ARCADIS Design & Consultancy for natural and built assets

ENVIRONMENTAL & SOCIAL IMPACT ASSESSMENT STUDY

for 50 MW Solar Project at Plot 2 in Ananthapuramu Ultra Mega Solar Park, Andhra Pradesh

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Prepared for:

Fotowatio Renewable Ventures(FRV)

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Disclaimer:

Information contained in this report is based on the observations during survey and interview with stakeholders. The interpretation of data and judgment is based on the professional experience and represent professional opinion of the interpreter.

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LIST OF ABBREVIATIONS

AC	Alternating Current
ADB	Asian Development Bank
APGENCO	Andhra Pradesh Power Generation Corporation Limited
APSIDC	Andhra Pradesh State Irrigation Development Corporation
APSPCPL	Andhra Pradesh Solar Power Corporation Private Limited
APTRANSCO	Transmission Corporation of Andhra Pradesh
BEE	Bureau of Energy Efficiency
BPL	Below Poverty Line
CGWB	Central Ground Water Board
CHNC	Community Health & Nutrition Cluster
CPCB	Central Pollution Control Board
CPR	Common Property Resources
CSR	Corporate Social Responsibility
CTE	Consent to Establish
CTO	Consent to Operate
DC	Direct Current
DISCOM	Distribution Company (India)
DMHO	District Medical & Health Officer
DWCRA	Development of Women and Children in Rural Areas
E&S	Environmental and Social Risk
ECC	Emergency Control Centre
EHS	Environmental Health and Safety
EIA	Environment Impact Assessment
EPC	Engineering, Procurement & Construction
EPFI	Equator Principles Financial Institutions
ESDD	Environment & Social Due Diligence
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental Social Management Plan
ESMS	Environmental Social Management System
ESSG	Environmental Social Safety and Governance
FI	Financial Institutions
FRV	Fotowatio Renewable Ventures
GHG	Green House Gases
GHI	Global Horizontal Irradiation
GRM	Grievance Redressal Mechanism
GSS	Grid Substation
IFC	International Finance Corporation
IFC PS	International Finance Corporation Performance Standards
ILO	International Labour Organization

IUCN	International Union for Conservation of Nature
KLD	Kilo Litre per day
LA	Livelihood Assessment
LIA	Livelihood Impact Assessment
Lpcd	Litre per capita per day
LRP	Livelihood Restoration Plan
MNRE	Ministry of New and Renewable Energy
MOEFCC	Ministry of Environment, Forest and Climate Change
NAAQS	National Ambient Air Quality Standards
NABARD	National Bank for Agriculture and Rural Development
NABL	National Accreditation Board for Laboratory
NREDCAP	New and Renewable Energy Development Corporation of Andhra Pradesh.
NTPC	National Thermal Power Corporation Limited
O&M	Operation and Maintenance
OEM	Original Equipment Manufacturer
OHS	Occupational Health and Safety
PAP	Project Affected People
PPA	Power Purchase Agreement
PPE	Personal Protective Equipment
PS	Performance Standard
PUC	Pollution under control certificate
PV	Photo Voltaic
R & R	Rehabilitation & Resettlements
RF	Reserve Forest
SBM	Swachh Bharat Mission
SECI	Solar Energy Corporation of India
SGWD	State Ground Water Department
SH	State Highway
SHG	Self Help Groups
SOP	Standard Operation Procedures
SPCB	State Pollution Control Board
SPD	Solar Power Developer
SPHO	Senior Public Health Officers
SPPD	Solar Power Park Developer
TDS	Total Dissolved Solids
USDA	United States Department of Agriculture
WPA	Wildlife Protection Act

EXECUTIVE SUMMARY

Background	Ananthapuramu Ultra Mega Solar Park with a cumulative capacity of 1500 MW is being developed. Out of which 1000 MW is being developed by NTPC. Remaining 500 MW is being developed by SECI. SECI - a Government of India controlled Public Sector Undertaking is developing the 500 MW projects in 10 plots of 50 MW each. FRV has been awarded two Plots (2 & 8) within the solar park out of the ten solar project contracts with a commissioning deadline in the month of October 2017. FRV is willing to develop, finance, construct and operate the Solar PV Project. FRV has instituted two wholly owned special purpose companies (SPVs) incorporated in India for managing the Projects viz. FRV Andhra Pradesh Solar Farm – I Private Limited and FRV India Solar Park – II Private Limited. Arcadis India Pvt Ltd (Arcadis) as an environment consultant has been appointed by FRV to undertake the ESIA study for 50 MW solar generation plant at P2 plot in Ananthapuramu Ultra Mega Solar Park. The ESIA was conducted in January –February 2017 to assess any potential impacts (both negative and positive) that may arise from the construction, operation and decommissioning of the solar plant. The Environmental and Social Impact Assessment (ESIA) study for the project has been undertaken in accordance with terms of reference approved by International Finance Corporation's (IFC) Performance Standards (PS) on Social and Environmental Sustainability, 2012; IFC's general guidelines of Environment, Health and Safety, 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	FRV's 50 MW solar power project at P2 plot in Ananthapuramu Ultra Mega Solar Park is located at Thumu Kunta village under Galiveedu Mandal of Kadapa district, Andhra Pradesh. Power from the solar photovoltaic plant will be evacuated by APSPCL to 33/220 kv substation (Pooling Substation), located 0.5 km away from the P2 site. The Pooling substation will be connected to a 220/400 kv grid substation (GSS). GSS is already in operational stage for other solar units. Distance between PSS of P2 to GSS is approximately 8km.The project is expected to be commissioned by October 2017. The approach route for the transmission line will be based on a criterion to reduce the environmental and socioeconomic footprint of the transmission line. The project is in preconstruction phase and land procurement is under progress by APSPCL. The proposed land is generally flat with some undulating and barren area. The site is easily accessible through Kadri - Rayachotty State Highway, SH-34. Existing village roads will also be utilized as access road to the site. Nearest railway station is Nallacheruvu located approximately 35 km away from the site.
Applicable IFC's Performance Standards	The following IFC's performance standards are applicable for this project: PS1: Social and Environmental Assessment and Management Systems, PS2: Labour and Working Conditions, PS3: Resource Efficiency & Pollution Prevention, PS 4: Community Health, Safety and Security, PS5: Land Acquisition and Involuntary Resettlement, PS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources. Also, IFC's core labour standards are applicable to the project. The project does not fall in the Scheduled Area and project affected villages have minimal scheduled tribe population. Moreover as informed by APSPCL, no tribal land has been acquired. Hence, PS 7 may not be applicable. The project site and the study area does not have any cultural resource of significance, Hence PS8: Cultural Heritage is not applicable for this project.

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. FRV needs to develop, follow and implement own Environmental and Social Management System (ESMS) 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. FRV should also appoint a qualified E&S personnel with appropriate responsibility to implement/ oversee/ monitor the following: *Construction Phase* a) Performance of contractors on labour and health & safety aspects *Operation Phase* a) Periodic monitoring of social and environmental performance b) Internal and third party audit c) Management review *Both for Construction and Operation Phase* a) Implementation of the ESMP b) Community engagement and grievance redressal system/mechanism c) Regular training of employees and contractors d) Emergency preparedness and response e) Periodic reporting of E&S performance to the management Hence PS1 is applicable.
PS2: Labour and Working Conditions	The project will involve labour for civil construction and erection *During construction phase* Labours would be involved in civil construction and erection of solar panels. About 500 labours, along with a few skilled personnel are estimated to be employed in the peak construction phase. Onsite labour camp will be constructed for only the migrant labours till the completion of construction phase. *During operation phase* In the operational phase, a total of about 60 personnel expected to be required onsite including security guards, operation and maintenance staff and site engineers. Labours and workers would be involved in O&M and security. Additional Labours will be deployed on as need basis for module washing and vegetation abatement. Hence PS 2 is applicable.
PS3: Resource Efficiency & Pollution Prevention	The project involves use of resources like land and water. Improper handling of broken and damage solar panel may result in soil contamination. Improper handling of spent oil may lead to contamination of soil and ground water. *During construction* Top soil management is required during site levelling. Construction activities may lead to air and noise emission which needs to be managed. Broken / damaged solar panels may result in contamination of soil and ground water. The project would involve clearing of ground (grass, shurbs etc) vegetation. Construction and demolition waste along with waste water from labour camp and solid waste needs to be managed properly. Water will be used in construction and at labour camp.

	During operation The project would use water for cleaning of solar module & domestic requirement. Improper handling of broken / damaged solar panels may result in contamination of soil and ground water. Other solar plants are also located in the region. Diesel / transformer oil / spent oil may contaminate soil and water. Hence PS3 is applicable
PS4: Community Health, Safety and Security	Communities would be effected due to project activity: *During construction* The project envisages influx of migrant labours, who will be accommodated in the labour camp. These labours are expected to interact with community. Hence, there is a possibility of confrontation between migrant labour and local community. Heavy vehicles carrying solar panel and equipment may use village roads to access site. Health and safety concern of workers needs to be addressed. Proper barricading/ fencing of safety practices at construction site would impact exposure of community to site related risk. Common property may be utilised during construction phase. Access may be restricted / rerouted. *During operation* The Pooling Station, Grid Sub Station etc. are located within a close proximity to the solar plant and within the 1500 MW Ultra Mega Solar Park. A number of staff will remain involve during the operation period. The project will generate electrical energy and transmitting the same through High Voltage power line, thereby exposing the staff/ community to electrical injury. Construction of boundary wall may result in restriction of access/ increased distances from common property. Interaction of community with project staff especially security staff would occur. Improper handling of hazardous waste including but not limited to broken / damaged solar panel may contaminate land and water with heavy metal (including but not limited to cadmium) thus impacting the community. Thus PS 4 is applicable,
PS 5: Land Acquisition and Involuntary Resettlement	Andhra Pradesh Solar Power Corporation Private Limited (APSPCL) is the nodal agency and responsible for all land related matter involved in the project. As information retrieved from the APSPCL representative, major part of the plot P2 is in revenue (govt.) land, with a few patches of assigned lands. The assignees of the assigned lands are being compensated with a compensation amount agreed in negotiation meeting headed by competent authority. In absence of land related documents for acquisition of land specific to the project activity, acquisition of private land for the project activity cannot be ruled out. As informed by FRV around 223.74 Acres of the total lands in Plot No. P2 is Govt. Land, around 4.91 Acres are Private Lands and around 16.73 Acres are assigned lands. Total lands amounting to around 250 Acres for P2. As mentioned earlier, 2.79 Acres of lands from the total assigned lands are from one single member of ST community (under Survey No. 1108-2). As observed during visit the land are dry and devoid of major cultivation within the area of Plot No. P2 at Thumu Kunta village. But, since lands were acquired chances of economic displacement and the livelihood resources can't be ruled out. Thus, PS 5 is applicable for this project. However since FRV has not directly acquired land, the covenants as proposed by this PS is not implemented by FRV.

