Site)	Limited for duration of less than 6 months (Short)	Limited local scale impact resulting in temporary disturbance/ loss of environment/ social components (low)
Moderate/ Medium	Spread of impact within 2 km from the of the project site boundary (Buffer)	Impact may extends up to 2 years (Medium)	Local scale impact resulting in short term change and/ or damage to the environment components. (Moderate)
High/ Long	Influence of impact beyond 2 km from the project site boundary (Widespread)	Impact extends beyond 2 years (Long)	Regional impact resulting in long term changes and/ or damage to the environment components. (High)

6.1.1 Significance Evaluation Matrix

Significance evaluation matrix as shown in **Table 6-2** has been used to evaluate the significance of identified potential environmental impacts. This matrix includes criteria as discussed above to analyses the significance of impact. Color codes have been given to signify the impact intensity.

Significance of environmental impact has been analyzed and presented in further section of this chapter. The environmental impacts associated with the project activities have been identified and analyzed to evaluate their significance. Because of clean category projects, environmental impacts are very few with minor significance and can be controlled through mitigation measures.

Table 6-2: Impact Significance Matrix

Distribution	Duration	Intensity	Significance
Within Site	Short	Low	LOW
Within Site	Short	Moderate	
Within Site	Medium	Low	
Within Site	Medium	Moderate	
Within site	Long	Low	
Buffer area	Short	Low	
Widespread	Long	Low	
Within Site	Short	High	MODERATE
Within Site	Medium	High	
Within Site	Long	Moderate	
Within Site	Long	Low	
Buffer area	Short	Moderate	
Buffer area	Medium	Low	
Buffer area	Medium	Moderate	
Buffer area	Long	Low	
Buffer area	Long	Moderate	
Widespread	Short	Low	
Widespread	Short	Moderate	
Widespread	Medium	Low	
Widespread	Medium	Moderate	
Widespread	Long	Moderate	
Within Site	Long	High	HIGH
Buffer area	Short	High	
Buffer area	Long	High	
Widespread	Short	High	
Widespread	Medium	High	
Widespread	Long	Moderate	
Widespread	Short	Low	
Widespread	Short	High	
			NO IMPACT
			POSITIVE IMPACT

Table 6-3: Impact Aspect Matrix for Construction and Operation Phase

	PHYSICAL ENVIRONMENT									BIOLOGICAL ENVIRONMENT						SOCIO-ECONOMIC ENVIRONMENT					
	Aesthetics and Visual impacts	Air Quality	Noise Quality	Top soil removal / Soil Quality	Land Use	Local Drainage and Physiography	Surface water quality	Ground Water Resources	Ground water quality	Terrestrial habitat	Ecological Sensitive Areas	Aquatic Habitat and resources	Migratory Birds	Agriculture	Domesticated Animals	Loss of land and livelihood source	Common Property Usage Conflict	Local Job and Economic Opportunity	Cultural and Behavioral Conflict	Community Health and Safety	Occupational Health and Safety
A. Construction Phase																					
Land lease/purchase process										M				L		M	M	P			
Sourcing and transportation of construction material etc.	L	M	L	L		L				L							L		M	L	M
Storage and handling of raw material and debris	L	L		L	L				L											L	M
Establishment of labour camp and labour working condition.	L	L	L	L	L			L	L	L							L	P	M		L
Operation of DG sets		M	L	L	L				L	L											L
Access road construction		M	L	L	L		M	L		L							M	P	M	L	L
Site Clearance	L	M	L	L	M	L		L								L		P		L	M
Foundation excavation		M	L	M	M		M	L										P	M	L	M
Transportation of solar plant components to site and storage		M	L				L											P	M	L	M
Transformer yard construction		M	L	L	M													P		L	M
Substation construction			L	M	M													P		L	M
Laying of transmission lines	L	L	L	L	L											L	L	P	L	L	M
B. Operation Phase																					
Vehicular movement carrying Officials on site during routine inspection, maintenance and operation of solar power plant		L					L														
Periodic maintenance of all solar modules (washing modules)							L	L						L				P			L

	PHYSICAL ENVIRONMENT									BIOLOGICAL ENVIRONMENT						SOCIO-ECONOMIC ENVIRONMENT					
	Aesthetics and Visual impacts	Air Quality	Noise Quality	Top soil removal / Soil Quality	Land Use	Local Drainage and Physiography	Surface water quality	Ground Water Resources	Ground water quality	Terrestrial habitat	Ecological Sensitive Areas	Aquatic Habitat and resources	Migratory Birds	Agriculture	Domesticated Animals	Loss of land and livelihood source	Common Property Usage Conflict	Local Job and Economic Opportunity	Cultural and Behavioral Conflict	Community Health and Safety	Occupational Health and Safety
Maintenance of ancillary facilities such as store, yard, site office		L																			
Inspection of transmission lines													L								L
Security of solar power plant in operation																		P			L
Operation of solar power plant													L							L	M

6.2 Impacts on Physical Environment

6.2.1 Air Quality

Construction Phase:

In construction phase, various project components such as site preparation, transmission cable laying, switchgear, approach roads, internal road network and porta cabin construction will require land clearing, levelling, excavation, grading activities, vehicle movement and DG set operation. This results in an increased level of dust and particulate matter emissions, which in turn will directly and temporarily impact ambient air quality. If improperly managed, there is a risk of nuisance and health effects to construction workers onsite and to a lesser extent to nearby receptors from windblown dust (on the village access roads) due to transportation of raw materials. However, most of these project activities are expected to be restricted within the project boundary. Further, the movement of vehicles carrying raw materials on unpaved area within the project site and on access road causes fugitive dust emission and may extend to surrounding of project site like nearest settlements. Hence, the distribution of impact can be considered medium, duration of impact is short an intensity of the impact as medium. Since the impact is widespread, but for short duration and of low intensity, the impact can be termed of a **Moderate** significance. But, the impact is reversible, and temporary in nature, if the following mitigation measures are adopted.

Mitigation Measures:

- Vehicles speed to be restricted to 20-30 km/hr on unpaved road.
- Raw material should be covered with tarpaulin sheet during transportation and in storage area.
- Ensure water sprinkling on unpaved area to minimized the dust emission.
- Fine materials (e.g. sand) should be covered during transportation.
- All the project vehicles shall have PUC. Ensure regularly maintenance of project vehicles during construction and operational phase.
- Turn off the machineries when not in use.

Operational Phase:

During operational phase, there would be minimal vehicular movement about 2-3 nos. project vehicles for O&M purpose. Since major source of emission into the ambient air will be absent during the operational phase therefore impact can be termed as insignificant.

Mitigation Measure:

- Restrict movement of vehicles on unpaved surface within the site.

6.2.2 Soil Quality

These impacts are associated with the project activities such as piling of module mounting structure and storage of diesel, spent oil or transformer oil.

Construction Phase:

The project is under construction on open land. Loose top soil is generated due to excavation on project site due to site levelling for erection of module structures towers and access roads. The impact anticipated here is loss of top soil because of inappropriate storage. However, these activities and associated impacts are limited to be within the project boundary and during construction phase only. Considering the activities limited within the site, short duration of construction phase and low intensity,

significance of impact is evaluated as **Low**. Soil contamination may result due to accidental spillage and inappropriate storage of diesel or used oil during construction phase. Improper handling of broken solar modules may also lead to soil contamination. However, distribution of impact within the project boundary and short duration of construction phase with low intensity makes impact of **Low** significance and can be controlled with the recommended mitigation measures:

Mitigation Measures:

- Provide appropriate storage of top soil in an isolated and covered area to prevent its loss in high solar and runoff.
- Allow only covered transportation of top soil within the project site.
- Use top soil at the time of plantation and it can be given to nearby agricultural field after taking consent with the landowners/farmers.
- Plantation activities has been undertaken by HFE.
- Store hazardous material like diesel and used oil in isolated room and on impervious surface to prevent seepage into project site soil
- Filling and transfer of oil to and from the container shall be on impervious surface
- Care should be taken with regard to possible changes in soil quality due to human activities, such as disposal of waste material and domestic effluents on soil of the surrounding area.
- Broken solar panels should be stored in paved surface and be handed back to manufacturers / authorised recycler within 15 days.

Operational Phase:

During operational phase, project activities such as excavation and usage of chemicals such as diesel and spent oil will be absent except chances of accidental release of used oil from transformer, therefore impact associated with these activities such as top soil loss and soil contamination are minimal. Impact can be considered as insignificant. Improper handling of broken / damaged solar modules may also lead to soil contamination.

Mitigation Measure:

- Broken solar panels should be stored in paved surface and be handed back to manufacturers / authorised recycler on regular interval.

6.2.3 Noise Quality

The environmental impact anticipated in the project is the increment in ambient noise level due to various project activities.

Construction Phase

The major noise generating sources in the project are operation of vehicular traffic, and construction equipment like dozer, scrapers, concrete mixers, generators, pumps, compressors, rock drills, pneumatic tools, and vibrators. The project site is located in mix agricultural and barren land with no continuous noise generating sources except noise from DG set and inverter room of the project site. Assuming, the operation of these equipment's is expected to generate noise in a range of 75 – 90 dB (A) and it can be lower down from 90 dB(A) to 47 dB(A) at 50 m distance from the source and the nearest settlement is Kodagapura village which is located 1 km (approx.) away from the site.

Mitigation Measures:

- Use DG set with acoustic enclosure.

- Restrict major noise generating activities during night time 10:00 pm to 6:00 am.
- Provide personal protective equipment (e.g., Ear Muffs) to all workers wherever noise is generated due to machinery operation.
- Regular maintenance of project vehicles.

Operational Phase:

Any significant noise generating activity during operation of solar power plant is absent therefore impact in terms of increment in ambient noise level is not anticipated during the operational phase of the project.

6.2.4 Alteration of Natural Drainage Pattern

Topography of the project site can be characterized as mix (flat and mild undulations) therefore levelling or filling is expected to alter the natural drainage pattern.

Construction Phase:

During construction phase, site levelling activities, construction of underground reservoir will be carried out which in turn may result in change of contour level and natural drainage system. Therefore, change in contour level may affect the flow of surface runoff from project site. After the levelling and paving, increment in surface runoff is expected which should be diverted to the natural drainage/canal exists in nearby area. If it is not carried out then surface runoff from the site may affect nearby agricultural field which may cause social agitation.

Considering the extent of impact outside of project boundary and high intensity, impact is considered as major significance and following mitigation measures are suggested to implement:

Mitigation Measures:

- Site levelling should be done with minimum alteration in contour level
- Design storm water drainage management system to discharge the surface runoff in the nearby natural drainage
- Do not disturb the natural drainage system
- The exit of runoff from the project site in the adjacent surrounding land area should be restricted

Operational Phase

In operational phase, project activities causing the alteration of natural drainage pattern will not exist, therefore associated impact is not anticipated.

6.2.5 Water Resources

Construction Phase

During construction phase water is sourced through supplied by tanker through vendor and borewell . Packaged drinking water needs during the construction phase will be met via local tankers/approve vendors. During construction phase the water requirement is 15 KLD for construction activities and for domestic purpose water requirement during this phase is 13.5 KLD.

Considering the limited distribution of impact (within the site), short duration of activities and low intensity, significance of impact is assessed as Moderate**.** With mitigation measures it can be considered as **Low**

Operational Phase

In operational phase water is required for module cleaning throughout the project life cycle. In operational phase, the water requirement for module cleaning purpose would approximately 300 KL per cycle (1 cycle completion duration is 15 days, as reported) , this will be sourced through borewells. For domestic and drinking purpose water requirement would be around 5.6 KLD, this will be meet through tanker/authorized vendor/supplier. Considering the distribution of impact in within the region, long duration with moderate intensity, significance of impact is assessed as Moderate. With mitigation measures it can be considered as **Low**.

Mitigation Measures for both construction and operation phase

- Approval /NOC should be obtained from the competent authority (CGWB/CGWA) for abstraction of ground water through bore well.
- Ensure optimal usage of water viz., storage and reuse of wash water after module washing and plantation of low water requirement species
- Construct of rain water harvesting pit to recharge the ground water table.

6.2.6 Solid/ Hazardous Waste Disposal

Construction Phase:

Solid waste during the construction phase consists primarily of scrapped building materials, excess concrete and cement, excavated material, rejected components and materials, packing materials (pallets, crates, plastics etc.) and human waste. As consulted with representative of HFE, the broken solar panels will be packed and will be sent back to manufacturer. However, taking in consideration the impact within site, short duration and moderate intensity, the impact is considered as **Low.**

Mitigation Measures

- The excavated material generated will be reused for site filling and levelling operation to the maximum extent possible.
- Ensure contractual obligation that necessitates broken solar panels being accepted by manufacturer
- Use a 3-bin system so that food waste and recyclables viz. paper, plastic, glass, scrap metal waste etc. are segregated and stored in designated waste bins/ containers. The recyclables should be periodically sold to local recyclers while food waste will be disposed through waste handling agency.
- Waste oil from transformer will be collected and stored in paved and enclosed area and subsequently sold to SPCB authorised recyclers.

Operation phase:

There will not be any substantial generation of solid waste, other than insignificant domestic waste, and broken solar panels. The broken solar panels will be sent back to the manufacturer. Considering the limited distribution of impact (within the site), long duration of activities and low intensity, significance of impact is assessed as **low.**

Mitigation Measures

- Use a 3-bin system so that food waste and recyclables viz. paper, plastic, glass, scrap metal waste etc. are segregated and stored in designated waste bins/ containers. The recyclables should be periodically sold to local recyclers while food waste will be disposed through govt. approved waste handling agency.
- Ensure broken solar panels are properly packed and sent back to manufacturer.

6.2.7 Impact on Land and Land use

Construction Phase

During construction phase, impact on land use is anticipated due to various activities such as site levelling, filling and development of solar power plant. Land use classification will change into industrial land use after the development of solar power plant. Some impact on natural drainage system is also anticipated. Further, impact will be of long term and permanent in nature, but impact will not be of adverse nature.

Mitigation measures

- Changes in contour level should be avoided to the extent possible
- Maintain natural drainage system

Operation Phase

No impact on land use is envisaged during the operation phase.

6.2.8 Impact on Local Ecology

Construction Phase

The associated ecological impacts of the construction phase are due to following activities:

- Clearing and levelling of land
- Fencing of land
- Laying of solar module foundation and erection
- Laying of transmission towers and transmission lines
- Creating access roads

The impacts envisaged on ecology during construction phase are enlisted below:

- Loss of vegetation and habitat due to site clearance, road construction, building and PV array support construction etc.
- Erosion and clearing of topsoil (loss of habitat and habitat fragmentation).
- Disturbance/ displacement of animal's due to noise and movement of construction equipment and personnel.
- Migration of project associated personal, who are not accustomed to the natural environment and wildlife of the study area may lead to man animal conflict.

Destruction and Loss of Vegetation

Project construction involves land clearance, leveling, etc. causing the loss of vegetation. The clearance of vegetation will be restricted to the project site. Clearing of vegetation is also required for access route and transmission lines. Natural vegetation in the study area is under pressure from poor rainfall resulting in annual natural forest fire as well as modified by fire started by grazers. As a result, only scanty and scrubby vegetation can be found in the project site, no large trees are present and the level of impact generated from removal of this seasonal understory (ground cover) can be termed as negligible as the species are very common and have least conservation value.

Disturbance to Fauna

IFC Performance Standard 6 recognizes that protecting and conserving biodiversity - the variety of life in all its forms, including genetic, species and ecosystem diversity - and its ability to change and evolve. This Performance Standard reflects the objectives of the Convention on Biological Diversity to conserve

biological diversity and promote use of renewable natural resources in a sustainable manner. Performance Standard 6 is designed to protect and conserve biodiversity.

Construction and associated activity like movement of vehicle will be temporary in nature. Most of the small mammalian species, birds and reptiles those were either sighted directly during primary survey or through secondary sources are very common and found all over the region. Temporarily, they may abandon the project activity area during the construction period and migrate to nearby areas. Thus, the impact on fauna of the area is considered to be minor.

As a preventive measure project proponent has planned to build 6ft high fencing with lighting along the fence as a preventive measure to prevent man animal conflict.

Moreover, project area is not a designated or qualifying site of national and international importance for biodiversity the impact on disturbance to fauna of the area is of minor significance.

Significance of Impacts

Due to influx of labour and project personal during the construction phase, there is a probability of “man animal conflict”. But the impact would be temporary and expected to be limited to the construction phase only.

The impact on fauna and flora will have low intensity with a local spread for a short duration which will result in an overall low impact without mitigation. However, with proper implementation of suggested mitigation the impact can be reduced to insignificant.

Mitigation Measures

The following measures should be considered in the project design to mitigate the impact during construction phase due to the project:

- Labour camp should be located as far as possible from the Reserved Forest areas.
- All project activities shall be undertaken with appropriate noise mitigation measures to avoid disturbance to faunal population in the region.
- Activities generating high noise shall be restricted to day time and will be mitigated to minimize the noise level outside the site boundary.
- Movement of construction and transport vehicles shall be restricted to dedicated paths to minimize any harm to small mammals within the site.
- Transportation of construction material shall be restricted to day time hours in order to minimize noise and disturbance to fauna in the area.
- General awareness regarding wildlife shall be enhanced through trainings, posters, etc. among the staff and labourers.
- Strict prohibition shall be implemented on trapping, hunting or injuring wildlife within subcontractors and shall bring a penalty clause under contractual agreements.
- Camp and kitchen waste shall be collected and disposed in a manner that it does not attract scavenging wild animals.
- Temporary barriers shall be installed on excavated areas.
- The footprints of the construction activities shall be kept to minimum so as to reduce disturbance to flora and fauna.
- Forest department must be informed in case of any wildlife sighting or any incident involving wildlife.

Operation Phase

Impacts during operation phase are likely to be restricted to the maintenance activities within the project site like ground cover clearing under PV arrays and from internal road network within site. Apart from a relatively small direct loss of habitat, the shading of the soil by the solar panels is likely to impact reptile composition in these areas, as the shading is likely to alter soil temperatures which has direct implications for cold-blooded animals. Most reptiles are also sensitive to the amount of plant cover which is also likely to be affected by the arrays.

However, there is potential for avian distraction due to glare/ reflection from solar panels. PV solar energy facilities appear to be an “evolutionary trap” for birds who perceive them to be bodies of water on which they attempt to land. Insects, the prey of insectivorous birds, are also apparently attracted by this so-called “Lake Effect.” It might cause fatality or injury as birds make contact with the solar panels or surrounding ground as they attempt to land mistaking it for water (Upton, 2014). But the “lake effect” phenomena and its impact on avian fauna is very poorly understood, and detailed study is required to establish threat from such phenomenon.

Significance of Impacts

Considering the impact to have a distribution within site and low intensity, the impact significance is considered as low.

Mitigation Measures

- Vegetation clearing through brush cutting for maintenance activities shall be done manually wherever possible.
- Any cleared areas which do not have vegetation cover shall be re-vegetated with locally occurring species and monitored to ensure recovery is taking place.
- Vegetation that needs to be reduced in height shall be mowed or brush-cut to an acceptable height, and not to ground level except where necessary.
- General awareness regarding wildlife shall be enhanced through trainings, posters, etc. among the staff and labourers.
- Solar panels shall have an anti-reflective coating to minimize the light reflecting off of the panels so that there is very less impact due to glare from the panels.
- Moreover, to minimize effect of “Lake effect”, visual frightening techniques like “Scare crow” may be considered to frighten any bird trying to land on panels, and prevent birds from landing.
- Fencing and lighting along the project boundary must be properly maintained all through the project lifecycle.
- Regular contact with forest department must be maintained to get updated information regarding wildlife movement.

6.2.9 Socioeconomic Impact

Key Social Impact

Socio-economic impact assessment is designed to assist communities in making decisions that promote long-term sustainability, including economic prosperity, a healthy community, and social wellbeing. To assess and understand the social impacts associated with the project, social indicators have been identified and analyzed.

6.2.10 Loss of Land/ Livelihood Conflict

Construction Phase

As observed the project area is predominantly barren and rocky. The project site is an open vast area with mild undulations. Land in the project influenced area was predominantly unused. Agriculture in the area is majorly dependent on rain and large portion of the land remains dry most part of the year. Overall irrigation scenario is not in the optimal state in the area. There was no habitation or cultivation field present in the project site.

Hence, taking the distribution of impact as within site for short duration and medium intensity, the impact significance can be termed as '**Moderate'.**

Mitigation Measures:

- Providing preference for livelihood opportunities to the families who lose their land due to the project activity.
- Stakeholder engagement plan and community development plan should be implemented for project if possible.
- It should be ensured that maximum employment is given to the locals w.r.t their capacity and skills.
- Grievance Redressal Mechanism should be followed onsite. Complaints from the locals should be timely registered, investigated and resolved.

Operation Phase:

- There would be no impact on land during operation phase. There would be a requirement of security guards for plant site, hence local employment opportunity would be generated, and this would be a positive impact of the project as it would enhance the economic opportunities to the locals.

Mitigation Measures:

- Based on need assessment, CSR initiatives should be implemented in the project affected villages.
- Community development plan should be implemented.
- It should be ensured that employment is given to the locals w.r.t their capacity and skills, wherever possible.
- Grievance Redressal Mechanism (GRM) should be followed onsite. Complaints from the locals should be timely registered, investigated and resolved.

6.2.11 Engagement of Local and Migrant Labour

Construction Phase:

The social impact associated with the engagement of local and migrant labour in the project is conflict between labour and contractor or developer which in turn may result in suspension of project and reputational risk on project developer. Considering the project in construction phase indicators have been discussed to provide sense of what should not be done with respect to labour engagement. The issues discussed here in the form of indicators IFC PS 2 and Indian Labour Act. The distribution of impact is buffer area, duration is short, and intensity is moderate, the impact significance can be termed as "**Moderate**"

Considering the sensitiveness associated with the engagement of child, forced labour, HFE should laid down policies through which it should demonstrate compliance to all the above factors. Its contractors should be made aware of all its policies for labour requirements and incorporated in their contracts prior to the starting of the project.