PS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	Thumu Kunta RF is located within 1-2 km from P2 location and the vegetation cover of the project site is similar to the degraded natural vegetation found in the study area. Sloth bear and leopard are reported to be present around the project site as per consultation with the forest officials and villagers. These are protected and conserved under Indian Wildlife Protect Act (1972). As there is a risk of 'Man Wildlife Conflict" during construction phase due to influx of migrant labours and project personnel, PS -6 is applicable for the project. 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. • 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** • 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.
PS 7: Indigenous Peoples	According to Census, 2011, around 3% population in Thumu Kunta village belongs to ST category. As information provided by FRV around 2.79 acres of Assigned Land bearing survey number 1108 -2 were taken from a ST Community member for Plot No. P2 in Thumu Kunta Village. But, no supporting documents with regard to Free, Prior, Informed Consent (FPIC), as referred in IFC PS Document, of the Affected Communities has been provided. Hence, PS 7 seems to be applicable.
PS 8: Cultural Heritage	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 proposed to be used for commercial purposes. No notified Cultural Heritage site is located near the project area. Hence, PS8 is not applicable.
Key Project Impacts – Construction Phase	*Impact on livelihood:* Land for the project activity are being acquired by Andhra Pradesh Solar Power Corporation Private Limited (APSPCL), a government entity. Agreed compensation are being paid to the affected landholders. *Impact on drainage*: Papagni river and its channels are located in the study area. Some alteration in topography due to the project development would result in impacting local water balance to some extent in the nearby areas.

	Access restriction: Since project involves constructing boundary wall to large parcel of land the community may face access restriction. *Impact on air quality:* Generation of fugitive dust due to movement of project vehicles, transportation of fine material (if not covered) and emission from diesel generators. Impact will be limited to the construction phase only. *Water resources*: Water will be used through bore well during construction phase. As per CGWB categorisation w.r.t to the groundwater development, the mandal in which project site falls are mentioned under "Safe" category. Hence, impact on the ground water is anticipated to be low, based on the water requirement and duration of construction phase. *Conflict between migrant and local community*: Due to the large number of workers involved in the construction phase. Social impact associated with migrant labourer and possible conflict with local population is envisaged. *Traffic Load:* At all project sites, State Highway- SH34 & the village road, will be used for movement of trailer trucks carrying solar plant parts and other heavy vehicles for the project activity along with the movement of labours and other project materials. Hence, the impact w.r.t increase in traffic load is envisaged. *Impact on Fauna:* Presence of wildlife in the reserve forest near the project area has been reported, but presence of wildlife in the project area is rare. Impact is anticipated on the movement and injury to the wildlife due to project activity.
Key Project Impacts – Operation Phase	*Access restriction:* Since project involves constructing boundary wall to large parcel of land the community may face access restriction *Soil contamination:* Storage / improper disposal of broken / damaged solar panel and used oil from transformer may result in soil / ground water contamination. *Impact on water resources*: Water will be required mainly for washing of solar panels. During operation phase ground water will not be used, therefore groundwater resources will not be impacted. APSPCL will provide and supply water from the Veligallu reservoir during the operation phase. Moreover, jet water spray method/dry cloth wiping method would be further adopted for minimizing the consumption of water. *Occupational health and safety of workers:* Accidents like electrocution, short circuits may lead to occupational health and safety issues, for which proper training to workers need to be given to combat the same as well as it needs to be further ensured that the workers wear appropriate PPE's according to their nature of work involved. *Social Welfare:* To reduce the dissatisfaction among the local people regarding the project activity, maximum job opportunity through direct & indirect employment opportunity should be provided to the local people. In this regard APSPCL will be responsible. Besides, a community development plan along with a grievance redressal mechanism should be followed. Complaints received by local people should be registered, investigated and timely resolved. Ecological Impact: Sufficient height of the project boundary fencing will prohibit the entry of wildlife into the area. It would also be expected that glare effect from the solar plant will not be impacted to the avian species in the region as other plants are in operation phase and as such no evidence was reported.
Key Mitigation Measures	Appropriate mitigation measures have been planned and recommended in the ESIA report. It is recommended to implement the ESMP during the entire life cycle of project. These measures will minimise the impacts on air, water, soil, noise quality, solid and liquid effluent waste, ecology and socio-economic conditions. The activities of the project during both construction and operation phase will help in improving the socioeconomic condition of the surrounding area.

	Construction Phase • Drainage study and drainage management plan should be formulated prior to site levelling and modification of site topography • Widening and Restoration of village road, if damaged due to movement of heavy vehicles • Water sprinkling on road should be undertaken to reduce emissions during transportation. • Fine material (e.g. sand etc.) should be covered during transportation. • Proper PPE's viz. gloves, glasses, helmet and shoes should be worn by workers/labours while handling solar panels as well as during other activity during construction phase. • The accessibility of the local people should not be impacted due to solar power plant. Alternative access should be provided to compensate for access restriction, if any. • It should be ensured that the accommodation provided to the migrant workers should have basic amenities such as electricity, drinking water, health & sanitation facility and kitchen. • Integral noise shielding to be used where practicable and fixed noise sources to be acoustically treated, for example with silencers and enclosures to minimize the noise. • Hazardous materials such as waste oil, used oil should be stored at designated locations in enclosed structures over impermeable surface. Hazardous waste authorisation needs to be obtained from regulators • Complaint register should be maintained onsite to receive complaints from local people and workers and needs to be timely address. Such complaints should be acted on and escalation matrix be provided. • 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. • Recovery of ground (mostly grasses and herbs) vegetation under the PV panels and in other places that do not need to remain cleared shall be encouraged to grow. • Planting native, fast growing trees on access roads and/ or in nearby barren areas/ schools/ Panchayat office which may also give an alternate habitat to the faunal species especially the bird species and maintain the ecological balance. *Operational Phase:* • Appointment of authorised recycler for broken / damaged solar module and used oil. • Implement the recommended complaint resolution procedure (Grievance Redressal Mechanism) to assure that any complaints regarding any issue related to project activity is not left unnoticed. The complaints should be registered, investigated and timely resolved. • 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.
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), disposal of broken / damaged solar panel 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 kind of impacts of the project on environment, resources, biodiversity, labours and community, the project is categorized as **Category B** from the perspective of environment safeguard.

From the perspective of IFC categorisation as well, the project is categorised as Category B.

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

A joint venture company has been formed in agreement between SECI (Solar Energy Corporation of India), APGENCO (Andhra Pradesh Power Generation Corporation Limited) and NREDCAP (New & Renewable Energy Development Corporation of Andhra Pradesh Ltd.) for development of Solar Park in Andhra Pradesh. The JV Company is known as Andhra Pradesh Solar Power Corporation Private Limited (APSPCL) has been designated as Solar Power Park Developer (SPPD) for facilitation and implementation of Ananthapuramu Ultra Mega Solar Park (1500 MW) to be developed at NP Kunta Mandal, Ananthapuram District and Galiveedu Mandal, Kadapa District in Andhra Pradesh.

Fotowatio Renewable Ventures (FRV) is a leading global solar development company with a 4.3 GW development portfolio in the emerging solar markets including Australia, the Middle East, Africa and Latin America. Since 2006, the management team of FRV has completed the construction, operation, maintenance and financing of over 650 MW of photovoltaic and CSP solar energy plants. Such projects represent more than $2.5 billion in total financings with more than 20 leading banks. FRV Solar Holdings XI BV has been granted, through international competitive bidding, 2 x 50MW Solar Power Projects in the State of Andhra Pradesh in India by Solar Energy Corporation of India Limited (SECI) - a Government of India controlled Public Sector Undertaking. SECI has proposed to set up 500 MW capacity solar projects through international competitive bidding process inside a solar park being developed by Andhra Pradesh Solar Power Corporation Private Limited (APSPCL). FRV has been awarded two (50 MW each of Plots 2 & 8 within the solar park) out of the ten solar project contracts with a commissioning deadline in the month of October 2017. FRV is willing to develop, finance, construct and operate the Solar PV Project. FRV has instituted two wholly owned special purpose companies (SPVs) incorporated in India for managing the Projects viz. FRV Andhra Pradesh Solar Farm – I Private Limited and FRV India Solar Park – II Private Limited.

A solar power plant is a superior and a clean option for power generation in comparison to non-renewable fossil fuels. Ministry of Environment, Forest and Climate Change (MoEF&CC) in its Office Memorandum No. J-11013/41/2006-IA. II (I) dated 13th May, 2011 stated that the solar photovoltaic power projects are not covered under the ambit of EIA Notification, 2006 and therefore does not require prior environmental clearance. Moreover, solar power plant has been categorized under white category and exempted to obtain consent to operate (CTO) from state pollution control board. CPCB in its order published on 7th March 2016 has directed to all the SPCB about the categorization of industries. This categorization has been done on the basis of potential of industries to cause pollution. All the non-polluting industries has been categorized under white category and does not requires consent to operate (CTO). Only, intimation to SPCB while starting the industry will suffice.