Mitigation Measures:

- Employment will be provided to local people wherever possible, especially as unskilled construction workers and security guards
- The project proponent should include clause or provisions related with non-engagement of forced and child labour, gender equity, non-discrimination on employment and opportunity and freedom to express their view in contractor's agreement and HR policy
- Project proponent through its contractors should ensure that labour is being adequately paid by contractors. Also ensure that wages are being paid as per the requirement of minimum wages act
- Project proponent will conduct internal audits as when required to monitor the performance of contractor.
- Project proponent through the contractor will inform the labour about emergency preparedness plan and communication system to be followed during emergency.
- Project proponent through contractor should ensure that labour receive training on health and safety issues involved in the project.

Operation Phase

Locals can be hired as security guards for the project site. This will enhance the local employment and would be a **Positive Impact**.

6.2.12 Labour Camp (Onsite and offsite)

Construction Phase:

There may have some chances that conflict between the migrated labours and the local community arise. Considering the possibilities of such conflicts and the existing situation the distribution of impact is buffer area, duration is short, and intensity is moderate, the impact significance can be termed as "**Moderate**"

Mitigation Measures:

The project proponent will setup onsite labour camp for migrated labours employed through contractors to restrict the interaction between them with local community as to avoid any conflict.

6.2.13 Social Issues Regarding ROW

Construction Phase:

It was observed during site visit the land for 20 MW solar power project is located in isolation and far distant from any human habitation and/ or cultivation field. Hence, there is no chance regarding issues arise on Right of Way for transmission line etc. and thereby obstruction of places of importance at entre of the project site. Considering the existing present condition and the records, information that has been received during site visit from the Project Proponent the impact significance can be termed as "**Low**".

Mitigation Measures:

- The layout for access roads and transmission lines should consider minimum land requirement and should minimise use of agricultural land and avoid human habitation;
- Site Management should ensure that all agreements will be executed properly and documented
- Any waste generated during the construction phase should not be accumulated near the religious structure as this might affect the sentiment of the locals

6.2.14 Community Engagement

Construction Phase:

There are chances that the local community's interest may impact with any sort of undue activities. Considering the future possibilities of such impacts the impact significance can be termed as "**Moderate**".

Mitigation Measure:

- The Projects construction phase efforts will be made to engage with the community through the Panchayati Raj Institution representatives and key identified leaders of the community at site area village in Gundlupete Tehsil of Chamrajanagar district.

6.2.15 Occupational Health & Safety Impact

Construction Phase:

Occupational Health & Safety Hazards for workers

Occupational Health and safety hazard associated with project activities (during construction) in Solar Power Plants are identified as follows:

- **Electrocution and Firing due to short-circuit**: It should be ensured that proper training be given to workers before they initiation of any project activity as well as the workers wear their appropriate Personal Protective Equipment (PPE) viz. helmets, safety jackets, safety shoes, goggles, gloves etc. as per their nature of work involved.
- Possible injuries associated with working with transmission line laying
- Accidents during cutting, chipping and piling
- ***Physical injuries:*** These can occur when workers involved in loading/unloading activities don't adhere to proper ergonomics discipline. Injuries like muscle strain, ligament tear, slip disc can occur which may prove to be fatal.
- ***Trip and fall hazards:*** The injuries are like those discussed under working at height. They occur when workers trip over/fall when debris etc. lies in the walkway/ passages.
- **Diseases due to unhygienic condition**: It should be ensured that proper and adequate number of toilets should be constructed for the labourers so that hygienic conditions prevail in the site area.
- **Violation of privacy and dignity of women involved**: There can be a violation of the privacy and dignity of the women involved in the work force as there is no enclosed or exclusive provision for women. Hero Future Energy, following their own Environment, Health and Safety ("EHS") Management Policy and abide by the IFC Standards, will ensure that the dignity and privacy of women is maintained through separate and protected provision for sanitation facilities during operation phase of these project as well as in other future projects.

Also, there can be dissatisfaction among the labourers due to many conflicts/issues unresolved, hence there should be a complaint register onsite. HFEcontractor should ensure to have regular medical check-up of their hired labourers. HFE or their contractor should ensure to have regular medical check-up of their hired labourers. HFE is already ensuring the regular medical check-up of their hired labourers. Hence, taking the distribution of impact as within site, duration as short and intensity as moderate, the impact significance can be taken as **"Moderate"**.

Mitigation Measures:

- All material will be arranged in a systematic manner with proper labelling and without protrusion or extension onto the access corridor.

- Loading and unloading operation of equipment should be done under the supervision of a trained professional.
- All work at height to be undertaken during daytime with sufficient sunlight
- Proper PPEs should be provided to workers handling welding, electricity and related components. Workers handling electricity and related components shall be provided with shock resistant gloves, shoes and other protective gears.
- There should periodical training to educate the workers for proper use of PPE's.
- There should be proper monitoring system to ensure that each individual labourer is using the PPEs properly.
- Fire extinguishing equipment should be provided in adequate number on site to handle any possible fire outbreaks
- An accident reporting and monitoring record should be maintained
- Display of phone numbers of the city/local fire services, etc. at site should be done
- The labour engaged for working at height should be trained for temporary fall protection devices
- There should be arrangement for hygienic and scientific sanitation facilities for all the labourers working in the site.
- There need to have enclosed and exclusive provision for women to protect the privacy and dignity of the women involved in the work force.
- Provision of the Contract Labour Rules, 1971 require the operator of a construction site to provide adequate sanitation facilities to worker within the site premises (Latrine: One per 25 male/female; Urinal One per Male/female).
- HFEshould inform the labour about the Grievance Redressal Mechanism (GRM) by which they can inform about any grievances.
- HFE should ensure that labour receive training on health and safety issues involved in the project.
- HFE should inform the labour about Emergency Preparedness Plan (EMP) and communication system to be followed during emergency.
- HFE should involve their Welfare Coordinator.

Operation Phase: Occupational Health & Safety Hazards for Workers

Occupational Health and safety hazard associated with project activities (during operation) in Solar Power Plants are identified as follows:

- Electrocution/ Electrical Shocks: These may occur when the skin meets live power lines etc. The severity of the burn depends on voltage, current, time of contact etc.
- Firing due to short-circuit
- Diseases due to unhygienic condition
- The impact significance can be taken as Moderate.

Mitigation

- Provide and ensure wearing of personal protective equipment's viz., gloves, helmets, ear plug, safety belt etc.
- Ensure effective work permit system for critical activities such as electrical work and working at height

- HFE have developed Emergency Preparedness and Response under ESMF for implementation at the entire project location, In the event of an emergency situation
- Ensure proper sanitation facilities.

6.2.16 Labour Accommodation (Onsite and offsite)

Construction Phase

As per International Labour Organization (ILO) *"Housing provided to workers as part of the employment contract should meet certain minimum specifications in respect of the nature and standard of the accommodation and facilities to be made available. The guidelines and recommendation facilities like drinking water, separate kitchen, fans, beds, toilets and power supply has been provided to the workers/ labours in the labour camp set up in the project site."* [5]

Considering the future construction on anvil HFE distinctly and exclusively consider and apply as far as possible the recommendations of ILO and other relevant Apex Bodies the following factors should be followed in the Solar Power Project site located at the designated project area.

- Housing space: Adequate housing space for labours will be provided. As per International Labour Organisation (ILO) standards, the floor area of workers' sleeping rooms should not be less than 7.5 square metres in rooms accommodating two persons, if a room accommodates more than four persons, the floor area should be at least 3.6 square metres per person.
- Adequate supply of safe potable water;
- Sanitation facilities for contract labourers: Proper functional toilets will be provided in the labour camp. The disposal of waste water is managed by the septic tanks and soak pits constructed in the camp.
- Proper and adequate drainage system to drain out the waste water to avoid any kind of contamination or spread of disease thereby;
- Adequate arrangements for comfortable and secure living within the sleeping room
- Arrangements for secured locker etc. for safe keeping of the labours' individual and personal belongings. which can be locked by the occupant to ensure privacy;
- Common Hygienic dining rooms, canteens or mess rooms, located away from the sleeping areas;
- There must have arrangements for safeguard of health issues and immediate arrangements for addressing accidental incidents.

Mitigation Measures:

- HFE have their own Environmental Social Management Framework (ESMF). Following that an Emergency Preparedness Plan to deal with health and safety issues during project life cycle of a Solar Power Plant has been built.
- HFE will ensure that they will abide by the policy of safe guarding all issues regarding the health and safety of the workers who will be working under the Projects.
- **Emergency Preparedness and Plan for On-Site Emergencies:** the plan will define nature of emergencies that can be encountered during operation of a solar plant. Requirements of an Emergency Control Centre (ECC), firefighting facilities and medical facilities will also be detailed out. Roles and Responsibilities of personnel at site, communication channel to be followed, and procedures for different emergencies will also be detailed. HFE should ensure that all its hired

[5] Source: Labour Accommodation Standards, ILO

contractors should abide by the requirements of plan formulated like undertaking mock drills, identification of first aiders and fire fighters, display of emergency numbers onsite etc.

6.2.17 Impact on Cultural/ Archaeological Site

The site does not contain any archaeological monuments or sites as per the Archaeological Survey of India. No historical and cultural monuments will be affected by the 20 MW Soler Project.

No such evidential proof was found even during field visit in the site area village of Gundlupete Tehsil of Chamrajanagar District. Though, to ensure whether alike remnants of old civilization are present and/ or in case of accidental discovery of artefacts during construction activities, chance find procedure is required to be planned and implemented.

No impact is envisaged both during construction and operation phase.

6.2.18 Access to Common Property Resources

Another issue which may cause social impact on indigenous people in terms of conflict between project developer and local community is restriction on community to access the common property resources, any physical structure with historical, religious and aesthetic significance was also not found close to the project area villages. Considering the absence of resources with cultural significance, disturbance to physical cultural resources and impact associated with it, is not anticipated for both the construction and operation phase.

As informed by the HFErepresentative, the access roads will be strengthened and further maintained till the project cycle within the villages.

No impact is envisaged both during construction and operation phase.

6.2.19 Cumulative Impacts

Considering the availability of land and good solar potential in the district, establishment of some other solar power project in near future cannot be ruled out. As land procurement/ acquisition is involved in the solar power project, there are possibilities of impacts on the private land owners. All the settlements are located at a distance from the solar plant, also at present there are no other solar power project exists within the immediate vicinity of site. hence no issues regarding the same is noticed there.

7 ENVIRONMENTAL & SOCIAL MANAGEMENT PLAN

The Environment and Social Management Plan specifies measures for addressing the limited negative risks and impacts and for enhancing the beneficial positive impacts. In addition, organizational capacity and training requirements, required to check and ensure effectiveness of the plan throughout the lifecycle of the project, have also been discussed.

HFE is committed to implement an effective Environmental and Social Management Framework (hereinafter referred as ESMF) to continuously manage and communicate the potential social and environmental impacts and risks imposed on the project employees (direct and indirect) and the local communities residing in the immediate vicinity of the project area. The outcomes of the Environmental and Social Impact Assessment of the project have been used to formulate an Environment and Social management & Management Plan, presented in **Table 7-1.** The Plan specifies measures for addressing the limited negative risks and impacts and for enhancing the beneficial impacts. In addition, organizational capacity and training requirements, required to check and ensure effectiveness of the plan throughout the lifecycle of the project, have also been discussed.

7.1 Training of Personnel & Contractors

HFE should ensure that the job specific training and EHS Induction training needs are identified based on the specific requirements of ESMF and existing capacity of site and project personnel (including the contractors and sub-contractors). Special emphasis shall be placed on traffic management, stakeholder's engagement and grievance redressal. General environmental awareness shall be increased among the project's team to encourage the implementation of environmentally sound practices and compliance requirements of the project activities. This will help in minimizing adverse environmental impacts, ensuring compliance with the applicable regulations and standards, and achieving performance beyond compliance. The same level of awareness and commitment shall be imparted to the contractors and sub- contractors prior to the commencement of the project.

An environment and social management training programme shall be conducted to ensure effective implementation of the management and control measures during construction and operation of the project. The training programme shall ensure that all concerned members of the team understand the following aspects:

- Purpose of action plan for the project activities;
- Requirements of the specific Action Plans
- Understanding of the sensitive environmental and social features within and surrounding the project areas
- Aware of the potential risks from the project activities etc.
- A basic occupational training program and specialty courses shall be provided, as needed, to ensure that workers are oriented to the specific hazards of individual work assignments.
- Training shall be provided to management, supervisors, workers, and occasional visitors to areas of risks and hazards.
- Workers with rescue and first-aid duties must receive dedicated training so as not to inadvertently aggravate exposures and health hazards to themselves or their co-workers.
- Through appropriate contract specifications and monitoring, the employer shall ensure that service providers, as well as contracted and subcontracted labour, are trained adequately before assignments begin.

7.2 Monitoring

To implement the ESMP, the on-site team should adhere to a time-bound and action-oriented Environmental and Social Action Plan to implement the mitigation measures provided for each of the identified environmental and social impacts. This ESMP should be monitored on a regular basis, quarterly or half-yearly and all outcomes would need to be audited in accordance with existing EHS commitments.

The monitoring process should cover all stakeholders including contractors, labourers, suppliers and the local community impacted by the project activities and associated facilities thereby increasing the effectiveness of suggested mitigations measures. HFE should ensure that all the contractors comply with the requirements of conditions for all applicable permits, suggested action plans and scheduled monitoring. The inspections and audits should be carried out by an internal trained team and external agencies/experts. The entire process of inspections and audits shall be documented and key findings of which should be implemented by the proponent and contractors in their respective areas.

7.3 Documentation & Record Keeping

Documentation and record keeping system has to be established to ensure updating and recording of requirements specified in ESMP. Responsibilities have to be assigned to relevant personnel for ensuring that the ESMP documentation system is maintained and that document control is ensured. The following records should be maintained at site:

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

Table 7-1: Environment Management Plan

SN	Aspect	Impact	Impact Intensity without mitigation	Action	Impact Intensity with mitigation	Monitoring/training Requirement	Responsibility
CONSTRUCTION PHASE							
A	**Physical Environmental Management Plan**						
1	**LANDSCAPE AND VISUAL**	Visual and landscape impacts due to presence of elements typical of a construction site such as equipment and machinery.	**LOW**	• Ensure the construction site is left in an orderly state at the end of each work day • Construction machinery, equipment, and vehicles not in use should be removed in a timely manner to the extent possible • Proper handling of waste streams	**NO IMPACT**		Contractor under the supervision of HFE's Personnel
2	**GROUND WATER ABSTRACTION**	• The total water requirement is high. However, as per CGWB CGWB report, the site is located in semi critical zone w.r.t ground water resources. Significant concerns is related to ground water used for construction phase through bore well, Proper permission or approval/NOC from concerned authorities should be obtained • but extraction of ground water over a long period may cause a serious concern if bore well is	**MODERATE**	• During construction phase, water is also being sourced from tanker through vendor. • Construction of rain water harvesting pit to recharge the ground water • Use dry wipe method to clean the modules • Reduce the frequency of washing to save water • If possible, collect the water after module wash and reuse it for module washing • Obtain permission /NOC from concerned ground water authority	**LOW**	Maximum efforts should be made to reuse and recycle water to reduce water consumption.	Project Developer/ Contractor under the supervision of HFE's Personnel

SN	Aspect	Impact	Impact Intensity without mitigation	Action	Impact Intensity with mitigation	Monitoring/training Requirement	Responsibility
		installed for ground water extraction. Hence the impact is envisaged.					
3	**GROUND WATER QUALITY**	• Possibility of impacted runoff water from the site entering the nearby water bodies. • Domestic water runoff from the portable toilets into neighboring water bodies can lead to degradation of water quality. • Waste water from toilets constructed for site office can impact groundwater.	**LOW**	• Storage of oil shall be undertaken on paved impervious surface and secondary containment shall be provided for fuel storage tanks • Adequate drainage system should be in place • Leak-proof holding tanks for domestic waste water should be constructed to protect the ground water • Waste water containing tanks / septic tank should be located at more than 500 m away from bore wells.	**LOW**	• Machinery and vehicles shall be thoroughly checked for the presence of leaks if any; • Leakage of vehicles to be checked; • Storage of oil on site to be checked	
4	**AIR QUALITY**	• Fugitive Dust due to movement of project vehicles and site clearance • Emission from Diesel Generators	**MODERATE**	• Vehicles speed to be restricted to 20-30 km/hr. on unpaved road. This will reduce dust emission • Raw material (fine materials) should be covered with tarpaulin sheet during transportation and in storage area • Practices water sprinkling wherever required on unpaved area but ensure use of tanker water purchased form authorized vendor only • All the project vehicles shall have valid PUC certificate	**LOW**	During construction phase	Project Developer/ Contractor under the supervision of HFE's Personnel

SN	Aspect	Impact	Impact Intensity without mitigation	Action	Impact Intensity with mitigation	Monitoring/training Requirement	Responsibility
				• Ensure regular maintenance of project vehicles • Turn off the DG sets & machineries which are not in use • DG sets preferably should be placed away from settlement area. • It will be ensured that exhaust emissions of construction equipment adhere to emission norms as set out by MoEF&CC/ CPCB.			
5	**SOIL QUALITY**	Top Soil Loss	**LOW**	• Provide appropriate storage of top soil in an isolated and covered area. • Allow only covered transportation of top soil within project site. • Use top soil at the time of plantation on the approach road. • Construction debris shall be reused in paving on site approach road to prevent dust generation due to vehicular movement • Re-vegetation shall be done in the area after the completion of construction, in order to reduce the risk of soil erosion	**NO IMPACT**	• The workforce shall be sensitized to handling and storage of hazardous substances viz. fuel oil, machine oil/fluid etc. • The workers engaged in handling hazardous substances shall be briefed about the possible hazards and the need to prevent contamination.	Project Developer/ Contractor under the supervision of HFE's Personnel
		Soil Contamination		• In case of any accidental spill, the soil will be cut and stored			

SN	Aspect	Impact	Impact Intensity without mitigation	Action	Impact Intensity with mitigation	Monitoring/training Requirement	Responsibility
				securely for disposal with hazardous waste. • Store hazardous material (like used oil) in isolated room with impervious surface. • Filling and transfer of oil to and from the container shall be on impervious surface. • Waste disposal grounds that are in use by the local people should be identified and permission from local administration for use of the same needs to be obtained for disposing domestic wastes.			
6	**NOISE LEVEL**	• Disturbance to habitants • Vehicular noise from heavy vehicles utilized to deliver construction materials and solar plant parts • Noise from DG sets • Construction noise from using mobile equipment, and concrete mixing	**LOW**	• Regular maintenance of construction machinery and equipment shall be carried out to ensure noise emissions are maintained at design levels. • Integral noise shielding/ acoustic closure (to be used where practicable and fixed noise sources to be acoustically treated, for example with silencers, acoustic louvers and enclosures. • Keep stationary source of noise such as DG sets (during construction phase) at farthest point from the settlements	**NO IMPACT**	It will be ensured that noise emissions of construction equipment adhere to emission norms as set out by MoEF&CC/ CPCB	Project Developer/ Contractor under the supervision of HFE's Personnel

SN	Aspect	Impact	Impact Intensity without mitigation	Action	Impact Intensity with mitigation	Monitoring/training Requirement	Responsibility
				• Restrict major noise generating activities during night time 10:00 pm to 6:00 am • Provide personal protective equipment to workers working near DG sets and other high noise source. • Local communities need to be informed about the vehicular movement before start of heavy vehicle carrying materials and machines to site. Sensitive locations should be identified and avoided as far as possible from the route and if unavoidable, drivers should be informed to restrict speed at those locations. • Diesel generator sets, if used; will adhere to noise standards of MoEF&CC.			
7	**SOLID WASTE**	Contamination of land	**LOW**	• Distribute appropriate number of properly contained litter bins and containers properly marked as "Domestic Waste". • Domestic and construction waste like recyclables viz. paper, plastic, glass, scrap metal waste etc. will be properly segregated and stored in designated waste bins/containers and periodically sold to local recyclers	NO IMPACT	Periodic EHS audits should be conducted to monitor the same	Project Developer/ Contractor under the supervision of HFE's Personnel

SN	Aspect	Impact	Impact Intensity without mitigation	Action	Impact Intensity with mitigation	Monitoring/training Requirement	Responsibility
8	**CHANGE IN LOCAL TOPOGRAPHY**	Alteration in natural drainage pattern	**MODERATE**	• Don't allow the considerable alteration of contour level • Provide alternatives to collect surface runoff from the project site during the monsoon period • Don't allow exit of runoff from the project site in the adjacent areas. • Design storm water drain considering the natural contour level • Site preparation activities should be designed to avoid any significant elevation of the land or blocking or altering natural drainage channels in the project site. • Site preparation and development shall be planned only after a detailed drainage plan has been prepared for site. • If channels/drains get blocked due to negligence, it will be ensuring that they are cleaned especially during monsoon season.	**LOW IMPACT**	The drainage patterns of the area will be maintained.	Project Developer/ Contractor under the supervision of Hero Future Energies
B	**Ecological Environmental Management Plan**						
9	**ECOLOGY**	• The construction activities will lead to in displacement of terrestrial species	**LOW**	• Existence of Bandipur National Park is within approximately 11.86 km proximity from site, • The general measures for natural resource conservation	**LOW**	Periodic EHS audits should be conducted to monitor the same	Project Developer/ Contractor under the supervision of

SN	Aspect	Impact	Impact Intensity without mitigation	Action	Impact Intensity with mitigation	Monitoring/training Requirement	Responsibility
		• Disturbance to local livestock population • Risk of natural drainage getting hindered during operation phase		and project impact mitigation will be followed. EHS practices will be ensured to minimize impacts on soil and water. Also there has been no cutting / felling of trees. Stretches of avenue plantation of trees, with multi – tier canopy, such as Ficus beghalensis, Tamarindus indica, Azadirachta indica and Ficus religiosa will be planted along the project boundaries and the road stretch leading to project site. Such practices will improve the scope for rejuvenating the degraded vegetationa and soil profile and contributing to ecological services also with a target of improving the micro – climate of the study area. • Following actions are required to be taken • During Construction Phase • Activities generating high noise shall be restricted to day time and will be mitigated to minimize the noise level outside the site boundary. • General awareness regarding wildlife shall be enhanced through trainings, posters, etc. among the staff and labourers.			HFE's Personnel

SN	Aspect	Impact	Impact Intensity without mitigation	Action	Impact Intensity with mitigation	Monitoring/training Requirement	Responsibility
				• Fencing along with proper lighting along the fencing must be constructed. • Strict prohibition shall be implemented on trapping, hunting or injuring wildlife within subcontractors and shall bring a penalty clause under contractual agreements. • Camp and kitchen waste shall be collected in a manner that it does not attract wild animals. • Temporary barriers shall be installed on excavated areas. • The footprints of the construction activities shall be kept to minimum so as to reduce disturbance to flora and fauna. • During Operation Phase • 6ft fencing should be properly maintained along with lighting along the fencing. • Solar panels shall have an anti-reflective coating to minimize the light reflecting off of the panels so that there is very less impact due to glare from the panels. • Moreover, to minimize effect of “Lake effect”, visual frightening techniques like “Scare crow” may be considered to frighten any bird trying to land on panels, and prevent birds from landing.			

SN	Aspect	Impact	Impact Intensity without mitigation	Action	Impact Intensity with mitigation	Monitoring/training Requirement	Responsibility
C	**Social Management Plan**						
1	**ENGAGEMENT OF LOCAL AND MIGRANT LABOUR**	Conflicts between labour and contractor	**MODERATE**	• Employment will be provided to local people wherever possible, especially as unskilled construction workers and security guards • HFE will include clause or provisions related with non-engagement of forced and child labour, gender equity, non-discrimination on employment and opportunity and freedom to express their view in contractor's agreement and HR policy • HFE through its contractors shall ensure that labour is being adequately paid by contractors. Also ensure that wages are being paid as per the requirement of minimum wages act • HFE shall include clause to ensure access of necessary basic amenities and facilities such as drinking water, kitchen, toilet and crèches (for female workers children) • HFE shall conduct internal audits as when required to monitor the performance of contractor. • HFE through the contractor inform the labour about	**LOW IMPACT**	Periodic EHS audits should be conducted to monitor the same	Project Developer/ Contractor under the supervision of HFEPersonnel

SN	Aspect	Impact	Impact Intensity without mitigation	Action	Impact Intensity with mitigation	Monitoring/training Requirement	Responsibility
				emergency preparedness plan and communication system to be followed during emergency • HFE through contractor should ensure that labour receive training on health and safety issues involved in the project.			
2	**LABOUR ACCOMMODATION (Onsite and offsite Labour camp)**	Conflicts between labour and local community	**MODERATE**	• HFE to setup onsite labour camp for labours employed through contractors to restrict the interaction of migrated labour with local community as to avoid any conflict.	**LOW IMPACT**	Grievance Redressal mechanism should be followed and monitored	Project Developer/ Contractor under the supervision of HFEPersonnel
3	**LAND PROCUREMENT**	• Loss of Land • Livelihood • Obstruction to places of relevance • Manhandling Natural Resources of Utility	**MODERATE**	• It should be ensured that maximum employment will be given to the locals w.r.t their capacity and skills. • Implement the recommended complaint resolution procedure (Grievance Redress Mechanism) to assure that any complaints regarding project related components are promptly and adequately investigated and resolved • Provide some alternate way/road so that project should not obstruct the villagers access • The layout for access roads and transmission lines should consider minimum land requirement and should avoid procurement of agricultural land;	**LOW IMPACT**	• HFE Land and Project Team to understand mitigation measures • Construction contractors should adhere to social obligations, labour laws and international commitments • HFE through contract agreement, should ensure that The contractor should provide the migrant workers adequate information on expected social behavior and	• Project Developer/ Contractor under the supervision of HFE Personnel • Social Management team for grievance Handling

SN	Aspect	Impact	Impact Intensity without mitigation	Action	Impact Intensity with mitigation	Monitoring/training Requirement	Responsibility
				• Any waste generated during the construction phase should not be accumulated near the religious structure as this might affect the sentiment of the locals.		hygiene practices to be followed at site • Water usage should be monitored and controlled to minimize the wastewater generation • HFE to ensure that all site personnel and migrant labourers avoid using any community infrastructure facilities like water bodies, electricity etc., without prior permission from the Panchayats	
4	**IMPACT ON INDIGENOUS PEOPLE AND ARCHEOLOGICALLY IMPORTANT SITES**	Unrest among the community due to dislocation of any structure or thing of cultural belief. Impact on indigenous people due to land intake from ST people and use of village resources	**NO IMPACT**	No Impact	**NO IMPACT**	-	-
4	**COMMUNITY ENGAGEMENT**	Community Empowerment	**MODERATE**	Given the short duration of the project construction phase efforts will be made to engage with the community through the Panchayati Raj Institution representatives and key identified leaders of the community.	**LOW**	• Continuously throughout the project lifecycle. • Grievance Redressal Mechanism should be followed, and grievance register	Contractor under the supervision of HFE Personnel / PRI representatives

SN	Aspect	Impact	Impact Intensity without mitigation	Action	Impact Intensity with mitigation	Monitoring/training Requirement	Responsibility
						should be maintained onsite.	
5	**OCCUPATIONAL HEALTH AND SAFETY**	Material handling and storage Possible injuries associated with working with transmission line laying Other occupational hazards	**MODERATE**	• All material will be arranged in a systematic manner with proper labelling and without protrusion or extension onto the access corridor. • Loading and unloading operation of equipment should be done under the supervision of a trained professional • All work at height to be undertaken during daytime with sufficient sunlight • Proper PPEs should be provided to workers handling welding, electricity and related components. • Fire extinguishing equipment should be provided in adequate number on site to handle any possible fire outbreaks • An accident reporting and monitoring record should be maintained • Display of phone numbers of the city/local fire services, etc. at site should be done • The labour engaged for working at height should be trained for temporary fall protection devices	**LOW IMPACT**	• The labour engaged for working at height should be trained for temporary fall • All the workers should be made aware of the possible occupational risks/hazards by the way of an OHS training/awareness programme • An accident reporting and monitoring record should be maintained	Contractor under the supervision of HFEPersonnel
OPERATION PHASE							

SN	Aspect	Impact	Impact Intensity without mitigation	Action	Impact Intensity with mitigation	Monitoring/training Requirement	Responsibility
Physical Environment Management Plan							
1	**HAZARDOUS WASTE MANAGEMENT**	Contamination of land and soil	**MODERATE**	Broken solar panels, which will be collected in closed containers and then will be sent back to manufacturer	**LOW**	Periodic EHS audits should be conducted to monitor the same	Project Developer/
2	**SOLID WASTE MANAGEMENT**	Contamination of land	**MODERATE**	• Distribute appropriate number of properly contained litter bins and containers properly marked as "DomesticWaste". The waste generated should be disposed as per The Municipal Solid Wastes (Management and Handling) Rules, 2000. as amended till 2016 • Domestic waste will be composted and recyclables viz. paper, plastic, glass, scrap metal waste etc. will be properly segregated and stored in designated waste bins/containers and periodically sold to local recyclers.	**LOW**	Periodic EHS audits should be conducted to monitor the same	Project Developer
3	**GROUNDWATER ABSTRACTION**	Depletion of Water Table	**MODERATE**	• Permission for ground water abstraction must be be obtained from statutory authority. • Ensure optimal usage of water viz., storage and reuse of wash water after module washing. • Rain water harvesting structure to be practiced.	**LOW**	Periodic EHS audits should be conducted to monitor the same	Project Developer

SN	Aspect	Impact	Impact Intensity without mitigation	Action	Impact Intensity with mitigation	Monitoring/training Requirement	Responsibility
4	**ECOLOGY & NATURAL DRAINAGE**	Blocking of natural drainage due to project activity e.g. storing material or waste	**LOW**	Care should be taken throughout the operation phase to maintain the natural drainage channel as well as its buffer, free from blocking	**LOW**	Periodic EHS audits should be conducted to monitor the same	Project Developer
5	**WASTEWATER MANAGEMENT PLAN**	Degradation of ground and surface water quality	**MODERATE**	• Ensure that construction of septic tanks during operation a phase • Ensure that septic tanks are emptied and collected by contractor at appropriate intervals to avoid overflowing	**LOW**	Periodic EHS audits should be conducted to monitor the same	Project Developer
B	**Social Management Plan**						
1	**CORPORATE SOCIAL RESPONSIBILITY**	Community Empowerment	**MODERATE**	Employment will be provided to local people wherever possible, especially as unskilled construction workers and security guards	**NO IMPACT**	CSR Activities should be documented	HFE Personnel
				Developmental needs and expectations (such as employment in the project or up-gradation of educational, health care facilities, cultural property and infrastructure) of local communities will be identified through the Gram Panchayat, villagers and local administration.		Should be conducted continuously through the project cycle.	HFEPersonnel
				Opportunities for contributing to the economic and developmental needs of villagers through skill training will be explored.		Should be conducted continuously through the project cycle.	

SN	Aspect	Impact	Impact Intensity without mitigation	Action	Impact Intensity with mitigation	Monitoring/training Requirement	Responsibility
2	**OCCUPATIONAL HEALTH AND SAFETY OF WORKERS**	Electrocution Firing due to short-circuit Possible injuries associated with working at height Diseases due to unhygienic condition	**MODERATE**	• Provide and ensure wearing of personal protective equipment's viz., gloves, helmets, ear plug, safety belt etc. • Ensure effective work permit system following the laws of the state and central level for critical activities such as electrical work and working at height • HFE have developed Emergency Preparedness and Response under ESMF for implementation at the entire project location, In the event of an emergency situation • Ensure proper sanitation facilities.	**LOW**	Periodic EHS audits	Project Developer/ HFEPersonnel

7.4 Environmental Monitoring Plan

The Environmental Monitoring Plan is formulated to ensure and demonstrate compliance with the regulatory and Institutional Agency's EHS requirements. Monitoring of environmental and social parameters and comparing them with benchmarks set by regulatory and institutional authorities will help HFE's assess in the environmental performance and identify gaps or non-conformance ensuring immediate actions. The following environmental parameters will be monitored as when required during project operational phase for compliance. The Environment Monitoring Program is depicted in **Table 7-2.**

Table 7-2: Environment Monitoring Program

A. Environmental Quality Monitoring Program

EQI No	Environmental Quality Indicator (EQI)	Monitoring Parameter	Location	Period & Frequency
A.	**CONSTRUCTION PHASE**			
A1	Ambient Air Quality	Monitoring of PM10, PM2.5, SO2, NOx, CO	Kodagalapura and Somahali village	Twice during construction phase
A2	Ambient Noise quality	Measurement of Noise Pressure Level in dB(A)		Once during construction phase
A3	Ground Water quality	IS 10500 parameters		Once during construction phase
A4	Surface Water quality	IS 10500 parameters	Nearby surface water body	Twice during construction phase
A5	Soil Quality	Soil parameters viz. pH, SAR, Water holding capacity, Conductivity, Organic Carbon, NPK	Project site	Once during construction phase

7.5 Environmental Management Plans

The ESMP is comprised of some site-specific management plans viz. Emergency Preparedness and Response Plan, Waste Management Plan, Storm Water Management Plan, Environmental Monitoring Plan, Road Safety and Traffic Management Plan and Occupation Health and Safety Management Plan for this solar power project. The management plans will be executed through Environmental Social Management System.

7.5.1 Emergency Preparedness and Response Plan

Purpose

HFE have developed Emergency Preparedness and Response under ESMF for implementation at the entire project location, In the event of an emergency situation so that the loss of life and damage to the properties & natural resources are minimized. This plan outlines a series of emergency actions that will be executed by HFE & its Contractors to ensure preparedness and response to emergency situations throughout the life-cycle of the project.

Definition(s)

Emergency - Any unplanned situation, which presents a threat to the safety of workers and/or damage to the properties and other natural resources deemed valuable at the project site.

Emergencies

The emergency situations that are probable to occur at the site and the probable causes are listed below:

- Fire at site during temporary construction phase which cannot be doused by fire extinguishers; Also fire due to short circuit at the plant and equipment during both construction & operation phase.
- Collapse of any structure
- Outbreak of endemic disease among a large section of construction workers due to contaminated drinking water, unhygienic conditions that have developed at workplace.
- Protests by the local community or other stakeholders at any point of the project lifecycle due to grievances;
- Serious injury or death of employee or sub-contracted worker at work, due to non-work-related illness or work-related accident.
- Onset of any natural disaster like earthquake.

Emergency Management

The following steps should be taken to ensure proper management of emergency or crisis situations:

- The nearest civil hospitals, private health care centres or practitioner clinic should be identified and a agreements should be made with the aforesaid medical centres/practitioners to provide prompt health care services (including ambulance services) in the event of an emergency situation at site.
- A list of important telephone numbers such as fire brigade, health care facility/practitioner, police station, EHS and Social Coordinator, project office, head offices should be displayed at all the prime locations at site & the worker's camp (during construction phase).
- Regular liaising with the police, Gram Panchayats, district administrations should be carried out to ensure that prompt assistance is readily available in the event of an emergency.
- An Emergency Management (including Disaster Management) team comprising of 4-6 professionals both from the developer and contractors' side, during construction phase and 2-3 professionals during operation of the project; should be formed to combat any emergency situation and ensure safety of the life and property at site. For this purpose, 2-3 personnel employed in the plant during operation phase should be trained on Emergency scenarios and their management measures including their roles and responsibilities in case of an emergency situation.
- The workers (staff & contractual workers from both HFE & their appointed contractor/s) should be trained on their duties and emergency preparedness during an emergency. In case of an emergency, all site personnel should be trained to follow the communication lines given below:
  - Personnel at site affected by the emergency situations immediately inform the project office and the external agencies (such as police, fire brigade, ambulance services); In case, project office cannot be reached, the coordinator will be informed directly;
  - The Social, Environment, Health & Safety Coordinator (SEHS) on being informed about the emergency by project offices or by the employee directly; reaches site if necessary, and also follows-up with the aforesaid external agencies for aid;
  - The SEHS Coordinator takes charge of the emergency response and direct further action and co-ordination, including escalating the matter to the higher authority as required.

Responsibilities

The SEHS Coordinator will be responsible for implementing this procedure, which includes

- Ensuring that the emergency preparedness measures are in place;

- Providing training to the personnel at site regarding reporting of the emergencies, and to site office personnel regarding response to emergency calls from the site personnel,
- Direct action-and co-ordination at the time of an emergency

Community health and safety hazards specific to solar energy facilities primarily include the following:

Setback:

The project sites may alter the contour levels and natural drainage pattern which can cause local flooding in the area therefore adequate measures such as storm water drainage, rain water harvesting, etc. may result to local flooding.

Transmission Line:

Transmission Line should be routed in such a way that it causes least disruption to local communities.

Public Access:

Safety issues may arise with public access to Solar Plants (e.g., unauthorized entry to the Plants). Any public rights of way located within and close to the Solar Plants should be identified prior to construction to establish any measures that may be required to ensure the safety of their users. Prevention and control measures to manage public accesses include:

- Use gates on access roads.
- Where public access is not promoted to the site and/or there are no current rights of way across the site, consider fencing the solar energy facility site, or individual turbines, to prohibit public access to the turbine.
- Provide fencing of an appropriate standard around the sub-station with anti-climb paint and warning signs.
- Prevent access to turbine tower ladders
- Post information boards about public safety hazards and emergency contact information.

7.5.2 Community Liaison Plan

The Community Liaison Plan is a critical element of the overall Social Management Plans. Regular transparent communication between both the project and the communities and vice versa is crucial in building positive relationships between the two parties. This relationship should be crucial for managing unexpected situations which might arise during the project. This plan should be read with other social management plan because the liaison which needs to be done for the individual plan is detailed within the plan. The communication plan mainly focuses on the communication issues during the construction stage however it also includes some community Liaison measures for the operation phase as well.

Objectives:

The Performance Standards mandates continuous communication between project and the different stakeholders e.g. Workers, local community. The onus of initiating the process of communication rests on the project proponent. The project proponent should ensure that disclosure of relevant project information that would help the affected communities understand the risks, impacts and opportunities of the project. The Community Liaison Plan is developed to ensure a clear communication channel between the project and the local community. Even though the focus of the plan is primarily on communication with the community areas where there are likely interactions between the community and the Contractors such areas have also been covered. The community liaison plan would concentrate on the following aspects:

Communication with the Community: As mandated in the Performance Standards of IFC, HFEshould disclose the project details to make the community aware of the important features of the project. A Project Information Booklet would be prepared and distributed in the project affected villages. This booklet should preferably be presented in local language. The booklet in addition to containing the salient features of the project should have a map depicting the boundaries of the plant and its ancillary facilities. The important landmarks e.g. the settlement, schools and the roads, etc. should also be demarcated so that it becomes easy for the people in the villages to relate to the ground conditions. In addition to the project information the booklet should also highlight the impacts on the community as presented in the ESA document and the commitments for the safeguards including the entitlement matrix. To ensure wide circulation of the Project Information Booklet the booklet would be made available at all the schools, Anganwadi Centres, and other public facilities in the project affected village.

To ensure continuity of the flow of information to the community it is suggested that a quarterly Community Information Booklet should be published. During the construction phase the booklet would contain the information about the progress of the project and information which are pertinent to community e.g. disruption of the transportation links, outcome of consultation process on community development etc. It is that the community Information Booklet be continued even during the operations stage where this also acts as a transfer of information from the project to the community. In addition, it can also be used to share information between the communities e.g. achievement of a member of the community or any worker can be published in this booklet.

7.5.3 Waste Management Plan

The Waste Management Plan (WMP) will be applicable to the wastes arising during commissioning and operation of the solar power plant of Hero HFE Major waste streams from the project include non-hazardous solid waste, wash water generated from panel washing and sewage. WMP is intended to serve as a guideline for HFE and the contractor(s) to manage wastes effectively during the project life cycle. The WMP describes how wastes will be managed during the project life cycle and how the project will:

- Minimize the potential to cause harm to human health and the environment.
- Comply with Indian environmental regulation and guidelines following the IFC Performance Standards.
- Reduce operational costs and reduce any potential liabilities which may arise from waste handling operations.
- This plan also ensures that every waste stream and solid waste materials from the main plant site and bracketed facilities will be managed effectively.

The EPC contractors will manage the waste generated during construction phase like construction debris, packing material, paint containers and filters. The management measures of the aforementioned solid wastes and the hazardous wastes are discussed in details below:

- The recyclable and non-recyclable non-hazardous solid waste generated onsite should be collected and stored in a temporary waste storage facility from where all wastes will be sent for recycling and disposal to appropriate facilities.
- The reusable wastes like wooden waste and cardboards from packing materials, empty cement bags, construction debris, etc. can also be given to locals for their use or give it back to original equipment manufacturer (OEM).

7.5.4 Storm Water Management Plan

The purpose of Storm Water Management Plan (SWMP) is to ensure prevention and control of any adverse impact caused by un-regulated storm water runoff from the main plant to the nearby natural drainage channels, surface water bodies, public and private properties.

Following measures will be taken as part of the Storm Water Management Plan:

- The peripheral drains will be provided outside the plant boundary during construction phase, which will prevent the silt contaminated surface run-off from site to enter into the adjoining lands.
- No surface run-off from within the solar power plant site will be directly discharged into any nallah/water body.
- Rain water collected from the project site will be used to recharge the ground water through onsite rain water harvesting tank/pits.
- Avoidance of distrurbance of flows into natural watercourses i.e. provision should be made for temporary or permanent measures that allow for attenuation, control of velocities and capturing of sediment upstream of natural watercourses.
- Do not divert flows out of their natural flow pathways, thus depriving downstream watercourses of water.

7.5.5 Community Property Resource

During the project construction phase, there might be some sharing of resources by the villagers and the workers working in the 20 MW Solar Power project at study village. To an extent feasible this should be avoided to prevent potential conflicts between the project and the community. The movement of heavy vehicles and machineries might lead to conditions like disruption of electric wires and telephone wires in the project area and along transportation routes. All these damage utilities should be repaired/replaced to normal conditions, at the earliest. An account of the damage to the community resource should be documented and the root cause analysis carried out. The findings of the root cause analysis should also be documented and discussed with the agency/agencies found responsible for the incident. No water should be extracted from surface water bodies which are used by the community for drinking or domestic purpose. Any vacant or barren land, not assigned for project, should not be used for storage of fill/construction material, wastes, etc.

As part of the Environmental and Social Management System proposed, a system should also be developed for recording such incidents and tracking the incident till it is closed to the satisfaction of the community.

7.5.6 Occupation Health and Safety Management Plan

The Occupational Health and Safety (OHS) of the employee and contractual labours will be maintained at the work sites during both construction and operation phase. The OHS Management measures should comply with the Indian Regulatory requirements under OHSAS and the Factories Act 1948, amended 1954, 1970, 1976 and 1987.