As per Andhra Pradesh Solar Power Policy, 2015, Solar PV power projects will be exempted from obtaining any NOC/Consent for establishment under pollution control laws from AP Pollution Control Board.

Arcadis India Pvt. Ltd. (Arcadis) as an environment consultant has been appointed by FRV to undertake the ESIA study for 50 MW solar generation plant at P2 plot under Thumu Kunta village. The ESIA was conducted to assess any potential impacts (both negative and positive) that may arise from the construction, operation and decommissioning of the solar plant. Environmental sustainability in relation to the solar power generation project will be enhanced by designing the solar power plant that gives competitive advantage over existing energy sources. The overall benefits of the solar power system are expected to outweigh the potential negative impacts (if any). The Environmental and Social Impact Assessment (ESIA) study for the project has been undertaken in accordance with terms of reference approved by International Finance Corporation's (IFC) Performance Standards (PS) on Social and

Environmental Sustainability, 2012; IFC's general guidelines of Environment, Health and Safety; 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.

1.2 Project Location

The 50 MW solar power project site at P2 plot in Ananthapuramu Ultra Mega Solar Park is located at Thumu Kunta village under Galiveedu Mandal of Kadapa district, Andhra Pradesh. Power from the solar photovoltaic plant will be evacuated to 33/220 kv substation (Pooling Substation), located less than 0.5 km away from the P2 site. The Pooling substation will be connected to a 220/400 kv grid substation (GSS). GSS is already in operational stage. Distance between PSS of P2 to GSS is approximately 8km.

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

Table 1-1: Salient Features of Project

S. N.	Salient Features	Details
1	Project Owner	FRV Andhra Pradesh Solar Farm – I
2	Total Project Capacity	50 MW
3	Location of Site	P2 plot at Thumu Kuntavillage
4	Tehsil/Mandal	Galiveedu
5	District	Kadapa
6	State	Andhra Pradesh
7	Project Coordinates	14°4'57.608"N 78°30'45.373"E
8	Nearest Town	Galiveedu Mondal
9	Total Land Area	Approximately 250 acre
10	Ownership of land	APSPCL
11	Land holding type	Entire land in the solar park constitutes of unassigned government lands& assigned government lands. APSPCL will provide the land to FRV for 25 years' lease
12	Type of Land use (5 km radius from site)	Agricultural land, open scrub, water body and forest area
13	Present status of the project	Project is at preconstruction phase and land acquisition is in progress
14	Power evacuation	33/220 kV Pooling substation located 0.5km away from P2 plot.
15	Mode of Implementation	By EPC (Engineering, Procurement and Construction)
16	Solar PV Technology	Polycrystalline modules are proposed to be used
17	Project Life	25 years

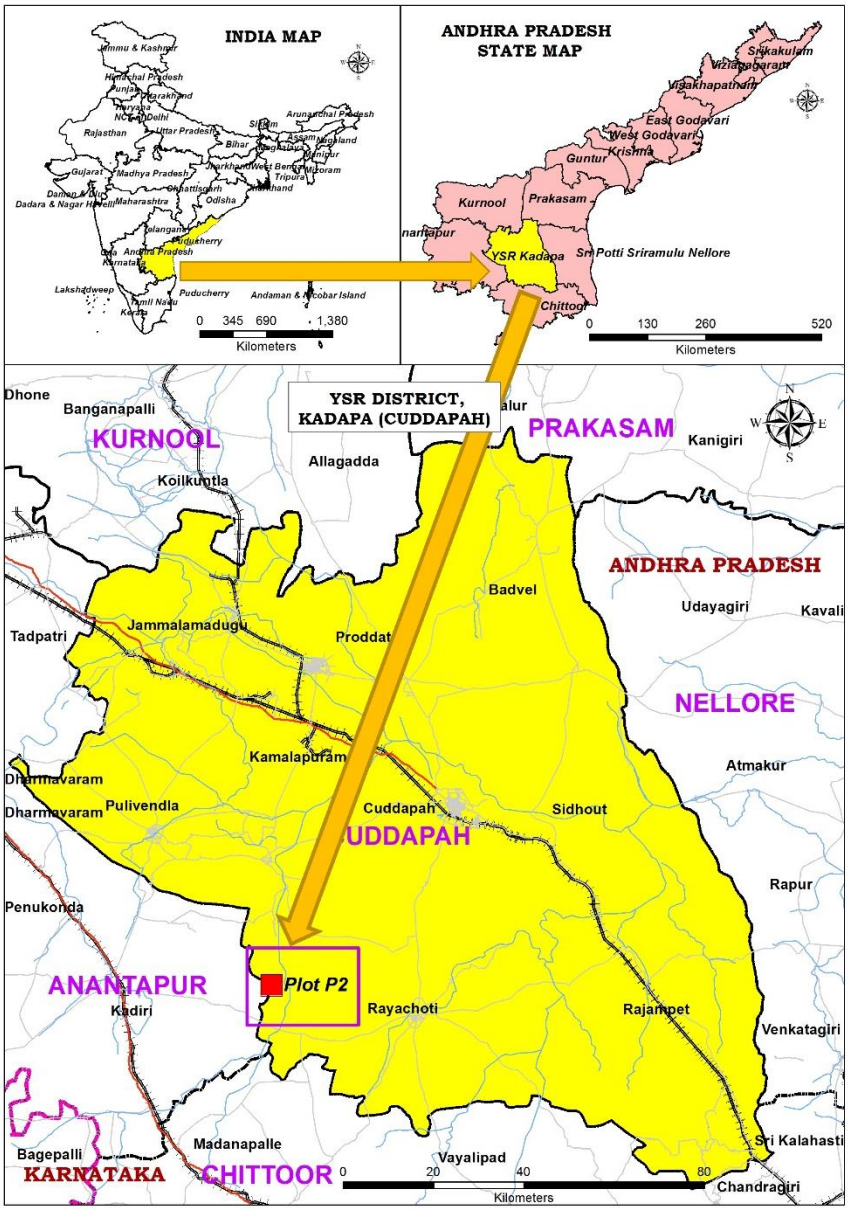
1.3 Project Phase and Status of Permits

The project is at pre-construction stage. The land procurement by ASPCL for proposed 50 MW solar power plant at Plot 2 is under progress during the time of this ESIA study. The required permits and approvals for the construction and operation of the project are summarised below:

Table 1-2: Required Permits & Approvals for the Project

S.N	Permits/Approvals	Status
1	Consent to Establish from Andhra Pradesh Pollution Control Board	Not required. However, Andhra Pradesh Pollution Control Board needs to be informed while starting the project.
2	Consents (CTE/CTO) if applicable for establishing batching plant	Applicable for batching plant and needs to be consulted with State Polution Control Board
3	Power Purchase Agreement	PPAs are effective from 16.09.2016
4	Approval for extraction of ground water	Needs to be obtained by FRV
5	Permission for utilization of surface water from the reservoir	APSPCL will provide the water during operation for which NOC is yet to be obtained from irrigation department.
6	Land procurement	Land procurement by APSPCL is under progress.

Figure 1-1: Project Location Map



1.4 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's general guidelines for EHS, 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 flora &fauna.
- Review of the land lease 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, household surveys 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.

1.4.1 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, ecology & biodiversity and traffic survey data collection of the site through primary and secondary sources.
- 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.

1.4.2 Limitations

The ESIA study has been carried out on the basis of project planning information and documents provided by the project proponent, stakeholder consultation and observations during ESIA study. Any major changes in the proposed activities may result in significant deviations of outcomes or impacts. Major limitations for the ESIA study includes:

- Land purchase process was in progress and entire land details for the proposed project was not available during site visit.
- Various policies of FRV and their EPC contractors were not available.

1.4.3 ESIA Team

ARCADIS has 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 30 solar power projects across India with over 1550 MW installed capacity. 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 50 MW solar power plant in Plot 2 is being developed under 1500 MW Ananthapuramu Ultra Mega Solar park of APSPCL. The project is expected to be commissioned by October 2017.The technical features of project is 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	Details
Type of Project &Project Capacity	Solar Photovoltaic Project of 50 MW capacity
PV Module	Polycrystalline Silicon Modules 72 cells module, Unitary Power - 320 Wand 16.51% efficiency
Inverter	Central inverters- 2.5 MW 20 Inverters Inverter Euro-Efficiency over 98% Maximum MPP (Maximum Power Point) Tracker to increase production Specification to reduce problems caused by dust, sand and heat. Grid Managing kit to ensure perfect grid integration
Mounting System	Fix Seasonal Mounting Structure Galvanized Steel Tilt : -5º / 20º
Monitoring System	Advanced photovoltaic monitoring system Allows management of the production, grid parameter, and communication with Grid Operator Includes O&M management system.

2.1 Present Status of Project

The project site visit was conducted in January-February 2017 and found that project is in preconstruction phase and land procurement is under progress by APSPCPL. The proposed land is generally flat with some undulating and barren area. Site is accessible through SH-34 connecting Kadri to Rayachotty. To some extent existing village road will also be used as access road. Project site and immediate vicinity are presented in **Figure 2-2**.