Construction Phase: The following occupation health and safety measures will be adopted during the construction phase:

- Provide and ensure wearing of personal protective equipment's viz., gloves, helmets, ear plug, safety belt etc.
- Prepare emergency communication system and emergency preparedness plan

- Ensure provision and maintenance of drinking water and sanitation facilitation for construction workers in accordance with the provision of Contract Labour Act and Building and Other Construction Workers Act.
- Periodic cleaning of work areas will be undertaken and supervised by the contractors to ensure hygienic conditions on site.
- Workers will stop working in extreme natural climatic conditions i.e. heat wave, heavy rain etc.
- Ensure effective work permit system for critical activities such as electrical work and working at height
- All work places will have adequate fire alarms and firefighting equipment's to handle any outbreak of fire in O& M.
- Adequate drinking water will be supplied at workplace for workers onsite and water quality meets drinking water quality standards.
- Sufficient light and ventilation will be provided for workers working in confined space.
- Periodic health check-up camps for workers onsite will be organized to ensure prevention of occupational health hazards.
- All work areas should have First Aid Kits to manage injuries occurring in the area.
- The switchyard building will be provided with fire extinguishers and sand buckets at all strategic locations to deal with any incident of fire.

Operational Phase: Although no significant occupational health and safety risks are identified during operations, the following mitigation measures need to be adopted:

- Operators are provided with adequate PPEs depending upon nature of the operation and occupation health and safety risks associated with it viz. electrical maintenance activities, replacement of solar panels etc.
- Special emphasis on electrical safety will be laid and all employees will be trained in electrical safety and First Aid
- Standard Operation Procedures (SOPs) will be developed for operational activities likely to have potential occupational health and safety risks
- Periodic medical examination will be undertaken for workers including contractor and subcontractor of the plant.
- Periodic inspections will be carried out to ensure all the above are implemented and any non-conformances will be recorded along with grievance related to OHS issues.
- An EHS coordinator will effectively implement and monitor the OHS Management System and ESMP.

7.5.7 Grievance Redressal Mechanism (GRM)

As per the Performance Standards (PS) of IFC, the client should establish a grievance mechanism to receive and address specific concerns about compensation and relocation that are raised by displaced persons or members of host communities, including a recourse mechanism designed to resolve disputes in an impartial manner. Community grievance must be recorded in specific "Community Grievance Register Format".

The grievance mechanism should be scaled to the risks and adverse impacts of the project. It should address concerns promptly, using an understandable and transparent process that is culturally appropriate and readily accessible to all segments of the affected communities, and at no cost and

without retribution. The client will inform the affected communities about the mechanism in the course of its community engagement process.

HFE's Grievance Redressal Mechanism (GRM) is in place which is recommended for implementation in this project site.

7.5.8 Community Development Plan under CSR

Companies Act, 2013 has introduced mandatory Corporate Social Responsibility Regulations which are effective from 1st April, 2014. Section 135 of the Companies Act, 2013 ('the Act'), read with Companies (Corporate Social Responsibility Policy) Rules, 2014 ('CSR Rules') requires every company having:

- Net worth of Rs.500 crore or more; or
- Turnover of Rs.1, 000 crore or more; or
- Net profit of Rs.5 crore or more

In line with the CSR Regulations, HFE has developed their own CSR Policy in alignment with its CSR vision, principles and values, for delineating its responsibility as a socially and environmentally responsible corporate citizen. The Policy lays down the areas of intervention, principles and mechanisms for undertaking various programs in accordance with Section 135 of the Companies Act 2013.

Needs/ Gap Assessment for CSR Initiatives

Analysis of above socio economics description and community consultation in project area villages reveals that concern of villagers are linked with the fulfilment of basic needs and improvement of some infrastructural facilities at school/ Anganwadi/ health etc. levels. Based on discussion with villagers, land sellers and Panchayat members, following gaps have been identified which needs to be addressed:

7.5.9 Engagement of Labour

Though the project is in pre-construction stage, considering factors involved in construction stage the below matters are given.

Indicators in Labour Engagement

Abolition of child and forced labour: Engagement of child and forced labour by contractor or developer in any form for the proposed project will be unfair with the children' right.

Gender equity and non-discrimination: Discrimination and imbalance in gender equity in employment and opportunity may lead to conflicts between contractor and labour.

Freedom of association and right to collective bargaining: Not giving freedom to labour to express their views and form association may cause conflicts between labour and contractor but this is not applicable for solar power plant as the labour requirement is of short duration restricted to construction phase only and number of labour employed is not very large for the same phase. The ILO guidelines are provided in **Appendix B**

7.5.10 Road Safety and Traffic Management Plan

Scope and Purpose

The plan encompasses the address of community safety related impacts that may arise from the increased vehicular traffic due to movement of heavy equipment/machineries and vehicles along the site access and approach roads particularly during construction phase. The plan will be regularly updated by the contractor with the project progress and as vehicle movement requirements are

identified in detail. Designated traffic coordinator will be responsible for overall coordination of traffic management.

During Construction Phase

The following mitigation measures will be implemented during this phase:

- Project vehicular movement will be restricted to defined access routes.
- Proper signage will be displayed at important traffic junctions along the vehicular access routes to be used by construction phase traffic. The signage will serve to prevent any diversion from designated routes and ensure proper speed limits are maintained near residential areas.
- Any road diversions and closures will be informed in advance to the project vehicles accessing the above route. Usage of horns by project vehicles will be restricted near sensitive receptors viz. schools, settlements etc. Though, no such chances are seen so far. Because, the project location is absolutely located in isolation.
- Traffic flows will be timed wherever practicable during period of increased commuter movement in the day.
- Temporary parking facilities should be provided within the work areas and the construction sites to avoid road congestion.
- Vehicular movement to be controlled near sensitive locations viz. schools, colleges, hospitals identified along designated vehicular transportation routes.
- Routine maintenance of project vehicles will be ensured to prevent any abnormal emissions and high noise generation.
- Adequate training on traffic and road safety operations will be imparted to the drivers of project vehicles. Road safety awareness programs will be organized in coordination with local authorities to sensitize target groups viz. school children, commuters on traffic safety rules and signage.
- The HFE / contractor(s) should frame and implement a “No Drug No Alcohol” Policy to prevent road accidents/incidents.

During Operational Phase

Since limited vehicular movement is anticipated during operational phase considering only the daily movement of project personnel any impacts arising from the same can be effectively addressed through implementation of mitigation measures as discussed during the construction phase. In addition, the following measures will be emphasized.

- Use of horns near the villages along the access road to villages, main plant and internal roads should be restricted.
- The vehicular movements along the access roads and highways should be restricted during the night time.
- All the vehicles entering the access roads and plant should have Pollution under Control (PUC) certificates.
- The speed limit in the internal roads should be restricted to 25 km/hr. Proper warning signs and road safety awareness posters should be displayed to create road safety awareness among the personnel accessing the site.
- Periodic Road Safety and Traffic Management campaigns and awareness sessions should be carried out among the villagers and the plant workers/personnel to develop road safety awareness among the people likely to be impacted by the project.

- An emergency road safety plan should be framed by the Proponent to combat any emergency conditions/accidents along the highways, access roads and within plant area.
- HFE should frame and implement a “No Drug No Alcohol” Policy to prevent road accidents/ incidents.
- The drivers should be given an induction on road safety and traffic management policy.
- A permanent parking lot should be provided within the main plant site (in individual work areas) and the associated facilities.
- Use of seat belts for both drivers and passengers should be made compulsory to minimize death & injuries in the event of an accident.

8 CONCLUSION

Based on the conclusion drawn from the ESIA study with respect to the intensity of impacts due to project activities on environment, resources, biodiversity, labours and community, the project is categorized as Category B (as per IFCs categorization of projects), ***which specifies that this project is expected to have limited adverse environment and social impacts, which can be mitigated by adopting suitable mitigating measures.***

An environment and social analysis has been carried out looking at various criteria such as topography, air, noise, water resources and water quality, ecology, demography of the area, climate, natural habitat, community and employee health and safety etc.

The project will have number of positive impacts which are:

- The land has been procured for the project on willing to buy and willing to sell basis for which adequate compensation was made, as reported.
- During the construction phase, local populations often supply manpower for services such as those of drivers, vehicle vendors, contractors, watchmen etc.
- Storm water channels are planned along the periphery of the project site.

Complaints received through Grievance Redressal Mechanism (GRM) procedures shall be addressed by HFE in line with the procedure of ESMF. This will overcome public inconvenience during the project activities. Based on the environmental and social assessment and surveys conducted for the project, the potential adverse environmental impacts can be mitigated to an acceptable level by implementing adequate mitigation measures identified in the EMP, whereas project will improve the socio-economic conditions of the surrounding areas.

APPENDIX A: RELEVANT PAGE OF CPCB DIRECTION

केन्द्रीय प्रदूषण नियंत्रण बोर्ड
CENTRAL POLLUTION CONTROL BOARD
(पर्यावरण एवं वन मंत्रालय, भारत सरकार)
MINISTRY OF ENVIRONMENT & FORESTS, GOVT. OF INDIA

No.B-29012/ESS(CPA)/2015-16/ March 07, 2016

To

The Chairman
All the State Pollution Control Boards / Pollution Control Committees
(List Attached)

SUB: MODIFIED DIRECTIONS UNDER SECTION 18(1)(b) OF THE WATER (PREVENTION & CONTROL OF POLLUTION) ACT, 1974 and THE AIR (PREVENTION & CONTROL OF POLLUTION) ACT, 1981 REGARDING HARMONIZATION OF CLASSIFICATION OF INDUSTRIAL SECTORS UNDER RED / ORANGE / GREEN / WHITE CATEGORIES.

WHEREAS, under section 16 (2)(b) of the Water (Prevention and Control of Pollution) Act, 1974 and under Section 16 (2)(c) of the Air (Prevention & Control of Pollution) Act, 1981, one of the functions of the Central Pollution Control Board (CPCB), constituted under the Water (Prevention and Control of Pollution) Act, 1974, is to coordinate activities of the State Pollution Control Boards (SPCBs) and Pollution Control Committees (PCCs), and

WHEREAS, under section 16 (2)(c) of the Water (Prevention and Control of Pollution) Act, 1974 and under Section 16 (2)(d) of the Air (Prevention & Control of Pollution) Act, 1981, one of the functions of the CPCB is to provide technical assistance and guidance to SPCBs and PCCs; and

WHEREAS, it was brought to the notice of CPCB, that different SPCBs / PCCs were following different criteria for classification of industrial sectors under Red/Orange/ Green category and that classification was being used by the SPCBs/PCCs for grant of consents to industries and for Inventorization / surveillance of industries.

WHEREAS, the issue regarding classification of industries was deliberated upon in the 56th Conference of Chairmen & Member Secretaries of CPCB & SPCBs/PCCs held on August 31, 2010 and a working group comprising of representatives from SPCBs & CPCB was constituted to prepare a consolidated list of industrial sectors falling under Red/Orange/Green category to bring uniformity in classification of industrial sectors across the country;

'परिवेश भवन' पूर्वी अर्जुन नगर, दिल्ली-110032
'Parivesh Bhawan', East Arjun Nagar, Delhi - 110032
दूरभाष/Tel : 43102030, फैक्स/Fax : 22305793, 22307078, 22307079, 22301932, 22304948
ई-मेल/e-mail : cpcb@nic.in वेबसाईट/Website : www.cpcb.nic.in

- Industrial Sectors having Pollution Index score of 60 and above – Red category
- Industrial Sectors having Pollution Index score of 41 to 59 –Orange category
- Industrial Sectors having Pollution Index score of 21 to 40 –Green category
- Industrial Sectors having Pollution Index score incl.&upto 20 -White category

The newly introduced White category of industries pertains to those industrial sectors which are practically non-polluting such as Biscuit trays etc. from rolled PVC sheet (using automatic vacuum forming machines), Cotton and woolen hosiers making (Dry process only without any dying/washing operation), Electric lamp (bulb) and CFL manufacturing by assembling only, Scientific and mathematical instrument manufacturing, Solar power generation through photovoltaic cell, wind power and mini hydel power (less than 25 MW).

The salient features of the 'Re-categorization' Exercise are as follows:

- Due importance has been given to relative pollution potential of the industrial sectors based on scientific criteria. Further, wherever possible, splitting of the industrial sectors is also considered based on the use of raw materials, manufacturing process adopted and in-turn pollutants expected to be generated.
- The Red category of industrial sectors would be 60.
- The Orange category of industrial sectors would be 83.
- The Green category of industrial sectors would be 63.
- Newly introduced White category contains 36 industrial sectors which are practically non-polluting.
- There shall be no necessity of obtaining the Consent to Operate" for White category of industries. An intimation to concerned SPCB / PCC shall suffice.
- No Red category of industries shall normally be permitted in the ecologically fragile area / protected area.

The purpose of categorization is to ensure that the industry is established in a manner which is consistent with the environmental objectives. The new criteria will prompt industrial sectors willing to adopt cleaner technologies, ultimately resulting in generation of fewer pollutants. Another feature of the new categorization system lies in facilitating self-assessment by industries as the subjectivity of earlier assessment has been eliminated. This 'Re-categorization' is a part of the efforts, policies and objective of present government to create a clean & transparent working environment in the country and promote the Ease of Doing Business.

Other similar efforts include installation of Continuous Online Emissions/ Effluent Monitoring Systems in the polluting industries, Revisiting of the CEPI (Comprehensive Environment Pollution Index) concept for assessment of polluted industrial clusters, Revision of existing industrial Emission/Effluent discharge standards, initiation of special drive on pollution control activities in Ganga River basin and many more in coming future.

3

APPENDIX B: ILO GUIDELINES

No.6

ILO HELPDESK

ASSISTANCE@ILO.ORG

International Labour Organization

Workers' housing

Housing provided to workers as part of the employment contract should meet certain minimum specifications in respect of the nature and standard of the accommodation and facilities to be made available.

The following guidance is based on international labour standards. National or state regulation will often set baseline specifications as part of housing, labour, health or even fire safety regulations; they should be checked and followed. National employers and workers organizations may also be a good source of information on national law, collective bargaining agreements and customs pertaining to housing for workers; or may be able to refer you to the appropriate statutory authority.

Guiding principles

➡ In providing worker[1] housing, the objective should be to ensure "adequate and decent housing accommodation and a suitable living environment"[2] for workers. This includes upkeep, improvement and modernisation of housing and related community facilities.[3]

It is "generally not desirable that employers should provide housing for their workers directly".[4] Employers are encouraged to help their workers to obtain housing through autonomous private agencies, public housing schemes, or cooperatives.[5] This is because workers living at the work site on property owned or controlled by the employer tend to be less integrated into the local community, and more dependent on the employer. However, certain circumstances, such as when an undertaking is located far from normal centres of population, or where the nature of the employment requires that the worker should be available at short notice may require the employer to provide housing for his or her workers.[6]

If housing is provided by the employer "the fundamental human rights of the workers, in particular freedom of association, should be recognised."[7] Arrangements where accommodation and communal services are provided as payment for work should take care to ensure that the interests of the workers are protected. If rent is charged, it should not cost the worker more than a reasonable proportion of his or her income.[8]

Siting and construction

➡ The housing and related community facilities should be of durable construction, taking into account local conditions, such as liability to earthquakes.[9]

The location of workers' housing should ensure that workers are not affected by air pollution, surface run-off or sewage or other wastes.[10]

Housing Standards

➡ Housing should ensure "structural safety and reasonable levels of decency, hygiene and comfort".[11] The undertaking should ensure the following:

a) a separate bed for each worker;
b) adequate headroom, providing full and free movement, of not less than 203 centimetres;
c) the minimum inside dimensions of a sleeping space should be at least 198 centimetres by 80 centimetres;
d) beds should not be arranged in tiers of more than two;
e) bedding materials should be reasonably comfortable;
f) bedding and bedframe materials should be designed to deter vermin;
g) separate accommodation of the sexes;
h) adequate natural light during the daytime and adequate artificial light;
i) a reading lamp for each bed;
j) adequate ventilation to ensure sufficient movement of air in all conditions of weather and climate;
k) heating where appropriate;
l) adequate supply of safe potable water;
m) adequate sanitary facilities (see below);
n) adequate drainage;
o) adequate furniture for each worker to secure his or her belongings, such as a ventilated clothes locker which can be locked by the occupant to ensure privacy;
p) common dining rooms, canteens or mess rooms, located away from the sleeping areas;
q) appropriately situated and furnished laundry facilities;
r) reasonable access to telephone or other modes of communications, with any charges for the use of these services being reasonable in amount; and

[1] Workers' Housing Recommendation, 1961 (No. 115). The section entitled "Suggestions concerning methods of application," Part I, paragraph 5, encourages "equality of treatment between migrant workers and national workers". Therefore, this guidance applies equally to migrant workers and national workers.
[2] R. 115, General Principles, Part II, paragraph 2.
[3] R. 115, paragraph 3.
[4] R. 115, Part IV, paragraph 12(2).
[5] R. 115, Part IV, paragraph 12(1).
[6] R. 115, Part IV, paragraph 12(2).
[7] R. 115, Part IV, paragraph 12(3a).
[8] R. 115, Part II, paragraph 4, Part IV, paragraph 12(3c) and (4).
[9] R. 115, Suggestions Concerning Methods of Application, Part I, paragraphs 10-11.
[10] R. 115, Suggestions Concerning Methods of Application, Part IX, paragraph 43.
[11] R. 115, paragraph 19.

APPENDIX C: POWER EVACUATION

KARNATAKA POWER TRANSMISSION CORPORATION LIMITED

Fax No : 080-22292204
Phone No: 080-22210416

Office of the
Chief Engineer (Ele)
(Planning & Co-ordination)
2nd Floor, KPTCL,
Kaveri Bhavan,
Bengaluru 560009

No: CEE (P&C)/ SEE (Plg)/EE (PSS)/KCO-96/81271/F-901 Date: .5.2017

2443-60

12 MAY 2017

To,
M/s. Clean Solar Power (Tumkur) Pvt Ltd,
212, Ground Floor,
Okhla Industrial Estate PH-III,
New Delhi - 110020

Sir,

Sub: Regular Evacuation scheme for your proposed 20 MW solar project in Gundlupet taluk, Chamarajanagar District reg

Ref: 1) Your letter no: KPTCL /Evacuation /180MW /05 dated: 12.8.2016 & 23.1.2017

2) KREDL LOA letter no: KREDL /07/RPO /GC /1200MWs-269/ 2016/ 1221 dated: 23.3.2016 in favor of M/s Hero Solar Energy Pvt Ltd at Gundlupet Taluk, Chamarajanagar District for 20MW solar PV project.

3) KREDL Letter no: KREDL /07 /RPO /GC /1200MWs-269 / 2016 /2359 dated: 5.7.2016

4) KREDL Letter no: KREDL /SG /07 /F-78 /SECI / 2016 /2706 dated: 3.8.2016 regarding facilitation fees

5) KERC letter addressed to MD, KREDL vide letter no: KERC /S /F-31 /Vol-1131 /16-17 /1092 dated: 21.7.2016

6) KERC letter addressed to MD, CESC vide letter no: KERC /S /F-31 /Vol-1131 /16-17 /1197 dated: 22.7.2016

7) T.O. note approved by MD, KPTCL in connection with processing 1200MW KREDL Projects on 23.8.2016

8) KERC letter addressed to ACS, Vikas Soudha vide letter no: KERC /S /F-31 /Vol-1131 /16-17 /1443 dated: 29.8.2016

9) T.O. letter no: 12716-717 feasibility report furnished by KPTCL on 27.2.2016 to MD KREDL

10) PPA executed with CESC on 26.5.2016 with COD as 12 months from effective date and the effective date is the date on which the KERC concurrence is obtained.

11) Additional Chief Secretory to GoK letter no: EN 58 VSC 2016 dated: 25.10.2016 addressed to MD, KPTCL

12) Feasibility report from the Chief Engineer (Ele), transmission zone, KPTCL, Mysuru vide letter no: 10017-19 dated: 25.3.2017

13) Facilitation fees paid to KREDL vide Rt no: 344 dated: 25.5.2016 amounting to Rs 2090000/-

14) T.O. note approved by D (T) on 22.4.2017.

15) Tentative evacuation scheme communicated vide T.O. letter no: 1667-73 dated: 27.4.2017

16) Your acceptance letter no: KPTCL /Evacuation /180MW /47 dated: 27.4.2017

****

Adverting to the above references, KPTCL furnished the feasibility report to KREDL vide T.O. letter under ref (9) for 60 taluks in the Karnataka state as desired by them. You approached T.O. seeking evacuation scheme along with a KREDL allotment letter for Gundlupet taluk, Chamarajanagar District vide ref (1 & 2). As per the feasibility report, for Gundlupet taluk, Chamarajanagar District following substations was studied:

i. **66/11kV Gundlupet s/s for 20MW**

While you desired / changed to evacuate **20MW** solar power to 66/11kV **Bommalapura s/s** at Gundlupet taluk, Chamarajanagar District. The same was processed further. At the moment when the filed report was received from the concerned transmission zone, you again requested for evacuation scheme to **66kV Kabbhalli s/s** and were further processed. As per MD, KREDL letter under ref (3), the 1200MW tenders were not invited based on the feasibility report furnished by KPTCL. Hence requested to consider the firms request where they seek for connectivity.

Under the circumstances, in lieu of 20MW to 66/11kV Gundlupet s/s, as per sanction in ref (2) your request for **66/11kV Kabbhalli s/s** has been considered for 20MW. Thus you shall not hold claim for any connectivity in future against this KREDL allotment at any other place, as the same has been approved for Gundlupet taluk of Chamarajanagar District for solar projects under the bid invited for 1200MW by KREDL.

The tentative evacuation scheme has been communicated to you vide ref (15) and you have conveyed your acceptance for the tentative evacuation scheme vide ref (16) along with acceptance you have also requested for sparing of land for construction of 66kV TB.at 66/11kV Kabbhalli s/s. Sparing of KPTCL land will be dealt separately. In this context, the following Regular Evacuation scheme to be executed by you under self-execution for your proposed 20 MW solar project in Gundlupet taluk, Chamarajanagar District at your own risk and cost:

"Construction of 66kV SC line on DC tower using Coyote ACSR conductor from your solar plant to 66/11kV Kabbhalli substation for a distance of 4.5kms along with necessary terminal bay & control equipment installed at both the ends of the line as per KPTCL technical specifications"

Further you shall comply with the following:

a. You shall purchase suitable land adjacent to **66/11kV Kabbhalli** s/s for construction of 66kV TB with metering & shall handover the land along with 66kV TB to KPTCL for maintenance.

b. The Standards and accuracy class of metering shall be as per Central Electricity Authority (Installation and Operation of Meters) Regulations-2006 and shall be equipped with **"Availability Based Tariff"** features and shall also be SCADA operational and be able to integrate with KPTCL system and to be provided at **66/11kV Kabbhalli substation end.**

c. As per Circular guide lines issued vide letter No: KPTCL/B28 (a)/32543/12-13 dated 17/8/2012 & its amendment **Board order issued vide no: KPTCL /B28 (a) / 32543 /12-13 dated: 25.3.2017**, you are liable to pay annual O&M expenses every year along with applicable service tax soon after commissioning of your project which shall be intimated by the O/o the concerned Chief Engineer (Ele), Transmission zone, KPTCL.

d. You are required carry out any modification /alteration /repairs / replacement /rectification if any that may arise or necessitated for putting up 66 kV terminal bay to facilitate termination of your 66kV evacuation line at **66/11kV Kabbhalli s/s** as per the directions and approvals of this office and pay necessary **'supervision charges'** for the works carried out under supervision of KPTCL.

e. **The validity of evacuation approval is up to the date of COD mentioned in the PPA in force.**

f. Invertor generators should have **LVRT** capabilities either at the manufacturing stage or as an additional feature incorporated to the generators so as to ensure continued connectivity with the Grid & generate active power in proportion to the retained voltage in accordance with The Central Electricity Authority (Technical Standards for connectivity to the Grid) Regulations-2007. In this regard firm is required to produce type test certificate as per **IEC-62910 (version 0126-16:2014-06)** standards for solar PV for the inverter generators going to be interconnected with Grid and necessary certificate from the field officers shall be furnished before seeking interconnection approval.

g. You shall provide dynamic reactive compensation of **±4.06 MVAr** automatic. The MVAr flows shall automatically adjust depending on production of solar power up to 20MW. The reactive compensation shall be at common pooling station of the project to restrict reactive power drawl from the Grid. The necessary work completion certificate shall be furnished from the field officers at the time of seeking interconnection approval.

h. **You shall furnish a copy of PPA & supplemental PPA approved by KERC at the time of seeking interconnection approval.**

i. **You shall furnish an undertaking stating that you will not hold KPTCL responsible in case of system constraints for which you may be asked to back down your generation or line outages which may result in loss of generation.**

<u>This regular evacuation approval is subject to complying with following General Terms & Conditions;</u>

1. The Specifications of materials and drawings shall be got approved by this office.
2. The materials and equipment being used for this evacuation scheme work shall be got inspected by Technical & Quality Control wing of KPTCL before its erection.
3. The Central Electricity Authority (Technical Standards for connectivity to the Grid) Regulations-2007 shall be followed strictly and complied with.
4. The site responsibility schedule as per the above cited Regulation shall be drawn and finalized between the concerned Executive Engineer (El). TL&SS Division, KPTCL and your authorized representative.

5. Granting of regular evacuation approval for **20MW** solar power project shall not be construed to mean that requirements of all other laws have been fulfilled by you. It is you who shall be responsible for compliance of all statutory requirement/approvals under other laws and for any non-compliance, you alone shall be responsible and KPTCL shall not be liable for any action whatsoever in this regard.
6. This regular evacuation approval is issued for the purpose of facilitating putting up of required evacuation line for evacuation of power form your solar project. After completion of evacuation line work, request shall be filed for interconnection /synchronization of your Generating plant with the Grid along with all the statutory clearances and compliances to the conditions indicated above.

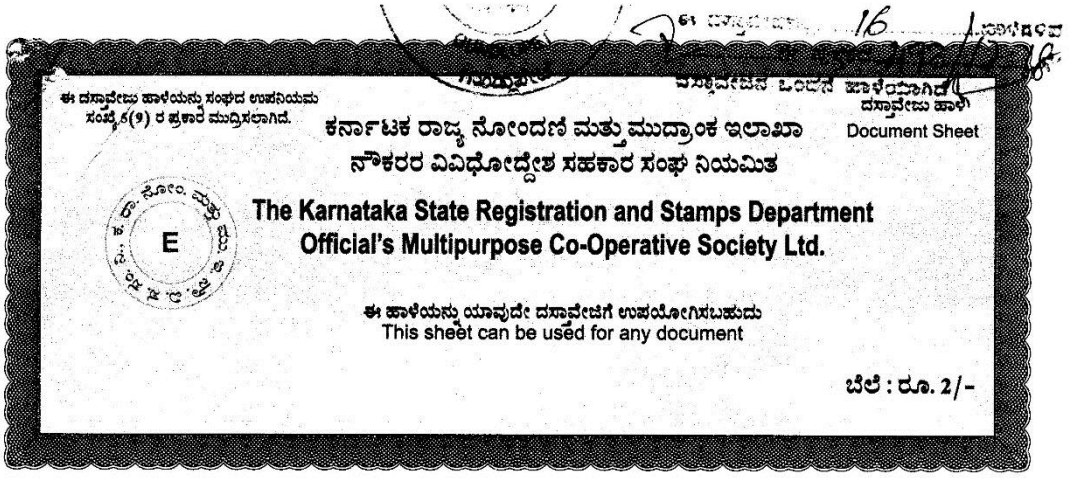
Further you are required to observe all other formalities which are applicable for solar power Project. You are required to approach the concerned Executive Engineer (El) Major Works Division, KPTCL for Co-Ordination of works under the scope of KPTCL.

Yours faithfully,

10/5/17

Chief Engineer Ele,
(Planning & Co-ordination)

APPENDIX D: SAMPLE COPY OF LAND SELL DEED


ಈ ದಸ್ತಾವೇಜು ಹಾಳೆಯನ್ನು ಸಂಘದ ಉಪನಿಯಮ ಸಂಖ್ಯೆ 5(9) ರ ಪ್ರಕಾರ ಮುದ್ರಿಸಲಾಗಿದೆ.

ಕರ್ನಾಟಕ ರಾಜ್ಯ ನೋಂದಣಿ ಮತ್ತು ಮುದ್ರಾಂಕ ಇಲಾಖಾ ನೌಕರರ ವಿವಿಧೋದ್ದೇಶ ಸಹಕಾರ ಸಂಘ ನಿಯಮಿತ

ದಸ್ತಾವೇಜು ಹಾಳೆ Document Sheet

The Karnataka State Registration and Stamps Department Official's Multipurpose Co-Operative Society Ltd.

ಈ ಹಾಳೆಯನ್ನು ಯಾವುದೇ ದಸ್ತಾವೇಜಿಗೆ ಉಪಯೋಗಿಸಬಹುದು
This sheet can be used for any document

ಬೆಲೆ : ರೂ. 2/-

AGREEMENT TO SELL(WITHOUT POSSSESSION)

THIS AGREEMENT TO SELL IS MADE AND EXECUTED ON THIS EIGHTEENTH DAY OF MAY TWO THOUSAND SEVENTEEN (18.05.2017) AT: GUNDLUPET.

BY:

(1) Sri. Mahadevappa
S/o. Sri. Shivappa
Aged about 53 years

(2) Smt. Neelamma
W/o. Sri. Mahadevappa
Aged about 45 years

(3) Smt. Shivamma
D/o. Sri. Mahadevappa
Aged about 30 years

(4) Smt. Baby
D/o. Sri. Mahadevappa
Aged about 28 years

(5) Neelambika
D/o. Sri. Mahadevappa
Aged about 16 years,
Represented by her
Father and Natural Guardian
Sri. Mahadevappa

For Clean Solar Power (Tumkur) Private Limited

1

ಕರ್ನಾಟಕ ಸರ್ಕಾರ
ನೋಂದಣಿ ಹಾಗೂ ಮುದ್ರಾಂಕ ಇಲಾಖೆ
Department of Stamps and Registration

ಪ್ರಮಾಣ ಪತ್ರ

1957 ರ ಕರ್ನಾಟಕ ಮುದ್ರಾಂಕ ಕಾಯ್ದೆಯ ಕಲಂ 10 ಎ ಅಡಿಯಲ್ಲಿಯ ಪ್ರಮಾಣ ಪತ್ರ

ಶ್ರೀ ಎಂ/ಎಸ್.ಕ್ಲೀನ್ ಸೋಲರ್ ಪವರ್ (ತುಮಕೂರ್) ಪ್ರೈ.ಲಿ., ಇದರ ವರವಾಗಿ ಆಥಾರಿಟಿ ಸಿಗ್ನೆಚೇರಿ ರಾಜರಾಮ್ ಶೆಟ್ಟಿ , ಇವರು 200.00 ರೂಪಾಯಿಗಳನ್ನು ನಿಗದಿತ ಮುದ್ರಾಂಕ ಶುಲ್ಕವಾಗಿ ಪಾವತಿಸಿರುವದನ್ನು ದೃಡಿಕರಿಸಲಾಗಿದೆ

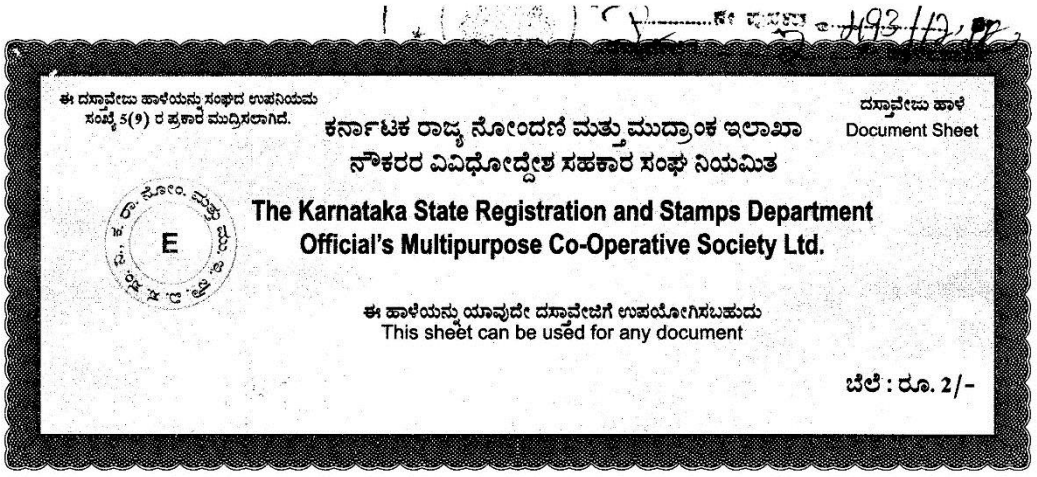
ಪ್ರಕಾರ	ಮೊತ್ತ (ರೂ.)	ಹಣದ ಪಾವತಿಯ ವಿವರ
ನಗದು ರೂಪ	200.00	
ಒಟ್ಟು :	200.00	

ಸ್ಥಳ : ಗುಂಡ್ಲುಪೇಟೆ

ದಿನಾಂಕ : 18/05/2017

ಉಪ-ನೋಂದಣಿ ಮತ್ತು ಮುದ್ರಾ ಅಧಿಕಾರಿ
(ಗುಂಡ್ಲುಪೇಟೆ)

Designed and Developed by C- DAC ,ACTS Pune.



All are Residing at :
Kodagapura Village,
Begur Hobli,
Gundlupet Taluk,
Chamarajnagar District.

Hereinafter called the **"SELLERS"** (which term shall, wherever the context so admits, be deemed to include theirlegal heirs, successors, executors, administrators, legal representatives, assigns or any one claiming through or under them); of the ONE PART.

IN FAVOUR OF:

M/s. CLEAN SOLAR POWER (TUMKUR) PVT.LTD.
A Company, incorporated under the Companies Act, 1956,
Having its registered office at: No.212, Ground Floor,
Okhla Industrial Estate,Phase-III, New Delhi-110020,
PAN.No.AAGCC4395R
Represented by its Authorized Signatory

MR.RAJARAM SHETTY
S/o.Late.H.M Shetty

Hereinafter called the **"PURCHASER"** (which term shall, wherever the context so admits, be deemed to include its successors, executors, administrators in office, legal representatives, assigns or any one claiming through or under its); of the **OTHER PART.**

For Clean Solar Power (Tumkur) Private Limited
Authorised Signatory

Print Date & Time : 18-05-2017 05:11:32 PM

ದಸ್ತಾವೇಜು ಸಂಖ್ಯೆ : 493

ಸಬ್ ರಜಿಸ್ಟ್ರಾರ ಗುಂಡ್ಲುಪೇಟೆ ರವರ ಕಚೇರಿಯಲ್ಲಿ ದಿನಾಂಕ 18-05-2017 ರಂದು 04:34:47 PM ಗಂಟೆಗೆ ಈ ಕೆಳಗೆ ವಿವರಿಸಿದ ಶುಲ್ಕದೊಂದಿಗೆ

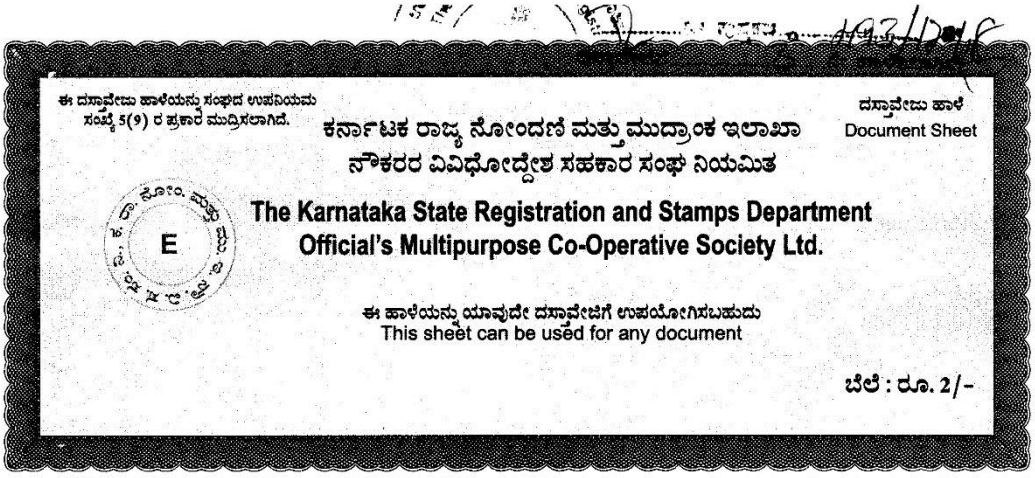
ಕ್ರಮ ಸಂಖ್ಯೆ	ವಿವರ	ರೂ. ಪೈ
1	ನೋಂದಣಿ ಶುಲ್ಕ	10469.00
2	ಸ್ಕ್ಯಾನಿಂಗ್ ಫೀ	700.00
3	ಪರಿಶೋಧನಾ ಶುಲ್ಕ	35.00
	ಒಟ್ಟು :	11204.00

ಶ್ರೀ ಎಂ/ಎಸ್.ಕ್ಲೀನ್ ಸೋಲರ್ ಪವರ್ (ತುಮಕೂರ್) ಪ್ರೈ ಲಿ., ಇದರ ವರವಾಗಿ ಅಥಾರಿಟಿ ಸಿಗ್ನಟೇರಿ ರಾಜರಾಮ್ ಶೆಟ್ಟಿ ಬಿನ್ ಲೇಟ್. ಹೆಚ್.ಎಂ. ಶೆಟ್ಟಿ ಇ ವರಿಂದ ಹಾಜರ ಮಾಡಲ್ಪಟ್ಟಿದೆ

ಹೆಸರು	ಫೋಟೊ	ಹೆಬ್ಬೆಟ್ಟಿನ ಗುರುತು	ಸಹಿ
ಶ್ರೀ ಎಂ/ಎಸ್.ಕ್ಲೀನ್ ಸೋಲರ್ ಪವರ್ (ತುಮಕೂರ್) ಪ್ರೈ.ಲಿ., ಇದರ ವರವಾಗಿ ಅಥಾರಿಟಿ ಸಿಗ್ನಟೇರಿ ರಾಜರಾಮ್ ಶೆಟ್ಟಿ ಬಿನ್ ಲೇಟ್. ಹೆಚ್.ಎಂ. ಶೆಟ್ಟಿ			For Clean Solar Power (Tumkur) Private Limited Authorised Signatory

ಬರೆದುಕೊಟ್ಟಿದ್ದಾಗಿ(ಮತ್ತು ಪೂರ್ಣ/ಭಾಗಶಃ ಪ್ರತಿಫಲ ರೂ..... (ರೂಪಾಯಿ.....ಮುಟ್ಟಿದ್ದಾಗಿ)
ಒಪ್ಪಿರುತ್ತಾರೆ

ಕ್ರಮ ಸಂಖ್ಯೆ	ಹೆಸರು	ಫೋಟೊ	ಹೆಬ್ಬೆಟ್ಟಿನ ಗುರುತು	ಸಹಿ
1	ಎಂ/ಎಸ್.ಕ್ಲೀನ್ ಸೋಲರ್ ಪವರ್ (ತುಮಕೂರ್) ಪ್ರೈ.ಲಿ., ಇದರ ವರವಾಗಿ ಅಥಾರಿಟಿ ಸಿಗ್ನಟೇರಿ ರಾಜರಾಮ್ ಶೆಟ್ಟಿ . ಬಿನ್ ಲೇಟ್. ಹೆಚ್.ಎಂ. ಶೆಟ್ಟಿ (ಬರೆಸಿಕೊಂಡವರು)			For Clean Solar Power (Tumkur) Private Limited Authorised Signatory
2	ಮಹದೇವಪ್ಪ . ಬಿನ್ ಶಿವಪ್ಪ (ಬರೆದುಕೊಡುವವರು)			



WHEREAS the SELLERS herein are the absolute owners and in peaceful possession and enjoyment of all that piece and parcel of land bearing Sy. No.166/1, measuring 2 Acres15 Guntas,Situated at Shigevadi Village,Begur Hobli, Gundlupet Taluk, Chamarajnagar District, which is more fully described in Schedule hereunder and hereinafter referred to as **"SCHEDULE PROPERTY"**.

WHEREAS the Schedule Property is originally belonged to Sri. Mahadevappa and Seller No. 2 is the wife of Sri. Mahadevappa and remaining Seller No.3, 4 & 5 are the daughters of Seller No.1, are the occupant of Schedule property by inheritance.The Khatha of the Schedule property is not yet been transferred in the name of the Sellers. The Sellers hereby submit that they have applied for transfer of Khatha in their names.

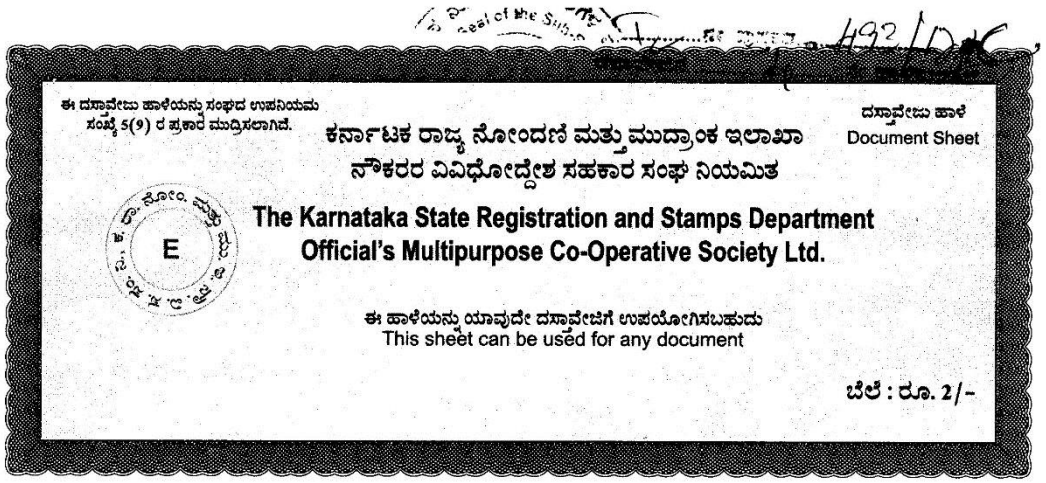
Whereas, the Schedule Property is Self Acquired property of Sellers herein and same has been mutated in the name of Sellers, vide Mutation Register Extract bearing M.R.No. 1/1992-93, herein and thereafter Sellers is in peaceful possession and enjoyment of the Schedule property by cultivating the same personally without any let or hindrance from any person.

For Clean Solar Power (Tumkur) Private Limited

3

ಕ್ರಮ ಸಂಖ್ಯೆ	ಹೆಸರು	ಫೋಟೊ	ಹೆಬ್ಬೆಟ್ಟಿನ ಗುರುತು	ಸಹಿ
3	ನೀಲಮ್ಮ . ಕೋ ಮಹದೇವಪ್ಪ (ಬರೆದುಕೊಡುವವರು)			
4	ಶಿವಮ್ಮ . ಬಿನ್ ಮಹದೇವಪ್ಪ (ಬರೆದುಕೊಡುವವರು)			
5	ಬೀಬಿ . ಬಿನ್ ಮಹದೇವಪ್ಪ (ಬರೆದುಕೊಡುವವರು)			
6	ಮೈನರ್ ನೀಲಾಂಬಿಕ ಇವಳ ಪರವಾಗಿ ಮೈ.ಗಾ .ತಂದೆ ಮಹದೇವಪ್ಪ . (ಬರೆದುಕೊಡುವವರು)			

ಪರಿಸರ: ಸೆಟ್ ರಜಿಸ್ಟ್ರಿ ಕ್ಲರ್ಕ್



WHEREAS the SELLERSfor theirfamily necessities and benefits have offered the Schedule Property free from all kinds of encumbrances for a sum of **Rs.10,46,875/- (Rupees Ten Lakhs Forty Six Thousand Eight Hundred Seventy Five Only)**to the Purchaser and the Purchaser has accepted the said offer subject to the terms contained herein under.