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

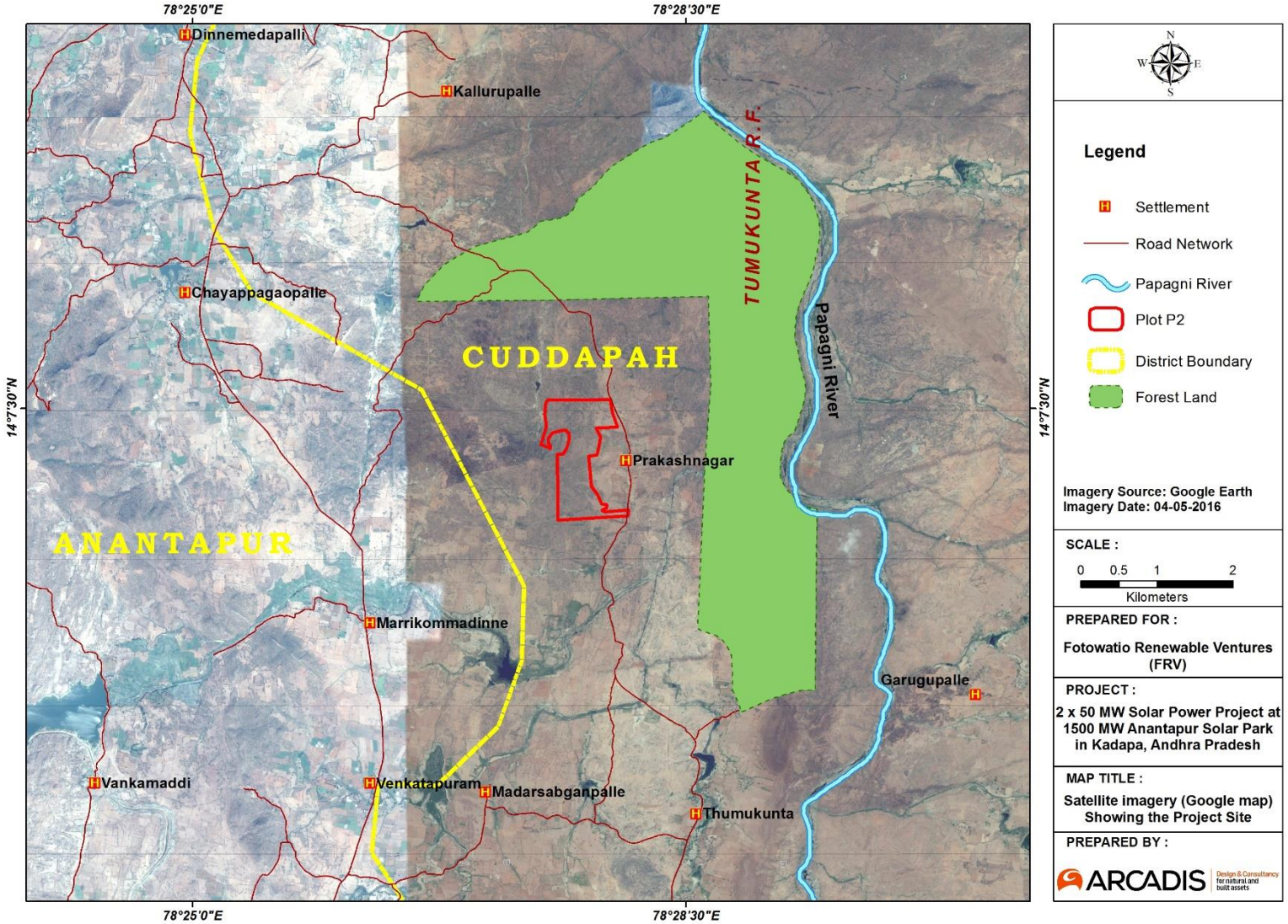
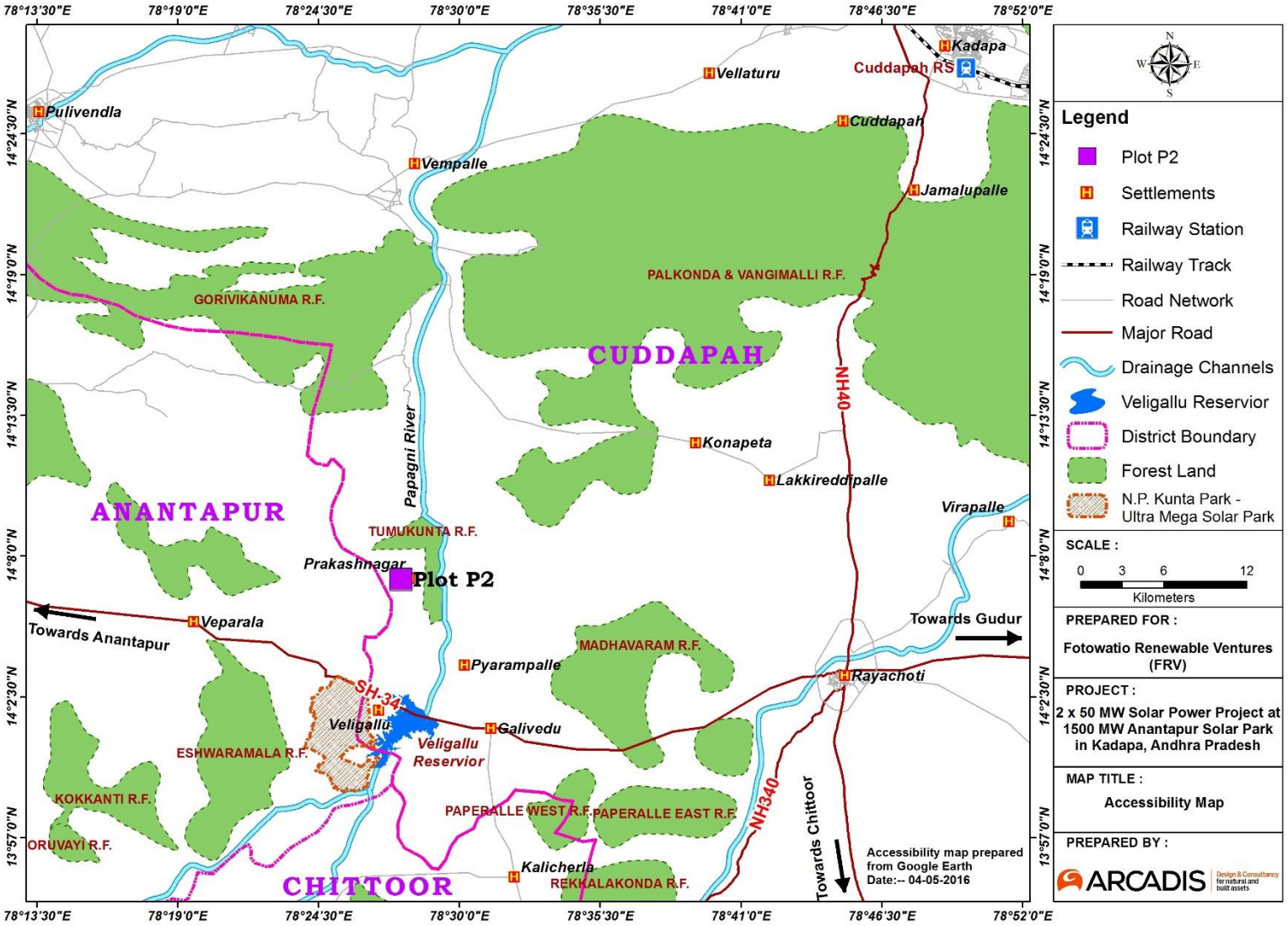


Figure 2-2: Accessibility of the Project Site



2.2 Site Suitability and Justification of Project

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

- **Solar radiation at the site:** Solar radiation map of India indicates that Andhra Pradesh receives a global horizontal irradiation (GHI) in the range of 5 to 5.5 kWh/m^2/day.
- **Topography:** The area proposed plot 2 is generally flat and open barren land with very mild slope in multiple directions. Installation of solar panel will be easy and reduce the cost of technical modifications require to adjust for undulations at the ground.
- **Substation proximity:** Power from the solar photovoltaic plant of 50 MW capacity will be evacuated to 33/220 kv substation (Pooling Substation of 150 MW), located 0.5 km away from the P2 site. The Pooling substation will be connected to a 220/400 kv grid substation (GSS). GSS is already in operational stage. Distance between PSS of P2 to GSS is approximately 8km.
- **Accessibility**: The site is easily accessible through Kadri - Rayachotty State Highway, SH-34. Existing village roads are also utilized as access road to the site. Nearest Railway station is Nallacheruvu located approximately 35 km away from the site. Kempegowda International Airport, Devanahalliat Bengaluru (Bangalore) is about 178 Km from Galiveedu via Kadapa-Bangalore Highway. **Figure 2.2** shows the accessibility of the project site.
- **Geological and soil conditions:** Galiveedu Mandal has extensive undulating plains with hilly and rocky areas. The soil of the Kadapa district has been classified into red ferruginous soil and black spoil. From the observation of the existing other solar power plants within the solar park, it is anticipated that geology and soil of the area will also support the proposed structures.
- It is also noted, the site was devoid of any habitation.

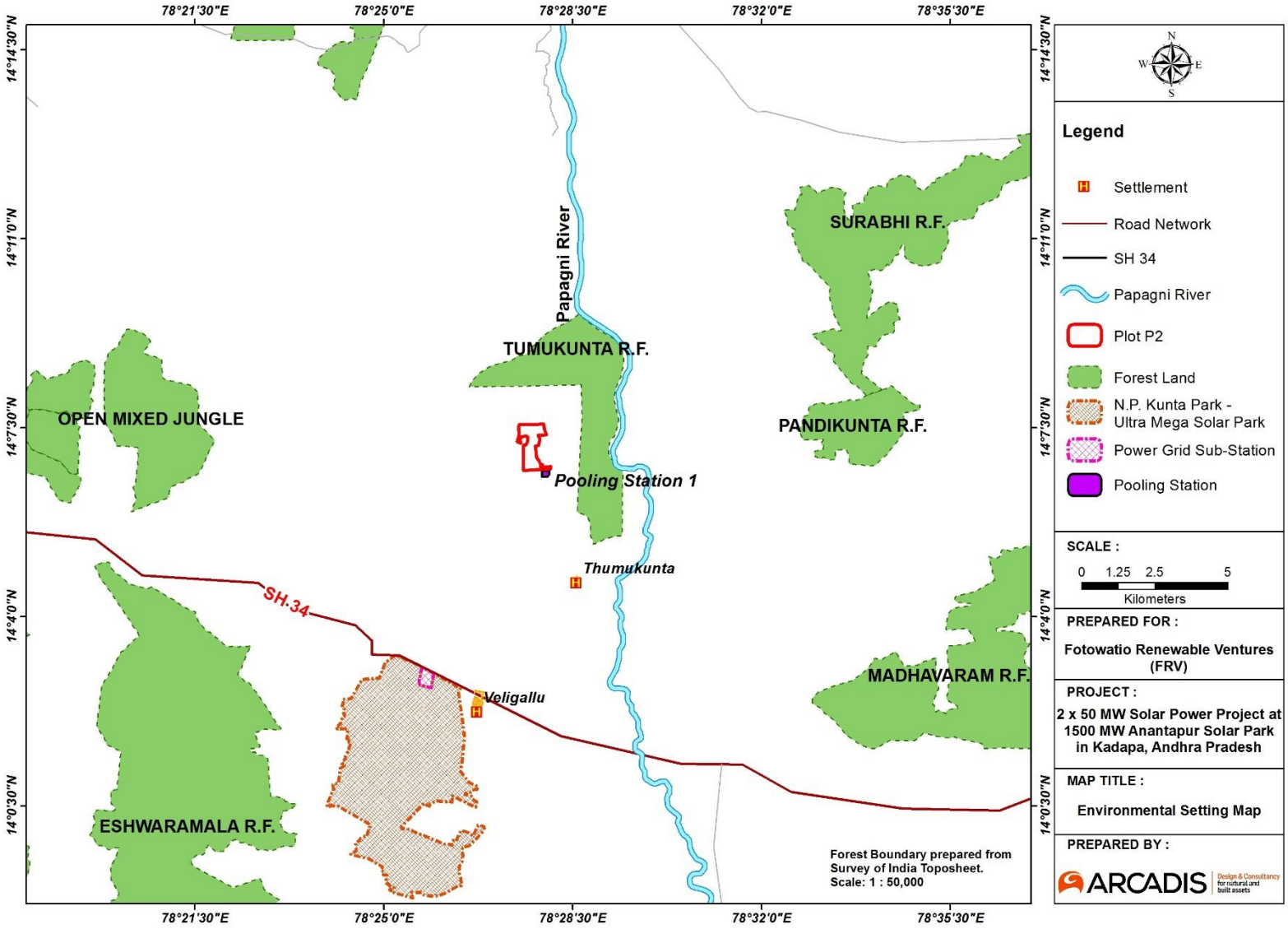
In light of above justification, the site has been found to be technically feasible for a solar power development.

2.3 Project Settings

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

- The site has mix terrain (flat land and slightly undulating land). Project site is located in non-agricultural barren land. It is noted during site visit that few patches of the project area are cultivated red grams only during monsoon season.
- There are no shading elements such as mountains or huge trees available on the site. Bushy type vegetation are present in/ near the site.
- Veligallu reservoir is located at a distance of approximately 7.85 km in the southern direction from the proposed P2 project site. The dam has been constructed on Papagni river. Currently the reservoir water is used for irrigation purposes. As APSPCL informed, approx. 0.3 TMC water will be withdrawn from the reservoir for the entire solar park.
- Three reserve forests (RF) are located within the study area. Thumu Kunta RF is located within 1-2 km and Pandi Kunta RF is located 8.4 km away from the proposed P2 location in Kadapa district. Ishwaramala Reserve Forest is located 11.6 Km away in Anantapur District.
- The nearest village settlement from the site is Prakash Nagar which is located adjacent outside of the eastern side of Plot 2 within Thumu Kunta village.

Figure 2-3: Environmental Setting Map Plot P2



N.P Konta Ultra Mega Solar Park

Existing Power Grid Substation at N.P. Konta

2.4 Project Design, Technology and Component

The 50 MW solar power plant will be based on Poly Crystalline solar PV technology. The main equipments of a PV Project are PV modules, inverters, mounting systems, PSS and GSS. The system consists mainly of the following components:

PV Modules: PV modules use light energy (photons) from the sun to generate electricity through the photovoltaic effect. PV modules technologies are divided in two main groups:

- *Crystalline Modules:* PV modules are composed by several cells (mainly 60 or 72) electrically connected. Cells are made by crystalline or polycrystalline silicon. This technology is predominant in large scale PV facilities to its high performance under different climatic conditions, maturity, low cost and huge number of providers.
- *Thin film:* Thin film PV modules are composed by a layer of PV material deposit over an isolating base. PV material could be made by different products (TeCd, s-Si,….), but only TeCd has got a relevant market share and is suitable for large scale PV plants. This technology has a good production under low radiation and high temperature conditions, but on the other handthere are short number of manufacturers and short track record.
- *PV Module:* Polycrystalline Silicon Modules, 72 cells module, 16.5% efficiency,310W expected unitary power

Inverters: A solar inverter, or PV inverter, converts the variable direct current (DC) output of a PV solar panel into a utility frequency alternating current (AC) that can be fed into a commercial electrical grid. Main types of inverters are:

- *String Inverters:* Small size inverters (1-10 kW) which are directly connected to the PV modules. This type of inverters have the advantage of an easy installation and maintenance tasks. But in large scale PV plants have several problems, such as the large amount of equipments required, lower performance and high price.
- *Central inverters:* Big inverters with a capacity up to 1MW. Skilled personnel is required to install and maintain this equipments, but the performance is very high and are cheaper than string inverters.

Inverter: Central inverters

- 2.5 MW output power of each inverter (20 Inverters will be installed)
- Inverter Euro-Efficiency over 98%
- MPP (Maximum Power Point) Tracker to increase production
- Specification to reduce problems caused by dust, sand and heat
- Grid Managing kit to ensure perfect grid integration

Mounting System: PV modules must be attached to a structure. This structure could be fix or may have a movement to follow the sun path.

- *Fix Structure:* No movement of the module. Structure has some inclination to improving the production.
- *One axis tracking system*: Structure has a movement from east to west, in order to follow sun path. Tilt of the module is fixed.
- *Two axis tracking system:* Structure could be moved in two axis then the module surface is able to be perpendicular to solar radiation every moment, and therefore get the maximum radiation.
- *Structure:* Fix Seasonal Mounting Structure from a reputable Indian manufacturer, Galvanized Steel, Tilt : -5º / 20º

Grid Connection: The planned grid connection point is located in the 220/400 kV Solar Park Substation. Project will be connected to 33 kV side of a 33/220 kV of one of the two S.P. pooling stations. These pooling stations will be connected to a 220/400 kV interconnection Substation. Metering will be done in 220 KV side of the interconnection station. Maximum Output Power in connection point will be 50 MW. Solar Park Corporation will be in charge of the Pooling Substations, Interconnection Substation and 220 KV line between them. Project Company will be in charge of lay the 33 kV cables from the project plot to the Pooling Substation.

Grid Stability: PV systems have customizable control features that allow them to provide grid management. This allows PV systems to stabilize power grids. Advanced power electronics and communication components ensure compliance with all PV power plant grid requirements. The ability to reduce the feed-in rate within seconds of a frequency increase and to provide reactive power and short-circuit current when an error occurs, allows PV power plants to accurately control the amount of power they supply to the grid. Main functionalities of the system will be:

- *Remote controlled power reduction:* To avoid temporary overloads in the power distribution grid, grid operators prescribe specific active power values that inverters are required to achieve with minimal delay. These target values could be transmitted via a ripple control receiver.
- *Active Power Control*: If there is a frequency spike in the transmission line, the inverters respond by automatically reducing their active power output according to a characteristic curve. The inverters can therefore play a decisive role in stabilizing power frequency.
- *Voltage control with reactive power:* In order to keep line voltage constant, inverters supply lagging or leading reactive power to the grid. The grid operator specifies whether the reactive power value is fixed or dynamic. The Power Plant Controller is used to analyze and manage the process. The reactive power, or displacement factor, can also be controlled along a characteristic curve in relation to the supplied active power, the line voltage or an absolute value.
- *Reactive power at night:* Reactive power compensation reduces the load on power grids while ensuring decentralized voltage stability.
- *Low Voltage Ride-Through:* Through dynamic grid support the inverters remain connected to the grid during voltage dips that last no longer than a few seconds and support the grid by feeding in reactive power. They immediately resume normal feed-in operation once the voltage exceeds a defined minimum threshold.

Monitoring System: Advanced photovoltaic monitoring system allows management of the production, grid parameter, and communication with Grid Operator includes O&M management system.

Approach Route: The approach route for the transmission line will be based on a criterion to reduce the environmental and socioeconomic footprint of the transmission line. The shortest feasible route after considering these factors will be selected for the transmission lines:

- Transmission line route does not fall under any habitations and thick vegetation.
- No households or community structures are located in the route of the transmission line.
- All environmentally sensitive sites, archaeologically significant sites, areas of ecological and cultural significance were avoided while selecting the route.
- Right of way/ access roads will be shared with local residents of the area wherever possible.

2.5 Climate Change Effect on Solar Power Plant

Energy from solar power plant is directly related to fluctuating weather conditions. The vulnerability of solar power components due to climate change has been studied in various researches and publication. In Solar power plant, photovoltaic panels with an operating life time of 25 years are vulnerable to hail, solar and extreme temperature (Patt et al. 2010). Solar cell output usually rated at 25^0C and it decreases for each temperature rise of 1^0C after that hence increase in temperature will decrease the performance of solar cell. As the solar radiation assessment, has been conducted for the project and module has been designed in line with the assessment finding therefore solar power performance is not anticipated to reduce unexpectedly over the period of 25 years (project life cycle).

Cloud cover is another factor which influence the performance of solar panel's output and this performance can decrease by 40%-80% within a few seconds. However, it increases dramatically as the sky clear (Kleissl 2010).