NOW THIS AGREEMENT TO SELL WITNESSETH AS HEREUNDER:

1. The Sellers have agreed to sell and the Purchaser has agreed to purchase the Schedule Property free from all kinds of all encumbrances for a sum of The Purchaser has paid total sum of **Rs. 10,46,875/- (Rupees Ten Lakhs Forty Six Thousand Eight Hundred Seventy Five Only)**.

2. **Details of Payment:**

PARTICULARS OF PAYMENT	**AMOUNT**
1. A sum of **Rs. 9,46,875/- (Rupees Nine Lakhs Forty Six Thousand Eight Hundred Seventy Five Only)**paid by way of DD bearing No 020707 dated 12.05.2017 drawn on Axis bank	**Rs. 9,46,875/-**

ಗುರುತಿಸುವವರು

ಕ್ರಮ ಸಂಖ್ಯೆ	ಹೆಸರು ಮತ್ತು ವಿಳಾಸ	ಸಹಿ
1	ಪ್ರವೀಣ್ ಬಿನ್ ಜೋಸೇಫ್ ಬೇಗೂರು ಗ್ರಾಮ, ಗುಂಡ್ಲುಪೇಟೆ ತಾ.	
2	ಸೋಮಶೇಖರ್ .ಎಂ.ಎನ್. ನಂಜೇಗೌಡ .ಎಂ.ಕೆ. ಹಾಸನ ಟೌನ್.	

ಉಪನೋಂದಣಾಧಿಕಾರಿ ಸಬ್ ರಿಜಿಸ್ಟ್ರಾರ

1 ನೇ ಪುಸ್ತಕದ ದಸ್ತಾವೇಜು
ನಂಬರ GUN-1-00493-2017-18 ಆಗಿ
ಸಿ.ಡಿ. ನಂಬರ GUND103 ನೇ ದ್ದರಲ್ಲಿ
ದಿನಾಂಕ 18-05-2017 ರಂದು ನೋಂದಾಯಿಸಲಾಗಿದೆ

ಉಪನೋಂದಣಾಧಿಕಾರಿ
ಸಬ್ ರಿಜಿಸ್ಟ್ರಾರ (ಗುಂಡ್ಲುಪೇಟೆ)

Designed and Developed by C-DAC, ACTS, Pune

18 MAY 2017

Ltd.,Chittaranjan park Branch, New Delhi.	
2. A sum of **Rs. 1,00,000/-(Rupees One Lakh only)** paid by way of DD bearing No 020706 dated 12.05.2017drawn on Axis bank Ltd.,Chittaranjan park Branch, New Delhi.	**Rs.1,00,000/-**

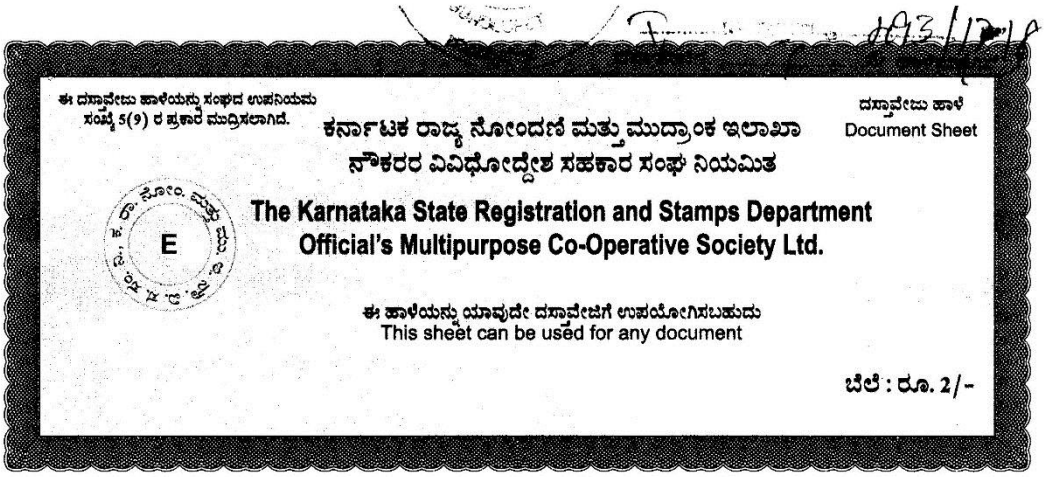
Before the witnesses, the receipt of which the SELLERS does hereby admit and acknowledge.

3. Pending the permission under Karnataka Land Reforms Act,the vendors have agreed to execute the sale deed in favour of the purchaser or his nominee within 06 months from the date of this Agreement of Sale after establishing her valid, freehold and subsisting marketable title to the Schedule Property and getting the Schedule Property converted for non-agricultural Industrial purpose after obtaining permission under S.109 of Karnataka Land Reforms Act 1961 for Sale Deed Registration.

For Clean Solar Power (Tumkur) Private Limited

Authorised Signatory

5



4. The SELLERS shall make out their freehold marketable title in respect of Schedule Property to the satisfaction of the Counsel of the Purchaser. Making out or establishing freehold marketable title means and includes:

(i) Production of all the original title deeds and documents for scrutiny by the counsel of the Purchaser.

(ii) Obtaining and furnishing encumbrance certificate for the period from 1940 to this date.

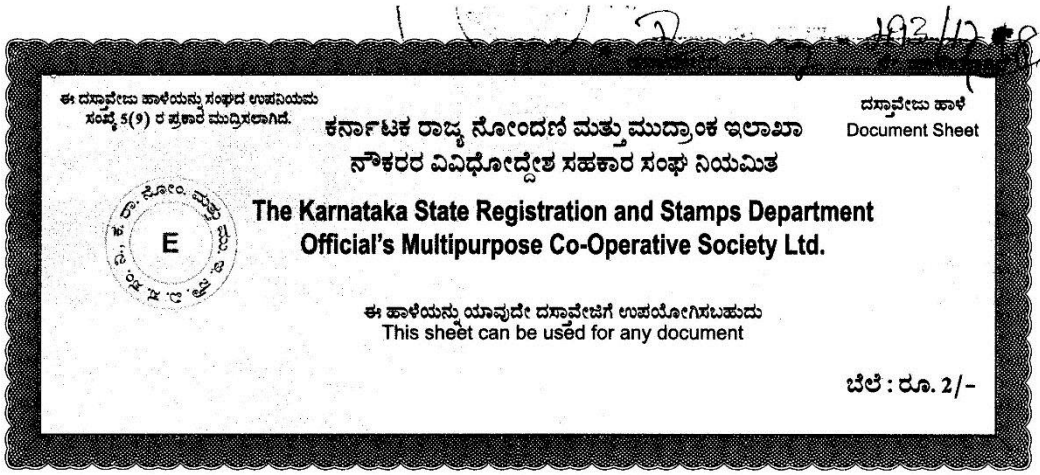
(iii) Obtaining and Furnishing of survey records such as Tippany/Hissa, TippanyNakal, Karda, Utar, Extract of Right side of Pakka Book, Akarband and Karab, Utar.

(iv) An endorsement by the Tahsildar to the effect that the Schedule Property is not the subject matter of any tenancy proceedings.

(v) An endorsement by the Assistant commissioner that the Schedule Property is not the subject matter of any proceedings under PTCL Act, 1978 (The Karnataka Scheduled Castes and Scheduled Tribes (Prohibition of Transfer of certain lands Act, 1978).

For Clean Solar Power (Tumkur) Private Limited

6



(vi) An endorsement by Assistant Commissioner to the effect that no proceedings under any provisions of Land Reforms Act, 1961, are initiated or otherwise pending in respect of the Schedule Property .

(vii) An endorsement by the Deputy Commissioner/land acquisition officer to the effect that the Schedule Property is not notified to be acquired.

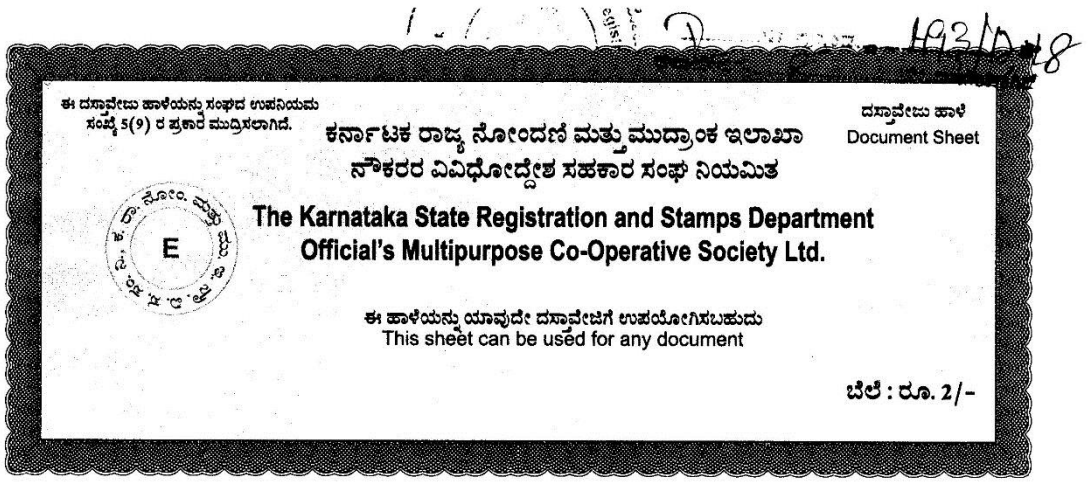
(viii) An endorsement by the Special Land Acquisition officer KIADB to the effect that the Schedule Property is not the subject of matter of any acquisition proceedings or otherwise the same is not notified to be acquired by it.

(ix) An endorsement by the concerned local bank and Department of Conservation of land to the effect that there are no dues pending in respect of the Schedule Property.

5. The Purchaser is desirous of purchasing the Schedule property from the Sellers after taking Converted for Non Agricultural Industrial purpose or Permission under Sec 109 of Karnataka land Reforms Act 1961 for final sale deed registration.

For Clean Solar Power (Tumkur) Private Limited

7

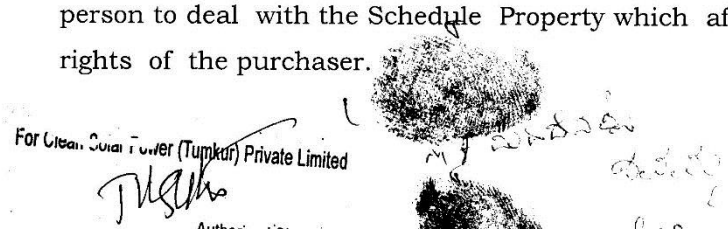


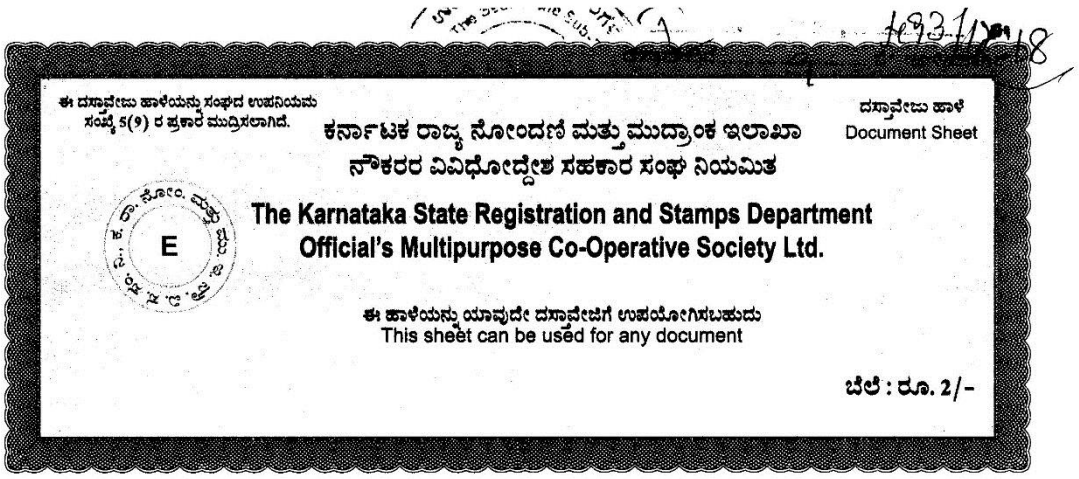
6. The Sellers shall get all the necessary Clearances, N.O.C.'s and other Documents required for the purpose of the registration of the Sale Deed in favour of the Purchaser or its nominees or assignee/s as the case may be at least thirty days prior to the date of registration.

7. The Sellers shall put temporary fencing for the entire land required as per law to purchase the said land in name of Purchaser within 30 days from the date of this Agreement. The Purchaser shall co-operate with Seller.

8. THE Sellers does hereby covenant with the Purchaser that:

   a. That during the tenure of this Agreement to Sell, the Sellers shall not deal with the Schedule Property or the possession or their title in any manner prejudicial to the interest of the Purchaser and on the other hand they shall keep their title and protect possession and shall not encumber the Schedule Property or execute any Power of Attorney empowering any person to deal with the Schedule Property which affects the rights of the purchaser.





b. The Sellers hereby undertake and consents not to effect any type of transfer i.e., sell, mortgage, Exchange, agreements, etc., with any third party in respect of schedule Property during the period of this agreement is in force.

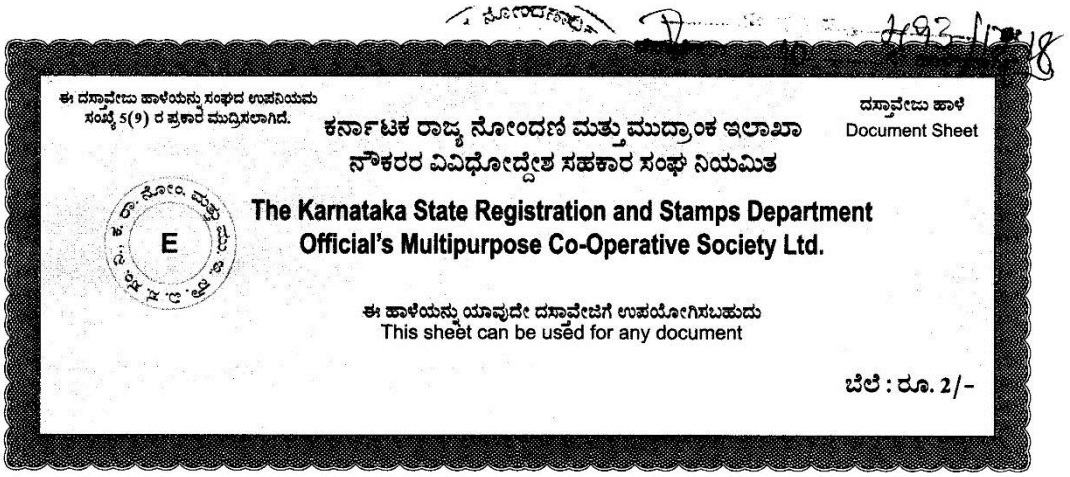
(i) The Sellers are the Sole and absolute owner of the Schedule Property having acquired the same in the afore said manner out of their self-earnings and apart from sellers no one else has any manner of claim or any kind of right, title or interest over the same;

(ii) Ever since the date of the acquisition of the ownership over the Schedule Property they have been in peaceful possession and enjoyment of the same by cultivating the lands personally and by exercising all their rights of ownership.

(iii) The Sellers have not taken any loan or financial assistance from any person or bank or financial institution upon the security of the Schedule Property. If taken, the same will be discharged by them at least 30 days prior to the date of registration.

For Ultra Solar Power (Tumkur) Private Limited

9



(iv) There are no disputes, litigation or proceedings pending before any Court of Law or Tribunals Revenue departments, local authorities and or Government Departments in respect of the Schedule Property;

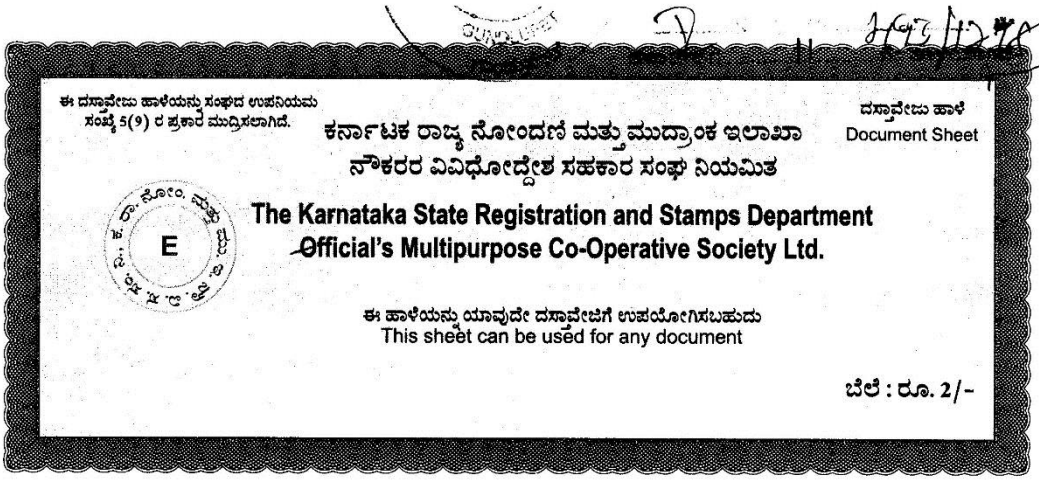
(v) The Sellers have not entered into any kind of agreement or arrangement with any other person in respect of the Schedule Property other than the agreement mentioned above.

(vi) The Schedule Property is not attached by any Court of law or any other competent authority and that it is not subjected to any minor or maintenance claims and that they have a valid, freehold and subsisting marketable title and there is no impediment of whatsoever nature to sell the Schedule Property in favour of the Purchaser in terms of this agreement.

(vii) The Schedule Property is not the subject matter of any acquisition or requisition proceedings and that they have not received any notice from any authority informing or otherwise notifying theirthat the said authority intends to acquire it for public purposes.

For Clean Solar Power (Tumkur) Private Limited

10



(viii) In case of death of any Vendors/Sellers herein, this agreement is binding on their legal heirs and legal heirs shall execute the sale Deed in favor of purchaser without expecting any consideration

9. The Sellers does hereby agree to give any kind of undertaking by way of affidavit or indemnity bond in order to assure the Purchaser that he has free hold valid and subsisting marketable title to the Schedule Property and the Sellers does hereby covenant that they have not done or caused to have done anything by which any claim or demand or charge or encumbrance or lien is created over the Schedule Property and do hereby undertake to indemnify the Purchaser in the event of any loss or damage incurred by them in this regard or for want of any defect in them predecessor's freehold marketable title in respect of the Schedule Property .

10. The Sellers shall furnish all such further information and clarifications as may be sought for by the Purchaser's Advocate for the purpose of establishing the Seller's free hold marketable title in respect of Schedule Property.

For Clean Solar Power (Tumkur) Private Limited

11

H93/12-18

ಈ ದಸ್ತಾವೇಜು ಹಾಳೆಯನ್ನು ಸಂಳದ ಉಪನಿಯಮ ಸಂಖ್ಯೆ 5(9) ರ ಪ್ರಕಾರ ಮುದ್ರಿಸಲಾಗಿದೆ.

ದಸ್ತಾವೇಜು ಹಾಳೆ
Document Sheet

ಕರ್ನಾಟಕ ರಾಜ್ಯ ನೋಂದಣಿ ಮತ್ತು ಮುದ್ರಾಂಕ ಇಲಾಖಾ ನೌಕರರ ವಿವಿಧೋದ್ದೇಶ ಸಹಕಾರ ಸಂಘ ನಿಯಮಿತ

E

The Karnataka State Registration and Stamps Department Official's Multipurpose Co-Operative Society Ltd.

ಈ ಹಾಳೆಯನ್ನು ಯಾವುದೇ ದಸ್ತಾವೇಜಿಗೆ ಉಪಯೋಗಿಸಬಹುದು
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ಬೆಲೆ : ರೂ. 2/-

11. The Purchaser shall be at liberty to get the Schedule Property converted for non-agricultural Industrial/commercial purposes for and on behalf of the Seller and the Seller for this purpose shall executed Irrevocable General Power of Attorney in favour of the Purchaser. The Cost of conversion including the fee/fine, charges, liaison charges and all incidental and consequential expenses thereto shall be borne by the Purchaser and the SELLERS in no manner be responsible for any expenses or charges or fees or fines in this regard.

12. The Purchaser shall be at liberty to transfer all its rights under this agreement in favour of any person/s of its choice subject to the obligations of the Purchaser contained under these presents.

13. In the event of Purchaser transferring or otherwise assigning its rights under this agreement, the Seller does hereby undertake to execute the sale deed in favour of such assignee/s or nominee/SPV/subsidiaries companies as the case may be, in terms of this agreement and subject to the condition that the Purchaser join such sale deed as confirming parties/Consenting Witnesses.

For Clean Solar Power (Tumkur) Private Limited

Authorised Signatory

12

ಈ ದಸ್ತಾವೇಜು ಹಾಳೆಯನ್ನು ಸಂಘದ ಉಪನಿಯಮ ಸಂಖ್ಯೆ 5(9) ರ ಪ್ರಕಾರ ಮುದ್ರಿಸಲಾಗಿದೆ.

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ಕರ್ನಾಟಕ ರಾಜ್ಯ ನೋಂದಣಿ ಮತ್ತು ಮುದ್ರಾಂಕ ಇಲಾಖಾ ನೌಕರರ ವಿವಿಧೋದ್ದೇಶ ಸಹಕಾರ ಸಂಘ ನಿಯಮಿತ

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ಬೆಲೆ : ರೂ. 2/-

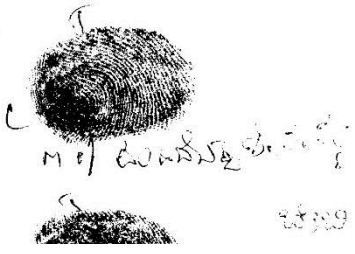
14. The Sellers shall deliver the vacant and peaceful possession of the Schedule Property to the Purchaser on the day of execution of the sale deed.

15. The Sellers shall not do anything or omit to do something by which the rights of the Purchaser under this agreement are affected adversely.

16. The Sellers shall not enter into any kind of agreement or understanding with any person in respect of the Schedule Property during the subsistence of this agreement.

17. In this agreement, the word 'Purchaser', if the context so requires shall means and includes "Purchaser" and the word 'He', if the context so requires shall mean and include "She" and "They'. The Word Purchaser/s where ever the context so requires shall mean and include their assignee/s, and or nominee/s.

18. The property taxes and all out goings in respect of the Schedule Property till the date of registration of sale deed shall be borne by the Seller.



For Clean Solar Power (Tumkur) Private Limited

Authorised Signatory

13

ಈ ದಸ್ತಾವೇಜು ಹಾಳೆಯನ್ನು ಸಂಘದ ಉಪನಿಯಮ ಸಂಖ್ಯೆ 5(9) ರ ಪ್ರಕಾರ ಮುದ್ರಿಸಲಾಗಿದೆ.

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19. The cost of Stamp duty, Registration fee and incidental charges of execution and registration of sale deed shall be borne by the Purchaser.

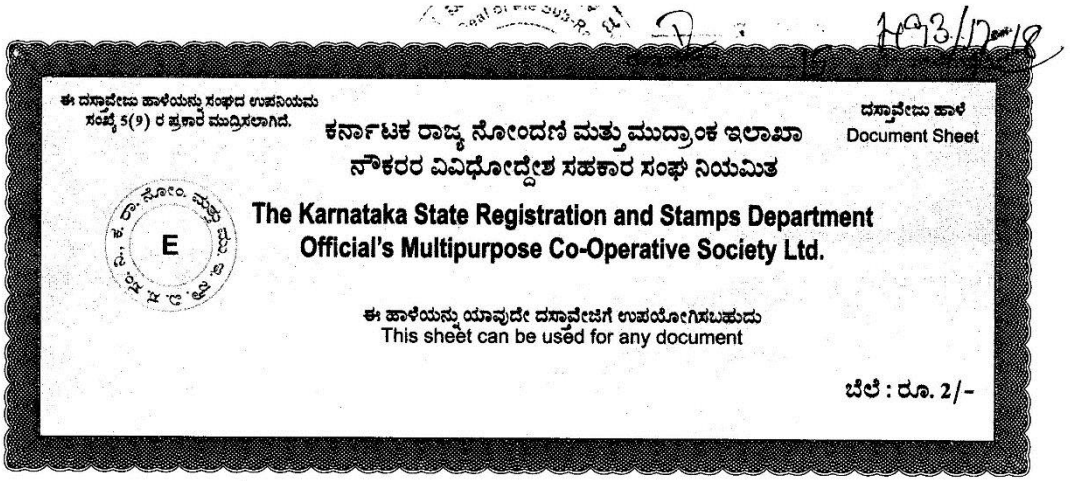
20. Neither the Sellers nor the Purchaser shall be entitled to terminate this agreement unilaterally and that in the event of any disputes or differences and or claims arising out of breach of any of the terms of this agreement by the parties to the agreement or any other disputes, differences and/or claims arising out of this Agreement, same shall settled by competent civil court.

21. Whereas the Sellers hereby indemnify and keeps the PURCHASER or his successors-in-title fully indemnified against any loss or liability cost or claims, action or proceedings, if any should arise, at any time in future against him owing to any defect in or for want of clear and marketable title or due to any defect, violation or non-compliance of any of the declarations or covenants herein.

For Clean Solar Power (Tumkur) Private Limited

Authorised Signatory

14



22. Whereas the Sellersagree to take care of any claims from any undisclosed legal heirs from these family members or from the family members of the original purchaser from whom they have purchased with their own funds or from other lands owned or purchased by them.

23. Subject to the terms of this agreement, in the event of breach of terms of this agreement by one party, the other party shall be at liberty to enforce the specific performance of the terms of this agreement.

24. The Possession of the Schedule Property will be handed over to the Purchaser at the time of executing the Absolute Sale Deed.

SCHEDULE PROPERTY

All that piece and parcel of agricultural Land bearing Sy. No. 166/1, measuring 2 Acres 15 Guntas, Situated atShigevadi Village, Begur Hobli, Gundlupet Taluk, Chamarajnagar District.

East by: The Land in Sy.No. 13 of Ballahalli Vilalge;
West by: The Land in Sy.No. 165/5;
North by: The Land in Sy.No. 165/2; and
Southby: Remaining Land of same belonging to Smt. Gowramma.

ಈ ದಸ್ತಾವೇಜು ಹಾಳೆಯನ್ನು ಸಂಘದ ಉಪನಿಯಮ ಸಂಖ್ಯೆ 5(9) ರ ಪ್ರಕಾರ ಮುದ್ರಿಸಲಾಗಿದೆ.

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Document Sheet

E

The Karnataka State Registration and Stamps Department
Official's Multipurpose Co-Operative Society Ltd.

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ಬೆಲೆ : ರೂ. 2/-

IN WITNESS WHEREOF THE PARTIES ABOVENAMED HAVE SIGNED AND EXECUTED THIS AGREEMENT TO SELL ON THE DAY MONTH AND YEAR FIRST ABOVE WRITTEN IN THE PRESENCE OF THE WITNESSES ATTESTING HEREUNDER.

For Clean Solar Power (Tumkur) Private Limited

PURCHASER
M/s. CLEAN SOLAR POWER (TUMKUR) PVT.LTD.
Represented by its Authorized Signatory Mr.Rajaram Shetty

Authorised Signatory

SELLERS

Mahadevappa :

Neelamma :

Shivamma :

Baby :

Neelam :
(Represented by her Father and Natural Guardian) Sri. Mahadevappa

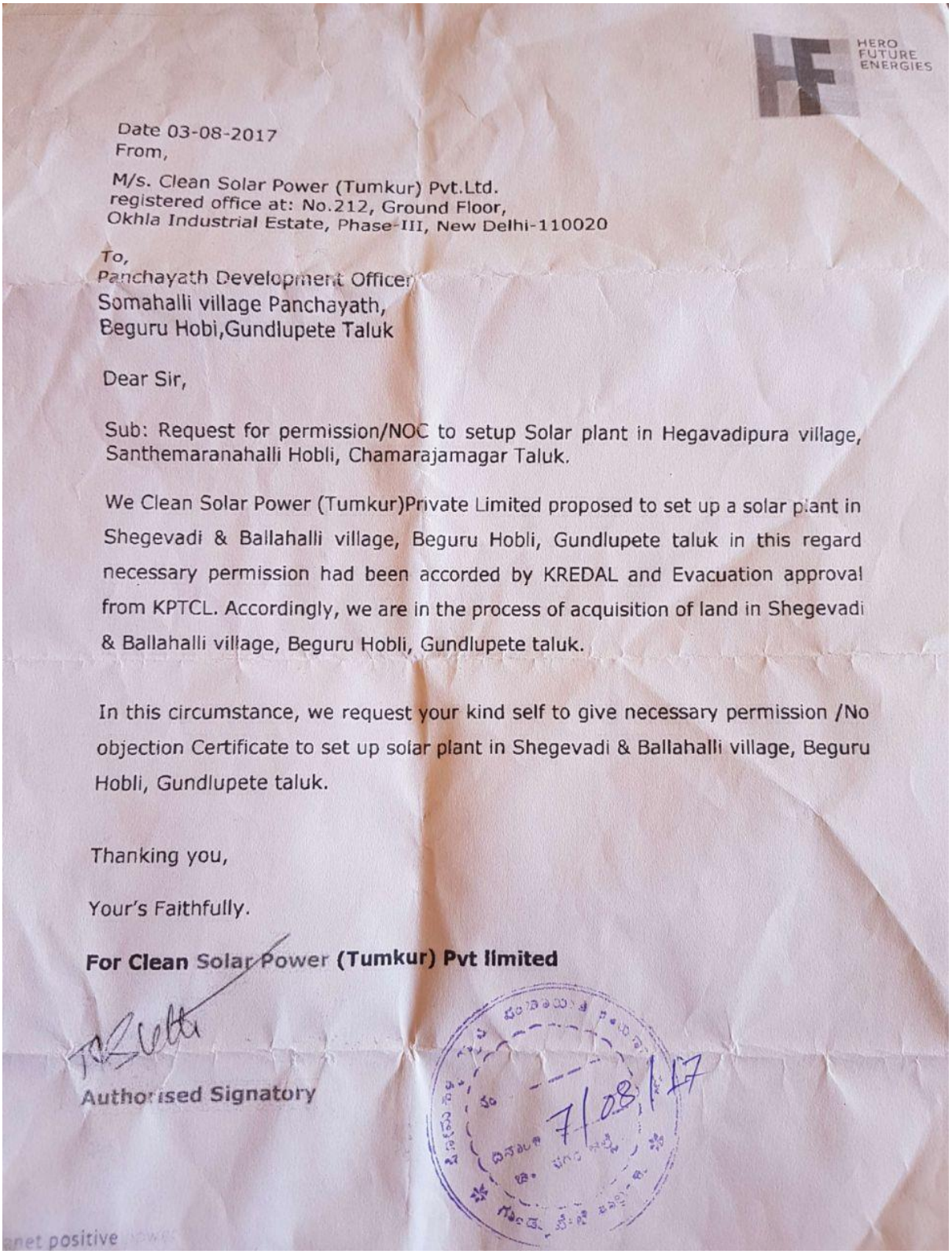
WITNESSESS

S/o Nanjegowda Hassan

DRAFTED BY

16

APPENDIX E: NOC LETTER TO VILLAGE PANCHYAT



HERO FUTURE ENERGIES

Date 03-08-2017
From,

M/s. Clean Solar Power (Tumkur) Pvt.Ltd.
registered office at: No.212, Ground Floor,
Okhla Industrial Estate, Phase-III, New Delhi-110020

To,
Panchayath Development Officer
Somahalli village Panchayath,
Beguru Hobi,Gundlupete Taluk

Dear Sir,

Sub: Request for permission/NOC to setup Solar plant in Hegavadipura village, Santhemaranahalli Hobli, Chamarajamagar Taluk.

We Clean Solar Power (Tumkur)Private Limited proposed to set up a solar plant in Shegevadi & Ballahalli village, Beguru Hobli, Gundlupete taluk in this regard necessary permission had been accorded by KREDAL and Evacuation approval from KPTCL. Accordingly, we are in the process of acquisition of land in Shegevadi & Ballahalli village, Beguru Hobli, Gundlupete taluk.

In this circumstance, we request your kind self to give necessary permission /No objection Certificate to set up solar plant in Shegevadi & Ballahalli village, Beguru Hobli, Gundlupete taluk.

Thanking you,

Your's Faithfully.

For Clean Solar Power (Tumkur) Pvt limited

Authorised Signatory

7/08/17

net positive

APPENDIX F: LAND BREAKUP

Sl No	Survey No	Land Owner Name	Date of Registration	Land Extent			
				Acres	Converted in to Guntas	Guntas	Total Extent in Guntas
1	166/1	GOWRAMMA W/O Guruswamappa	6/3/2017	1	40	7	47
2	166/1	Mahadevappa	5/18/2017	2	80	15	95
3	166/1	Vishwanath	5/19/2017	1	40	7	47
4	176/2	SHIVAMMA W/O Guruswamappa	5/19/2017	1	40	12	52
5	176/2	SHIVAMMA W/O Shivabasappa	5/19/2017	1	40	11	51
6	176/2	Gururajappa	6/7/2017	2	80		80
7	176/1	Gururajappa		3	120	20	140
8	166/2	Gururajappa			0	34	34
9	173	Astvarna Murthy	7/13/2017	1	40	14	54
10	173	Sannamma	7/13/2017	1	40	14	54
11	177/1	Chinnamma & Others	7/31/2017	4	160	14	174
12	11	Mahesh	6/29/2017	5	200	23	223
13	12	K M Shivaprasad	5/24/2017	2	80		80
14		K S Shanthaveeradevaru	6/28/2017	8	320	10	330
15		Rajendraprasad	5/24/2017	2	80		80
16		Gururajappa/ Shivananjamma	7/27/2017	5	200	16	216
17	12 & 15	M Veerath Devaru	5/24/2017	2	80	25	105
				3	120	37	157
18	12 & 14/2	M Shanthveeradevaru	5/24/2017	3	120		120
				3	120	34	154
19	13	Siddrama Devaru	5/24/2017	3	120	26	146
20	183	K Basavanna	5/19/2017	2	80	10.05	90.05
21	194				0	20	20
22	183	K Shivappa	5/18/2017	2	80	10.5	90.5
23	175	Renukamaba	5/19/2017	2	80	39	119
24	165/1	Basappa	5/22/2017		0	33	33
25	165/1	Mahadevappa	5/24/2017		0	33	33
26	165/2	Veerathappa	5/22/2017	3	120	1	121
27	185/4	Bella Shetty	7/21/2017	1	40	0.05	40.05
28	185/1 & 3	GOWRAMMA W/O Siddashetty	7/28/2017	2	80	30	110
29	164/2	K M Panchaksharappa	5/22/2017	1	40	27	67

Sl No	Survey No	Land Owner Name	Date of Registration	Land Extent			
				Acres	Converted in to Guntas	Guntas	Total Extent in Guntas
30	164/2	K M Bikshesh Prasad	5/22/2017	1	40	19	59
31	172	Guruswamy	6/16/2017	4	160	4	164
32	14/3 & 16	K S Gowrishankarswamy	6/28/2017	1	40	33.05	73.05
				4	160	29	189
33	184	GOWRAMMA W/O Siddashetty & 6 Othrs	7/11/2017	2	80	19	99
34	164/3	Gurupadappa	7/12/2017	1	40	10	50
				1	40	9	49
35	167/3	Prabhuswamy	7/12/2017		0	31	31
		Basavaraj			0	31	31
		Mahesh			0	31	31
36	167/2	Mahadevappa	7/12/2017			22.05	22.05
		Shivapadappa				22.05	22.05
		Lingaraju				22.05	22.05
37	174	Rajendraprasad	1/10/2017	4	160	20	180
Total				**84**	**3360**	**824.8**	**4184.8**
SUMMARY		**Total land in Acres**				**104.62**	

APPENDIX G: PERMISSION LETTER FOR PURCHASE OF AGRICULTURAL LAND

HERO FUTURE ENERGIES

Ref: KREDL/NA/180MW/52
Date: 30/06/2017

To
The Managing Director,
Karnataka Renewal Energy Development Ltd.,
No.39, "Shanthi Gruha"
Bharath Scouts & Guides Building,
Opp.the Chief Post Master General Office,
Palace Road, Bangaluru - 560 001.

Dear Sir,

Sub: Permission to purchase agricultural lands under new deemed conversion solar policy.
Ref: 1. KREDL LOA No. KREDL/07/RPO/GC/1200MWs-269/2016/1221, dated 23-03-2016
2. Govt. Order No. RD 69 LGP 2015

We have proposed to purchase agricultural lands Balahalli village, Begur Hobli, Gundlupet Taluk, Chamarajanagar District in various survey numbers as per the list appended to set up Solar power project and have enclosed necessary documents.

KARNATAKA RENEWABLE ENERGY DEVELOPMENT LIMITED has allotted 20MW to start solar Power Project at the above mentioned taluk vide orders referred at Ref.1.

Pursuant to the amendment of Section 109 of the Karnataka Land Reforms Act (Deemed conversion) vide orders referred at Ref.2 to promote solar power projects by GOK, the Revenue department has simplified 109 procedures in order to avoid inordinate delay in the implementation of the project which is eco-friendly.

Since we have obtained all the necessary documents required to file u/s.109 KLR 1961, we request you to write a letter to the Chamarajanagar Deputy Commissioner office to process of our file U/S.109 KLR 1961 and grant permission to buy the required land (Extent list appended) as per the new deemed conversion solar policy to establish solar power plant.

Thanking you,

Yours faithfully,

For M/s Clean Solar Power (Tumkur) Private Limited

Authorised Signatory.

K.R.E.D.L. 4/7/17

Enclosures:
1. Filled in form 15A
2. Copy of the Government Order regarding deemed Conversion for Solar Project;
3. Copy of LOA awarded through KREDL
4. Certificate of Incorporation;
5. Memorandum of Articles of Association
6. Detailed project report
7. RTC of the land & ATS with former

planet positive power
CLEAN SOLAR POWER (TUMKUR) PVT LTD.
CIN – U40101DL2016PTC298461
Regional office: No-302, 3rd FLOOR, PRESTIGE INFANTRY COURT, INFANTRY ROAD, BANGALORE- 560001, INDIA
Registered office: 212, GROUND FLOOR, OKHLA INDUSTRIAL ESTATE PH-III, NEW DELHI 110020, INDIA
Corporate office: 202, THIRD FLOOR, OKHLA INDUSTRIAL ESTATE PH-III, NEW DELHI 110020, INDIA
Landline No.:+91 11 49598000, Fax No. +91 11 49598022;
Email:-info@herofutureenergies.com. Website: www.herofutureenergies.com

"FORM 15A
(see rule 38-D)

Application for claiming/granting exemption under section 109 of the Karnataka Land Reforms 1961 (To be filled by the Applicant/Institution)

1)	Name of the Applicant/Institution with detailed address (in block letters)3	**M/s. Clean Solar Power(Tumkur)Pvt Ltd,** Plot No.212, Ground Floor, Okhla Industrial Phase-III, New Delhi-110020
2)	Purpose for which exemption is sought	For setting up 20 MW Solar PV Project awarded through KREDL
3)	Date of Registration of firm/Institutions under the Indian Companies Act, Societies Registration Act of any other Law (Copy of the Registration document to be enclosed along with the Memorandum of Article of Association). In case of Cooperative Housing Society, list of Members to be enclosed.	25/04/2016 MoA - AoA & Certificate of Incorporation Attached
4)	(a) Registration Certificate issued by the Department of Industries and Commerce for having registered as an Industry (Copy to be enclosed). (b) In case of Educational Institutions recognition letter/Order issued by State/Central Government. (c) Place of worship notification issued by Government as detailed in rule (3) (iii). (d) Audit Report of the previous year of the company. (e) Deputy Registrar of Co-operative Societies Report	MoA - AoA & Certificate of Incorporation Attached Not Applicable
5)	(i) Extent, of land for which exemption is sought, survey number wise. (ii) Agreement copy entered between the land owner and the applicant. (iii) Whether any case under section 79-A and B has been registered in respect of land now proposed to be sold. If yes, details thereof.	Attached -No-
6)	Whether the applicant is already having agricultural land in his/its name or in the name of any subsidiary institution/company. If so, furnish the details. Village, Taluk, Survey, Number and extent.	-No-
7)	Source of finance for the proposed project	Through own equity & Loan
8)	Copy of the project report	DPR Attached
9)	Professional expertise of the applicant in the respective field.	Objective of company is to set up renewable energy project
10)	11-E Sketch If part of Survey No. is proposed (Y/N)/Survey sketch if full number	Attached
11)	Whether recommendation letter of single window agency/State High Level Clearance Committee Certificate /Order in case of Industries including Tourism, Agro based industries and housing project is enclosed.	Not Applicable
12)	Name and address of the proposed seller of the Land (Survey number wise)	Attached

For Clean Solar Power (Tumkur) Pvt. Ltd.