Higher solar radiation can also increase dust particles deposit over the panels which decrease solar photovoltaic cell output (Goosens and Van Kerschaever 1999), but higher solar radiation can also cool the modules, increasing efficiency and output.

Another component of solar power plant is inverter. Studies, consistently show that the inverter, which converts direct current power output into alternating current (DC to AC), is the most unreliable component of a photovoltaic system, accounting for up to 69% of unscheduled maintenance costs (Patt et al. 2010). However, they are not usually directly exposed to the weather and are not especially vulnerable to climate change.

2.6 Resource Requirement

2.6.1 Land

Type of Land: APSPCL has leased out around 250 Acres of lands to Fotowatio Renewable Ventures (FRV) for implementation of 50 MW SPV Power Project at Anantapur (Ananthaparamu) Ultra Mega Solar Park (1500 MW) at Thumu Kunta village of Galiveedu mandal in Kadapa District, Andhra Pradesh. The 50 MW solar power project site is located in contiguous land at Thumu Kunta village and named as Plot No. P2.

Till the time of ESIA study in the field, land procurement was on progress for Plot No. P2 in Thumu Kunta village of Galiveedu Mandal in Kadapa district. Land taken for P2 are contiguous and the topography of the project site is largely plain in an open vast area with mild undulations. As observed during field the land in the project influenced area was unused dry land with shrubs within the plot. The agriculture in the area is majorly dependent on rain and large portion of the land remains dry most part of the year. It was informed by the community and govt. offices, the study area (as well as the Galiveedu Mandal) was declared as drought prone in 2016.

Land Scenario: As mentioned in the website of APSCPCL (*http://www.apspcl.ap.gov.in/)* total extent of land available in for the entire Thumu Kunta village under Ananthaparamu Ultra Mega Solar Park (1500 MW) is 2824.62 Acres. Details of land for the Solar Park in Thumu Kunta village is given in **Table 2-2.**

Table 2-2: Details of approximate land area distributed in different plots in Thumu Kunta village[1]

District/ State	Village	Unassigned Lands (in Acres)	Assigned Land (in Acres)	Pattalands (in Acres)	Total Approximate Land Area (in Acres)
Kadapa, Andhra Pradesh	Thumu Kunta	1610.84	910.41	303.37	2824.62

Due procedures were adopted by APSPCL for land acquisition process as per the State Government regulations (Notification, Patta land owner consultations, local community consultations, panchayat approval, compensation settlement etc.). The procurement of land was in progress during the time of visit by the ESIA Team.

It was informed lands for P2 is being leased out to FRV for 25 years.

As informed by FRV around 223.74 Acres of the total lands in Plot No. P2 is Govt. Land, around 4.91 Acres are Private Lands and around 16.73 Acres are assigned lands. As mentioned earlier, 2.79 Acres of lands from the total assigned lands are from one single member of ST community (under Survey No. 1108-2). The details of Land of Plot No. P2, as informed by the project proponent, is given in **Table 2-3**.

Table 2-3: Details of land area in Plot No. P2

Survey No	Name of the Land Owner	Nature of Ownership	Extent of Land	Remarks
34	Gangasani Venkateswarlu (Naganna)	Private	0.48	
35	Gangasani Venkateswarlu (Naganna)	Private	0.30	
1108-1	Govt. Land (Ayakattu Banjaru)	Govt. Land	4.64	
1108-2	Bodagutta Anjeneyulu (Narasimhulu)	Assigned	2.79	Scheduled Tribe
1109	Govt. Land (Ayakattu Banjaru)	Govt. Land	5.68	
1112	Govt. Land (Ayakattu Banjaru)	Govt. Land	4.42	
1114	Govt. Land (Ayakattu Banjaru)	Govt. Land	5.71	
1169	Gayalu(Gayalu)	Govt. Land	5.00	
1183-1	Gayalu(Gayalu)	Govt. Land	0.40	
1183-2	Gayalu(Gayalu)	Govt. Land	5.06	
1183-3	Varnilla Parvathamma(Srinivasulu)	Assigned	2.00	
1184	Gayalu(Gayalu)	Govt. Land	5.04	
1184-2	Kanchi Mekala Aadi Lakshmi(Gangaiah)	Assigned	2.00	

[1] *Source*:http://www.apspcl.ap.gov.in/,

Survey No	Name of the Land Owner	Nature of Ownership	Extent of Land	Remarks
1185-1	Unknown	Govt. Land	5.11	
1185-2	Gayalu(Gayalu)	Govt. Land	0.15	
1185-3	Mittapalli Susheelamma (Sekhar Reddy)	Private	2.00	
1186-1	Unknown	Govt. Land	5.11	
1186-2	Gayalu(Gayalu)	Govt. Land	0.15	
1193-1	Unknown	Govt. Land	5.11	
1193-2	Gayalu(Gayalu)	Govt. Land	0.15	
1194-1	Gayalu(Gayalu)	Govt. Land	5.11	
1194-2	Gayalu(Gayalu)	Govt. Land	0.15	
1194-3	Vemula Akulamma(Venkataramana)	Assigned	1.18	Scheduled Caste
1194/4	Mittapalli Puspavati (Iragam Reddy)	Private	1.09	
1195	Neelagiri Pakiraabi(Mahabub Paasha)	Assigned	5.04	
1195-1	Neelagiri Pakiraabi(Mahabub Paasha)	Assigned	1.72	
1195-2	Kuntlapalli Lakshmi Narasamma(Chandrasekhar Naidu)	Assigned	2.00	
1195-3	Mittapalli Puspavati(Iragam Reddy)	Private	1.04	
542	Government Land	Govt. Land	171.39	
Total Land Area			**250.02**	

Source: Fotowatio Renewable Ventures (FRV)

As observed during visit the land are dry and there is no cultivation activity within the area of Plot No. P2 at Thumu Kunta village. As lands were acquired, chances of livelihood impact can't be ruled out. In such condition PS 5 is applicable. Applicability of PS 5 has been discussed in Error! Reference source not found..

Land Requirement: As mentioned in the APSPCL website it was informed by the Project Proponent that approximately 250 Acres of land required would be provided to them by APSPCL for the 50 MW Solar Power Project. For CIGS - SF 165-S module type solar power plants, approximately 4-5 acres/ MWp of land is required. The typical land requirement for a 1 MW poly-crystalline solar PV plant with single axis tracker is approximately 5 acres, which means, for a 50 MW for a solar PV plant, nearly 250 acres of land is required. Hence, the total land area required for 50 MW project would be (50x 5) 250 Acres. It is also given in the pre-feasibility report of the FRV (project proponent) for the project that around 250 Acres of land is required.

As per the list provided by the project proponent, the total land area demarcated for the specific 50 MW project is 250.02 Acres, located in Plot No.P2 at Thumu Kunta village of Galiveedu Mandal in Kadapa district.

Land for Access Route: An exclusive access to the construction site is usually required prior to mobilization of manpower and machinery. Till the time of site visit the access route has not been demarcated, though the site (P2) is closer to SH 34, which is also called locally *Kadiri- Rayachotty*

Road. No other road development is noticed yet. As informed during field visit, the linking and other internal roads will be developed by APSPCL.

Land for Transmission line: Power from the solar photovoltaic plant of 50 MW capacity will be evacuated to 33/220 kv substation (Pooling Substation), located 0.5 km away from the P2 towards the south. This land area required is small for pole laying 2ft x 2ft. Land requirement for transmission line will be limited to the area required for the foundation of pylons.

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 50 MW Solar Power Project, which will be shared also for two other projects that may come up later sometime in future.
- 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 the 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.

As observed during field visit and informed by APSPCL representative, the Pooling substation will be connected to a 220/400 KV grid substation (GSS). GSS is already in operational stage. Distance between PSS of P2 to GSS is approximately 8 Km. Since there are villages and habitations in the surrounding areas of Plot No. P2, sufficient precautions should be taken as mentioned above for the transmission line between PSS to GSS. There should not be any issue regarding Right of Way (RoW) for the transmission route. No cultivation land nor any habitation should come on the way of transmission route.

Land Holding Pattern: During consultation with the representative of APSPCL, it has been informed that land under Plot No. P2 are mostly Govt. (Revenue) lands with patches of a few assigned lands. The land identified and being procured for the 50 MW Project in Plot No. P2 is fallow and barren. The land is predominantly rocky and dry in nature

Land Procurement Procedure: The representative of APSPCL has informed to the visiting ESIA Team the lands of Plot No.P2 at Thumu Kunta village will be allocated to FRV directly by APSPCL only after being procured by them (APSPCL) through proper process. It was informed by the APSPCL representative, the following steps were followed for land procurement/ acquisition.

- Lands were identified by Govt. of Andhra Pradesh
- Land survey by APSPCL and file requisition to Revenue Department (for Revenue, Assigned and Private Lands).
- Advance possession of Revenue land was made by APSPCL. Though finalization of terms and conditions is pending till date.
- Joint Collector of the District conducted Gram Sabhas were held for providing information on project, benefits etc. to assignees of assigned lands and private land owners.
- Village Committee was formed with representatives of villagers and farmers.
- Notification for land procurement/ acquisition was issued and farmers are provided 2 month time.
- "Negotiations Committee" (Joint collector as Chairman, RDO, MD of APSPCL as members) was formed and negotiation for price with farmers through meetings were held.

- Price is fixed based on last 6 months market price and compensation is at least 3 times the market price for the category of the land. Compensation paid to both Assigned and Private land owners is Rs 3.0 Lakhs / acre. APSPCL informed, that the final amount paid is more than that arrived at using the formula and is a fixed price based on mutual consent between Villagers committee and Negotiations committee.
- Minutes of Meetings for the agreed price are signed between the two committees.
- APSPCL deposited the compensation amount for the Assigned Lands at District Collectorate (DC) office. Land is then allocated to APSPCL.
- Farmers are paid compensation by Revenue Department.
- For Private Lands, APSPCL directly executes the registration with owners and pays the amount by cheque.

It was informed by APSPCL representative, the assigned lands are acquired by following the rules under Resettlement & Rehabilitation Act, 2013 of Govt. of India through proper process and mutual agreements between the parties through meetings headed by competent Govt. Authorities. It was also mentioned by the representative of APSPCL that the assignees of the assigned lands are also being compensated through fair compensation by competent govt. authority. The Revenue (Govt.) lands has also been incorporated through proper process by the relevant authorities.

But no supporting documents, except the list of land owners/ assignees/ users with regard to land procurement/ acquisition has been provided.

2.6.2 Water Requirement

During the project construction phase, water is required for preparing 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 also for domestic/municipal purposes for the operations staff. The estimated quantities of water required during the construction and operation phases are presented below in **Table 2-4.**

Table 2-4: Water Requirement during Construction and Operation Phase

Phase	Activity	Max. Consumption
Construction	Civil works water requirement	15 KLD (from 1 single bore well)
	Domestic/Municipal use – drinking (during peak construction phase) considering 500 labours @ 110 lpcd	55 KLD
Operation	Washing of solar panels (1.938 m2 each panel)	Expected to be 5500 KL p.a. for 50 MW project
	Domestic/ Municipal use	

During construction phase ground water will be utilized through bore well with the necessary approval from the competent authority. During operation phase, APSPCL (as informed during field visit) will provide water for the project from the Veligallu reservoir located closely to the site. State Irrigation department after considering the requirement of water for irrigation and fisheries purpose will give permission to APSPCL for sourcing water from Veligallu Reservoir during operation phase.

2.6.3 Manpower Requirement

Construction Phase

About 500 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 is also expected to be engaged. The contractor workforce will be comprised 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 30 skilled personnel from EPC Contractor in the peak construction phase. Around 4 personnel will be deployed by FRV directly on site during construction. It will be further enhanced up to 8 personnel at peak construction phase.

Operational Phase

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

It is informed by the project proponent 5 skilled personnel would be deployed on site during operation. 30 labours, comprising of semi- skilled and unskilled, would be deployed for security, module cleaning, vegetation abatement, module tilting etc. As informed by FRV the number of unskilled and semi-skilled labours may be increased up to 60 when module tilting is happening twice a year.

2.6.4 Raw Materials

The construction related materials viz. stone aggregates, sand and bricks etc.for the project are likely to be sourced from Kadiri (around 32 kms from the site).

2.6.5 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. Waste water will be generated during the operation phase due to solar module washing on regular basis. Proper storm water channels would be constructed along the periphery of the project site for draining of site run off. The domestic waste water would be managed through septic tanks.

2.6.6 Logistic Arrangement

Labour Camp: The project is in the preconstruction stage and land procurement is in progress during the site visit. The company will hire unskilled labours locally for reducing the requirement of labour camp. Onsite labour camp will be constructed as per project requirement. Labour camp will accommodate only the migrant labours till the completion of construction phase. All the basic amenities such as drinking water, kitchen, toilet facilities, etc. will be provided in the labour camp.

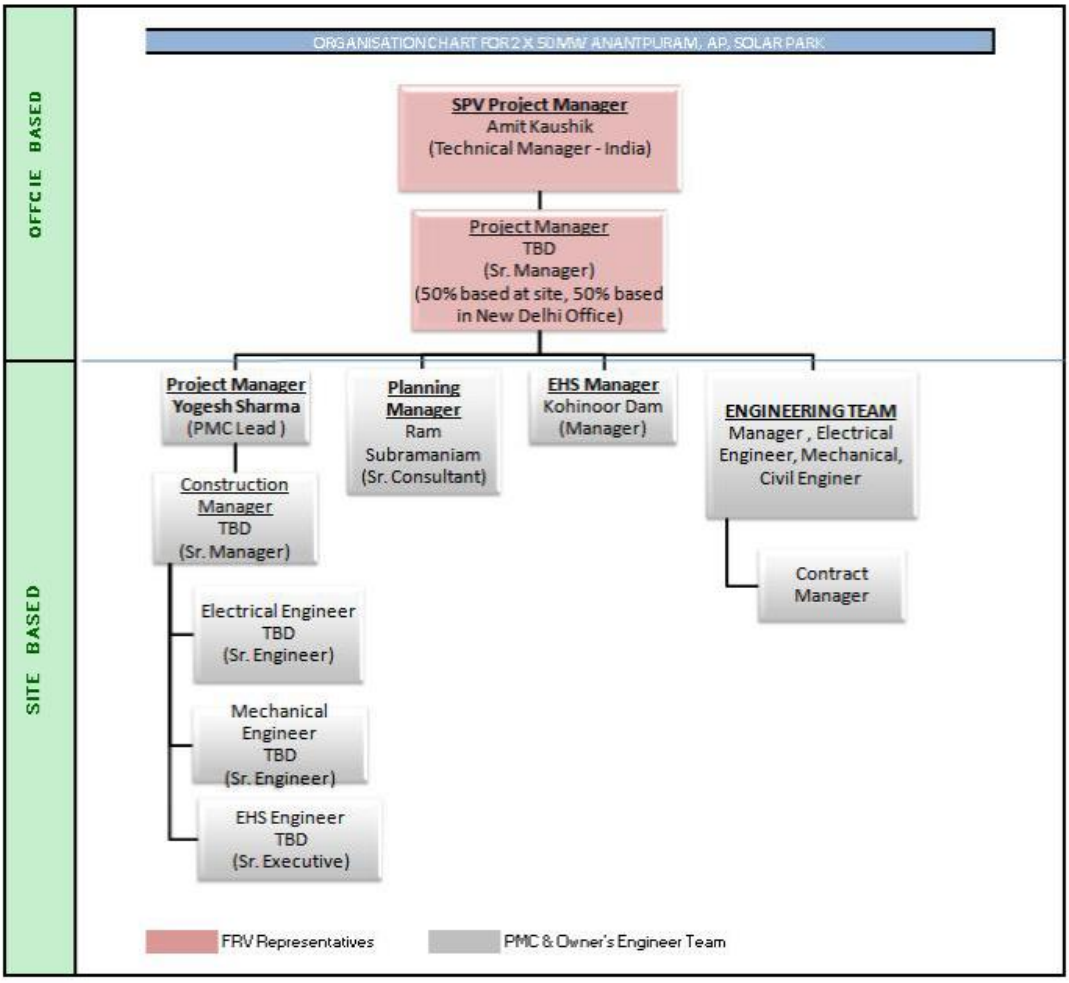
Project Vehicles: Project vehicles such as water tanker, tractors, JCB, and cars will be engaged to support various activities during construction phase and further efforts will be made to hire vehicles from local community.

2.6.7 Organizational Structure

To ensure smooth completion of various operations or activities of project during construction and operational phase, FRV has its own Integrated Management System policy. During the project phase, project operations will be managed by Project Manager and environmental, health & safety issues will be monitored by FRV regional EHSS Officer.

Organisational Structure for the specific proposed 50 MW Solar Power Plant, at P2 in Thumu Kunta village is appended in **Figure 2-4**.

Figure 2-4: Organisational Structure of 50 MW Solar Power Project at P2 in Thumu Kunta



The given Organisation Structure for 50 MW Solar Power Project at Plot No. P2 in Thumu Kunta village is subject to change/ alter based on the altered situation and requirements.

2.6.8 Implementation Schedule for the Project

As per the PPA, the project is expected to be commenced in October 2017. A tentative Implementation schedule as provided in L2 Schedule document is given here in **Table 2-5.**

Table 2-5: Task Based Implementation Schedule

Task Name	Duration	Start	Finish
Engineering	66 day	23 February 2017	10 May 2017
Procurement	134 days	02 April 2017 04	September 2017
Manufacturing Clearance, Inspection and MDCC	109 days	16 April 2017	20 August 2017
Transportation of Materials	92 days	21 May 2017	04 September 2017
Construction of facilities	140 days	08 April 2017	17 September 2017

It is informed by the project proponent that the implementation schedule may subject to alter with the finalization of EPC Contractor. A tentative L2 Schedule for the Solar Power Project is appended in **Appendix B**.

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 (MoEFCC) 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 Regulation

S.N.	National Environment, Health & Safety Regulation	Agency Responsible	Requirement	Applicability
1	Andhra Pradesh Solar Power Policy 2015	Andhra Pradesh Solar Power Corporation Private Limited, NTPC, Ministry of New and Renewable Energy, Govt. of Andhra Pradesh And SECI (Solar Energy Corporation of India), APGENCO (Andhra Pradesh Power Generation Corporation Limited) and NREDCAP (New & Renewable Energy Development Corporation of Andhra Pradesh Ltd.)	As per the policy, it will be the responsibility of the project developer to acquire land for the solar project. Even agricultural land can be acquired for this purpose. Land acquired for any solar project or for solar park will be deemed to be converted to non-agricultural land status and no further conversion procedures will need to be followed by the developers regarding the acquired land. The conversion charges would be as per the Agricultural Land (Conversion for Non-agricultural Purposes) Act, 2006. For land acquisition for solar projects and solar parks, the ceiling limit under the Land Ceiling Act will not be applicable. However, the land requirement will be decided at the rate of 5 hectares/MW or any lower limit based on the advancement of technology.	*APSPCL and FRV will follow the legal permissions and procedures and will comply with the obligations mentioned therein for the Solar Project site at Plot P2in* Thumu Kunta village *for the 50 MW Solar Power Plant in Anantapuramu Ultra Mega Solar Park (1500 MW)*
2	The Air (Prevention & Control of Pollution) Act 1981	State Pollution Control Board (SPCB)	As per Andhra Pradesh Solar Power Policy, 2015, Solar PV power projects will be exempted from obtaining anyNOC/Consent for establishment under pollution control laws from AP Pollution Control Board.	*Solar power plant is exempted to obtain CTO. However, SPCB needs to be informed by the project proponent while starting the project.*
3	The Water (Prevention & Control of Pollution) Act 1974	State Pollution Control Board (SPCB)	Development of solar power plant falls under white category and therefore it is exempted to obtain CTE and CTO from State Pollution Control Board.	*Solar power plant is exempted to obtain CTO. However, SPCB needs to be informed by the project proponent while starting the project.*
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* *As reported, no forest land is involved for the development of this project.*