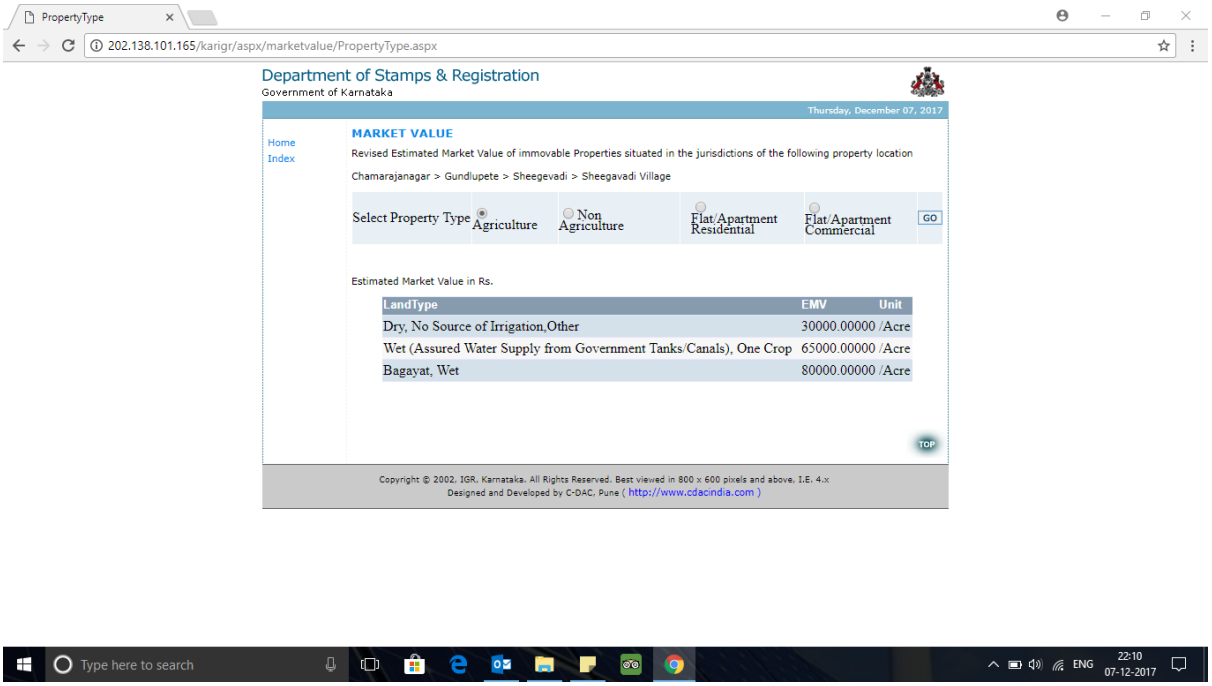
PLACE:
DATE:

Signature of the Applicant/Institution

Authorised Signatory

APPENDIX H: PPA

APPENDIX I: MARKET VALUE OF LAND



PropertyType

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Department of Stamps & Registration

Government of Karnataka

Thursday, December 07, 2017

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Index

MARKET VALUE

Revised Estimated Market Value of immovable Properties situated in the jurisdictions of the following property location

Chamarajanagar > Gundlupete > Sheegevadi > Sheegavadi Village

Select Property Type | Agriculture | Non Agriculture | Flat/Apartment Residential | Flat/Apartment Commercial | GO

Estimated Market Value in Rs.

LandType	EMV	Unit
Dry, No Source of Irrigation,Other	30000.00000	/Acre
Wet (Assured Water Supply from Government Tanks/Canals), One Crop	65000.00000	/Acre
Bagayat, Wet	80000.00000	/Acre

TOP

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APPENDIX J: SAMPLE QUESTIONAIRE FOR COMMUNITY CONSULTATION

Name of the village			Panchayat		
Taluka/Block			District		
Respondent				Date:	
Total Population		Total Male		Total Female	HH No.
Religion	Name	%	Name	%	
Caste/Group	Name	%	Name	%	
	Name	%	Name	%	
Education Level	Illiterate %	Primary %	Secondary %	H.S. %	Graduate %
Occupation	Agriculture %	Business %	Service %	Labour %	Other %
Source Drinking water facility	Tube well	Dug well	Stream	Piped water	Hand pumps
Sanitation facility	Pit latrine %	Sanitary latrine %	Open defecation %	Other %	
Electricity (Available %)			Electricity availability in HH		
Village road type/transport facility					
Schools (distance)	Primary	Middle	H. S.	College	Anganwadi
Health Facility (distance)	Health sub Centre	Primary	Hospital	Others	

Major diseases								
Major crops cultivated	Name	Period	Yield (q/acr)	Rate/q	Name	Period	Yield (q/acr)	Rate/q
Irrigation Facility	Ponds		River		Groundwater		Others	
Average land holding size								
Land rights								
Livestock	Cow		Buffalo		Goat		Pig	Fowl
	Duck		Others					
Grazing areas								
Cooking medium and source	Fuel Wood		Kerosene		Cow Dung Cake		Crop Residue	LPG
	Others							
Common Property Resources (CPR)	Religious and Cultural Places		Sectored Places		Community Hall		Community Ponds	Cremation Ground
	Streams		Canal		River		Others	
Major rituals and festivals	Name		Period		Name		Period	
Fishing area			Name of the					

Forest	Wood	Timber	NTFP	Others	
Any Vulnerable Groups like- landless/homeless- people, Women headed HH, Orphans etc.					
Any program related to child / women health care program					
Any employment generation program					
HH & Cottage industries in the village / area					
Any Scheme / Program related infrastructure / any amenities					
Occurrence any Natural Calamities / industrial / anthropogenic Hazard					

APPENDIX K: SUMMARY OF STAKEHOLDERS CONSULTATION

Stakeholder Group	Village/ Department/ Designation	Name	Methodology	Findings
Project Proponent Hero Future Energies (HFE)	HSE Engineer	Mr. Vinod Chowdary Gunnam	One to one interaction	• The background of the 20 MW Solar Power Project • It was also mentioned by him that no ST land was procured for the project. • NOC from the villages mentioned is yet to be procured.
Community	Koligara & Kodagapura	Majho Swami Mahadev Appa Maduya Patta appa	Group Discussion	• Major livelihood in this area is Agriculture and Livestock Farming. The main crops are Paddy, Tur, Bengal Gram, Banana, Tomato etc. • Rain-fed as well as Irrigated agriculture pattern both are practiced in project area. • The main source for Irrigation in agriculture bore well. • piped water supply system through overhead reservoirs exists in all the villages. Water is supplied to individual households against charges Rs. 25 per month/ household. • Ground water depth is more than 300-500 ft. • There is lack in Health facility within the villages. Nearest Health Care Facilities are also far enough. The only dependency area in this regard are the quacks. • Routine immunization programme is conducted. • The community is aware of the upcoming Solar Power Project and is expecting betterment in their livelihood with the initiation of the same.
School Authority/ Staff	Kodagapura Village	Ajita Srikanth M K. Nagarathwa K.N Kalavathi	Group Discussion	• Most of the schools are lacking water resources. • Sitting arrangements also inadequate • Though the schools need more facilities to improve from the present situation. • There is a lack of play items for the children • Lack of RO water

Stakeholder Group	Village/ Department/ Designation	Name	Methodology	Findings
Panchayat Members	Kodagapura Village, Somahalli Panchayat	Mahadevaamma Jagadish S.P Chandrashekhar Sambhu Lingappa	Group Discussion	• It was informed by the Panchayat Members that they are aware of the Solar Power project to be started in the village. • The local people aspire from the upcoming Wind Power Project.
Health Staff	Ayurvedic Health Centre, Somahalli Panchayat	Dr. Veeranna	One to one interaction	• It was informed by the doctor that ambulance facilities are available on call to emergencies nos.108.
Anganwadi Worker	Koligara village	Ms. Jaya amma	One to one interaction	• The AWC is in the building exclusively meant for the purpose. • The enrolment rate in the AWC is between 10 to 15 children. • Children, in the Anganwadi Centres normally sit on Floor Mats. • There is a lack of play items for the children • Lack of RO water
Land Owners	Kodagapura Village	Vaya Mallappa Shive Ramappa Guru Mallappa Siva appa Ravi Guru Raja appa Guru Murthi appa Rajendra Prasad Mahadeva Shetty Prabhu swamy Mahadev	One to one interaction	• Land owners are selling lands on willing to sale willing to buy basis. • As informed due to the escalating cost for cultivation and rising labour cost, profit from Agriculture is gradually declining. Hence, the farmers and land owners were trying to look for more ensured profiting and supporting options. • The land owners are expecting betterment in their livelihood with the initiation of the Solar Power Project in the area.

APPENDIX L: STUDY AREA POPULATION DISTRIBUTION AND GENDER RATIO

Particular	Total Population	Ave. HH Size	Male Pop.	% Male	Female Pop.	% Female	Sex Ratio
District level							
Chamrajnagar	1020791	4	512231	50.17	508560	49.83	992
Taluk level							
Gundlupete	223070	4	111109	49.80	111961	50.20	1007
Study area villages							
Koligara	3105	4	1584	51.01	1521	48.99	960
Kodagapura	3517	4	1770	50.30	1747	49.70	987

Source: Census, 2011

APPENDIX M: LITERACY SCENARIO OF STUDY AREA VILLAGE

Study Area	Total Literate	Male Literate	Female Literate
Chamarajanagar	61.43	55.36	44.64
Gundlupet	60.17	56.17	43.83
Koligara	61.04	58.92	41.08
Kodagapura	58.72	56.84	43.16

Source: Census, 2011

APPENDIX N: WORKFORCE PARTICIPATION RATE IN STUDY AREA VILLAGE

Study Area	Cultivator	Agri Labour	Other Workers
Chamarajanagar	21.67729238	32.0328508	23.34453687
Gundlupet	27.92513973	37.39190591	18.6813887
Koligara	34.38438438	32.73273273	19.06906907
Kodagapura	25.72178478	48.13648294	19.10761155

Source: Census, 2011

Female Work Force Participation Rate

Study Area	Male Worker	Female Worker
Chamarajanagar	63.80	36.19
Gundlupet	62.21	37.78
Koligara	58.40	41.59
Kodagapura	56.50	43.49

Source: Census, 2011

APPENDIX O: FLORA OF THE WORKING PLAN AREA

(upto 10 kms from project site)

Botanical Name	Common name	Family
Trees, shrubs, perennial climbers		
Acacia catechu	Khair	Mimosaceae
Acacia leucophloea	White babul	Mimosaceae
Acacia nilotica	Black babul	Mimosaceae
Acacia pennata	Climbing acacia	Mimosaceae
Agave americana	Agave	Agavaceae
Ailanthus excelsa	Bende / dodda	Simaroubaceae
Albizia lebbeck	Siris / Baage	Mimosaceae
Argyreia nervosa	Elephant creeper	Convolvvulaceae
Azadirachta indica	Neem	Meliaceae
Borassus flabellifer	Tal gaha	Arecaceae
Butea monosperma	Muttuga	Fabaceae
Calotropis gigantea	Crown flower	Asclepiadaceae
Calotropis procera	Bili yekkada gida	Asclepiadaceae
Carissa spinarum	Korindamalekalaavu	Apocynaceae
Cassia auriculata	Ranawara or avaram	Caesalpiniaeae
Cassia fistula	Kakke mara	Caesalpiniaceae
Cassia siamea	Seeme tangdi	Caesalpiniaceae
Chromolaena odorata	Siam weed	Asteraceae
Cocculus hirsutus	Daagadi balli	Menispermaceae
Daemia extensa	Juttuve	Asclepiadaceae
Dalbergia sissoo	Sissoo	Fabaceae
Decalepis hamiltonii	Makali beru	Periplocaceae
Dendrocalamus strictus	Bamboo	Poaceae
Dodonaea viscosa	Bandare	Sapindaceae
Emblica officinalis	Nellikkai	Euphorbiaceae
Erythroxylon monogynum	Red cedar	Erythroxylaceae
Eucalyptus tereticornis	Eucalyptus	Myrtaceae
Euphorbia antiquorum	Triangular spurge	Euphorbiaceae
Euphorbia nivulia	Malekalli	Euphorbiaceae
Ficus benghalensis	Aalada mara	Moraceae
Ficus religiosa	Arali mara	Moraceae
Gmelina arborea	Shivane Mara	Verbenaceae
Hemidesmus indicus	Sugankha pala giddda	Asclepiadaceae
Holoptelia integrifolia	Kaladri	Ulmaceae
Ipomoea carnea	Pink Morning glory	Convolvulaceae

Botanical Name	Common name	Family
Jatropha curcas	Dodda haralu	Euphorbiaceae
Jatropha gossypifolia	Chikka kaadu haralu	Euphorbiaceae
Lantana camara	Lantana	Verbenaceae
Leptadenia reticulata	Bugudi Hoovina Gedde	Asclepiadaceae
Maytenus emarginata	Tandrasi	Celastraceae
Melia dubia	Malabar Neem	Meliaceae
Mimosa rubicaulis	Rasne / Urisige	Mimosaceae
Muntingia calabura	Jamaica Cherry	Muntingiaceae
Peltophorum pterocarpum	Haladi Gulmohur	Caesalpiniaceae
Phoenix sylvestris	Wild date	Arecaceae
Phyllanthus reticulatus	Karihuli	Euphorbiaceae
Pithecellobium dulce	Seema hunase	Mimosaceae
Pongamia pinnata	Honge	Fabaceae
Prosopis juliflora	Mesquite	Mimosaceae
Prosopis spicigera	Banni	Mimosaceae
Samanea saman	Male mara	Mimosaceae
Sarcostemma acidium	Leafless East Indian Wine	Asclepiadaceae
Spathodea companulata	Nirukai mara	Bignoniaceae
Syzygium cumini	Nerale mara	Myrtaceae
Tamarindus indica	Tamarind	Caesalpiniaceae
Tarenna asiatica	Asiatic Tarenna	Rubiaceae
Tectona grandis	Sagavani	Verbenaceae
Terminalia arjuna	Arjun	Combretaceae
Tylophora indica	Antamula	Assclepiadacae
Vitex negundo	Nirgundi	Verbenaceae
Wattakaka volubilis	Sneeze Wort	Asclepiadaceae
Wrightia tinctoria	Kondamurki	Apocynaceae
Ziziphus glabrata	Irula	Rhamnaceae
Ziziphus horrida	Kotta mullu	Rhamnaceae
Ziziphus mauritiana	Yalachi	Rhamnaceae
Ziziphus oenoplia	Jackal jujube	Rhamnaceae

List of herbs and herbaceous species found upto 10 kms from project site

Scientific name	Family
Acalypha indica	Euphorbiaceae
Achyranthes aspera	Amaranthaceae
Aerva lanata	Amaranthaceae
Aerva tomentosa	Amaranthaceae
Ageratum conyzoides	Asteraceae

Scientific name	Family
Alternanthera pungens	Amaranthaceae
Alternanthera philoxeroides	Amaranthaceae
Alternanthera sessilis	Amaranthaceae
Alternanthera triandra	Amaranthaceae
Alysicarpus monilifer	Fabaceae
Andrographis echinoides	Acanthaceae
Aristida adscensionis	Poaceae
Blepharis repens	Acanthaceae
Boerhaavia diffusa	Nycataginaceae
Cassia occidentalis	Caesalpiniaceae
Cassia tora	Caesalpiniaceae
Cenchrus ciliaris	Poaceae
Cenchrus setifgera	Poaceae
Chloris barbata	Poaceae
Chrysopogon fulvus	Poaceae
Cleome viscosa	Cleomaceae
Crotalaria medicaginea	Fabaceae
Crotalaria mysorensis	Fabaceae
Crotalaria verrucosa	Fabaceae
Croton bonplandianum	Euphorbiaceae
Cuscuta reflexa	Cuscutaceae
Cyanodon dactylon	Poaceae
Cymbopogon caesius	Poaceae
Cymbopogon coloratus	Poaceae
Cynodon dactylon	Poaceae
Cyperus aristatus	Cyperaceae
Cyperus rotundus	Cyperaceae
Cyperus triceps	Cyperaceae
Dactyloctenium aegyptium	Poaceae
Datura alba	Solanaceae
Datura metel	Solanaceae
Desmodium triflorum	Fabaceae
Dichanthium annulatum	Poaceae
Digera muricata	Amaranthaceae
Digitaria bicornis	Poaceae
Digitaria setacea	Poaceae
Echinops echinatus	Asteraceae
Eclipta alba	Asteraceae
Eclipta prostrata	Asteraceae

Scientific name	Family
Eragrostis tenella	Poaceae
Eremopogon foveolatus	Poaceae
Euphorbia hirta	Euphorbiaceae
Euphorbia thymifolia	Euphorbiaceae
Evolvulus alsinoides	Convolvulaceae
Gomphrena globosa	Amaranthaceae
Hedyotis corymbosa	Rubiaceae
Hedyotis puberula	Rubiaceae
Heliotropium indicum	Boraginaceae
Heteropogon contortus	Poaceae
Hyptis suaveolens	Labiatae
Justicia diffusa	Acanthaceae
Kyllinga triceps	Cyperaceae
Leucas aspera	Lamiaceae
Leucas longifolia	Lamiaceae
Lippia nodiflora	Verbenaceae
Malvastrum coramandelianum	Malvaceae
Merremia gangetca	Convolvulaceae
Merremia tridentata	Convolvulacee
Mollugo hirta	Aizoaceae
Ocimum americanum	Lamiaceae
Ocimum basilicum	Lamiaceae
Ocimum canum	Lamiaceae
Ocimum sanctum	Lamiaceae
Oldenlandia herbacea	Rubiaceae
Oldenlandia umbellata	Convolvulaceae
Oldenlandiua corymbosa	Rubiaceae
Oxalis corniculata	Oxalidaceae
Panicum psilopodium	Poaceae
Panicum repens	Poaceae
Parthenium hysterophorus	Asteraceae
Peristrophe bicalculata	Acanthaceae
Phyllanthus niruri	Euphorbiaceae
Physalis minima	Solanaceae
Polygala arvensis	Polygalaceae
Polygala erioptera	Polygalaceae
Portulaca oleracea	Portulaccaceae
Saccharum munja	Poaceae
Scilla hyacinthina	Liliaceae

Scientific name	Family
Sida acuta	Malvaceae
Sida cordifolia	Malvaceae
Solanum nigrum	Solanaceae
Solanum surattense	Solanaceae
Spermacoce hispida	Rubiaceae
Spermacoce articularis	Rubiaceae
Spermacoce stricta	Rubiaceae
Trianthema decandra	Aizoaceae
Trianthema portulacastrum	Aizoaceae
Tribulus terrestris	Zygophyllaceae
Tridax procumbens	Asteraceae
Vernonia cinerea	Asteraceae
Xanthium strumarium	Asteraceae
Zornia gobbosa	Asteraceae

APPENDIX P: FAUNA OF THE WORKING PLAN AREA

(upto 10 kms from project site)

(Source: literature review from previous IEE studies of district)

A list of vertebrates other than birds reported upto 10 kms. from the study area

Scienfific name	Common name	WPA Schedule
Mammals		
Axis axis	Cheetal/Spotted Deer	III
Bandicota bengalensis	Indian mole rat	IV
Bandicota indica	Bandicoot rat	IV
Canis aureus	Golden Jackal	II
Cynopterus sphinx	Short-nosed Fruit Bat	IV
Dacnomys millardi	Large-toothed giant rat	IV
Funambulus palmarum	Three-striped palm squirrel	IV
Golunda ellioti	Indian bush rat	IV
Herpestes edwardsii	Common mongoose	IV
Herpestes javanicus	Small Indian mongoose	IV
Lepus nigricollis	Indian Hare/Blacknaped Hare	IV
Macaca mulatta	Rhesus Macaque	II
Megaderma lyra	Indian false vampire Bat	IV
Megaderma spasma	Asian false vampire Bat	IV
Mus booduga	Indian field mouse	IV
Mus dunni	House/Rice-field mouse	IV
Parascaptor leucura	White-tailed Mole	IV
Rattus rattus	Common house rat	IV
Soriculus leucops	Indian long-tailed shrew	IV
Sus scrofa	Indian wild boar	III
Vulpes bengalensis	Indian fox	IV
REPTILES	(P=Poisonous)	
Ahaetulla nasutus	Vine snake	IV
Amphiesma stolata	Buffstriped keelback	IV
Bungarus caeruleus	Common krait (P)	IV
Calotes versicolor	Garden lizard	IV
Chameleon zeylanicum	Chameleon	IV
Coelognathus helena	Trinket snake	IV
Daboia russelii	Russell's viper (P)	IV
Dendrelaphis tristis	Bronzebacked tree snake	IV
Echis carinatus	Saw scaled viper (P)	IV
Hemidactylus flaviviridis	Wall lizard	IV

Scienfific name	Common name	WPA Schedule
Hemidactylus frenatus	Small wall lizard	IV
Lissemys punctata	Indian plapshell turtle	IV
Lycodon aulicus	Pond Wolf snake	IV
Macropisthodon plumbicolor	Green keelback	IV
Naja naja	Cobra (P)	II
Oligodon arnensis	Common kukri	IV
Oligodon taeniolatus	Variegated or Russell's kukri	IV
Pangshura tentoria	Indian Tent turtle	IV
Ptyas mucosa	Rat snakes	IV
Ramphotyphlops braminus	Blind snake	IV
Varanus bengalensis	Common Indian monitor	IV
Xenochrophis piscator	Checkered keelback	IV
AMPHIBIANS		
Bufo melonosticatus	South Indian Toad	IV
Cacopus bystema	Burrowing frog	IV
Hyla arboria	Tree Frog	IV
Rana hexadactyla.	Ordinary frog	IV
Rana tigrina	Tiger Frog	IV

List of birds reported upto 10 kms from the study area

(source: literature review from previous studies of Gudlupete)

Scientific name	Common name	Family	WPA Schedule
Accipiter badius	Shikra	Accipitridae	IV
Acridotheres tristis	Common Myna	Sturnidae	IV
Acrocephalus agricola	Paddyfield Warbler	Sylviidae	IV
Acrocephalus stentoreus	Clamorous Reed Warbler	Sylviidae	IV
Actitis hypoleucos	Common Sandpiper	Scolopacidae	IV
Aegithina tiphia	Common Iora	Aegithinidae	IV
Alauda gulgula	Oriental Skylark	Alaudidae	IV
Alcedo atthis	Common Kingfisher	Alcedinidae	IV
Anas acuta	Northern Pintail	Anatidae	IV
Anas clypeata	Northern Shoveler	Anatidae	IV
Anas penelope	Eurasian Wigeon	Anatidae	IV
Anas poecilorhyncha	Spot-billed Duck	Anatidae	IV
Anas querquedula	Garganey	Anatidae	IV
Anas strepera	Gadwall	Anatidae	IV
Anser indicus	Bar-headed Goose	Anatidae	IV
Anthus hodgsoni	Olive-backed Pipit	Motacillidae	IV

APPENDIX Q: PHOTO DOCUMENTAION

Acceess road

Project site

Site office inside the solar plant

Boundary wall

Water tank in the project site

Toilet in the project site

Water supply through tanker

GSS

Oil Storage area in the project site

Water supply in the project site

Bore well in the project site

Water storage reservoir in adjacent to bore well

DG set at project site

Consultation with project proponent and land aggregator

Community Consultation

Agricultural activity in the study area

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