S.N.	National Environment, Health & Safety Regulation	Agency Responsible	Requirement	Applicability
5	Environmental Impact Assessment (EIA) Notification 2006 & MoEFCC Office Memorandum dated 30thJune'11.	MoEFCC	The EIA Notification 2006 and thereafter the MoEFCC Office Memorandum dated, 13th May 2011 exempts solar power project from obtaining prior Environmental Clearance from the regulatory authorities. But, under the provision of MoEFCC office memorandum dated 30th June 2011, requisite permission is required to be obtained from competent authority for water and land usage.	*Not Applicable. However, permission is required for usage of water which has already been applied (as reported).*
6	Environment (Protection) Seventh Amendment Rules 2009	CPCB	Ambient air quality monitoring has to 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 on the basis of the parent Air Act 1981.	*Not applicable since no significant air emission is expected from the project operation*
7	Noise (Regulation and Control) Rules 2000 amended in 2010	APSPCB	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*
8	Hazardous Waste (Management, Handling and Trans-boundary Movement) Rules 2008 Hazardous and Other Wastes (Management and Trans boundary Movement) Amendment Rules, 2016.	APSPCB	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 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.	*Applicable during construction phase.* *During the construction DG sets will be used for the civil work involved. The operation phase of the project will result in generation of some quantities of hazardous waste, mostly in the form of waste/used oil as well as broken solar panels. FRV needs to obtain consent from ASPCB for storage of transformer oil, if required. All the hazardous waste generated due to the project should be stored and disposed as per the requirements of the Hazardous Waste (Management, Handling and Trans-boundary Movement) Rules, 2008/ Hazardous and Other Wastes (Management and Trans boundary*

S.N.	National Environment, Health & Safety Regulation	Agency Responsible	Requirement	Applicability
				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 ASPCB approved vendor. *Though not covered under the rule, the broken solar panels is recommended to be sent back to the manufacturer or an authorised recycler.*
9	Environment (Protection) Second Amendment Rules 2002	MoEFCC	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 will be met through DG sets which will adhere to prescribed CPCB noise level limits and noise control measures.*
10	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, 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.	*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 have valid labour license. Compensation to workers (own and vendors) should not be below daily wage rate as specified by Government. Master 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 /imprisonment of the principal employer along with vendor and closure of project.*
11	Central Electricity Authority (Safety Requirements for Operation, Construction and Maintenance of Electric Plants and Electrical Lines) Regulations 2008, (CET)	Ministry of Power, Central Electricity Authority Andhra Pradesh Power Transmission	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*

S.N.	National Environment, Health & Safety Regulation	Agency Responsible	Requirement	Applicability
		Company Ltd. (APTCL)		*transmission lines specified under the rules are complied.*
12	Workmen's Compensation Act, 1923 & Rules 1924	Labour Welfare Board, Andhra Pradesh	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.*
13	The Contract Labour (Regulation and Abolition) Rules, 1971 Contract Labour (Regulation And Abolition), 1973	Labour Welfare Board, Andhra Pradesh	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 will be 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. Master 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. Failure to comply results in financial penalty.* *FRV 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.*
14	Minimum Wages Act, 1948	Labour Welfare Board, Andhra Pradesh	This Act provide for fixing minimum rates of wages in certain employments and requires the employer to provide to every	*Applicable during construction phase*

S.N.	National Environment, Health & Safety Regulation	Agency Responsible	Requirement	Applicability
			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.	
15	The Child Labour (Prohibition and Regulation) Act, 1986	Labour Welfare Board, Andhra Pradesh	The Act prohibits employment of children in certain occupation and processes. The Act also specifies conditions of work for children, if permitted to work.	*FRV should ensure that no child labour will be engaged at site for construction or operation works either directly or by the sub-contractors. FRV should include a clause in the subcontractor agreements prohibiting employment of child labour.*
16	Companies Act, 2013	FRV	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.*
17	Panchayat (Extension to Scheduled Areas) Act 1996	APSPCL	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 Sabhas 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.	*The project will need to comply with the requirement as stated in the law.*

S.N.	National Environment, Health & Safety Regulation	Agency Responsible	Requirement	Applicability
			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	

3.2 Social and Environmental Performance Standards of the International Finance Corporation

The International Finance Corporation has laid down a set of eight Performance Standards (PS) and project developers need to comply with applicable PS while establishing the project. The provisions of the Performance Standards relevant to the solar power projects are summarized below:

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

Title of Performance Standard	Performance Standard (PS) requirements in brief	Applicability to project (Compliance)	Actions Taken/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 FRV 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 project 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.**	FRV has developed an Environmental and Social Management System at the corporate level as well as adhere to the environment and social management plan recommended for its solar project at the ground level. FRV is required to fulfil the following requirements: • Environmental and social action plan; • Identification of risks and impacts; • Management program; • Organizational capacity and competency; • Training for security and safety workers; • Emergency preparedness and response; • Stakeholder engagement/ grievance redressal; and • Monitoring, reporting and review.
	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	

Title of Performance Standard	Performance Standard (PS) requirements in brief	Applicability to project (Compliance)	Actions Taken/Requirements
		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 coercion to ensure relevant and understandable access to project information.	Considering substantial land will be 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. FRV's Grievance Redressal Mechanism (GRM) will be implemented 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 the site.	
PS 2: Labour and Working Conditions		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.**	Fotowatio Renewable Ventures (FRV) should 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

Title of Performance Standard	Performance Standard (PS) requirements in brief	Applicability to project (Compliance)	Actions Taken/Requirements
			labour camps at all the mentioned project sites. The worker accommodation standards as laid down by ILO is presented in **Appendix D** of the document. The company, as a part of oversight procedures will need regular monitoring of compliance to the aforesaid 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.		Fotowatio Renewable Ventures (FRV) should develop site specific HR policy in line with the HR Policy at their 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 at Plot No. P2	Fotowatio Renewable Ventures (FRV) would engage labours directly or through contractors. However, the management of labourers should be supervised by FRV so 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	Need to be complied. 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 should be framed under the ESMS and the same will be implemented at project level.

Title of Performance Standard	Performance Standard (PS) requirements in brief	Applicability to project (Compliance)	Actions Taken/Requirements
			This is applicable both during construction and operation phase and should be supervised by FRV.
	Provide workers with a safe and healthy work environment, taking into account risks inherent to the particular project sector	Applicable during construction and operation phase	Provide workers with a safe and healthy work environment, taking into account risks inherent to the particular project sector
PS 3: Resource Efficiency & Pollution Prevention		In case the solar panel contain any hazardous material, chances of ground water and soil contamination cannot be ruled out. Site visits revealed that other solar projects is being develop in the same solar park. Example includes, Tata Power, NTPC Solar Power Projects in the project vicinity of the same solar park. FRV may be held accountable for collection and safe disposal of hazardous material. FRV needs to safeguard it's liability by keeping record of mitigation measures to safeguard against any future liability. Waste oil and other hazardous chemicals released from construction activities may result in contamination of ground and nearby surface water. **PS 3 is therefore applicable for the project.**	Water for project construction phase will be sourced from bore well. During operation phase water will be supplied by APSPCL from nearby reservoir. Permission from the Village Panchayat/regulatory authority shall be obtained prior to using the bore well. Safe drinking water will also be supplied to the workers. As such no 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. FRV should implement measures during construction: for management of excavated earth and construction rubble; and minimization of fugitive dust emissions. Further, FRV 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. Limited concreting work is expected for structure foundations, sub-station, and transmission towers. Cement concrete mixers will be expected to be used at site since significant concreting work is not expected. Concreting and other construction activities including use of earth moving equipment and increased traffic for material

Title of Performance Standard	Performance Standard (PS) requirements in brief	Applicability to project (Compliance)	Actions Taken/Requirements
			movement is expected to result in increase in ambient noise levels. However, this increase is short term during construction stage only. The construction work will be carried out only during day time and no noise generating equipment will be operated at night. No material impact on surface or groundwater resources is expected on account of the project, except that the water sourcing requirement during the construction phase will need to safeguard the immediate and medium term 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 if 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.	FRV through its contractors will ensure sprinkling of water to reduce dust in the air. Besides, FRV should also ensure use the vehicles having valid PUC certificates.
	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.	FRV 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.
	Performance Standard 4 recognizes that project activities, equipment, and infrastructure can	This Performance Standard is applicable to projects which entail potential risks and impacts	The Applicability will be both to the construction and operation phase at the

Title of Performance Standard	Performance Standard (PS) requirements in brief	Applicability to project (Compliance)	Actions Taken/Requirements
	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 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 particular attention to vulnerable groups.	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. **<u>The PS 4 is therefore applicable for the project.</u>**	project site in Thumu Kunta village of Galiveedu Mandal. 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 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.
PS 4: Community Health, Safety and Security	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.	**<u>PS5 applicable for the project.</u>**	It was informed, that lands for the 50 MW Solar power project has been identified and procured by APSPCL (nodal agency), through competent authority.

Title of Performance Standard	Performance Standard (PS) requirements in brief	Applicability to project (Compliance)	Actions Taken/Requirements
	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 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		During consultation with APSPCL it was informed that Revenue (Govt.) and Assigned lands are being taken for the entire 1500 MW Solar Park. It was told by the APSPCL representative locations falling on assigned and revenue lands is not resulted in any involuntary resettlement issue as the land taken on mutual agreement, proper negotiation and with proper compensation to the assignees. Lands taken for P2 in Thumu Kunta is entirely fallow/ barren. List of assignees, land owners and users of govt. lands are provided by APSPCL. But, no supporting documents (e.g. MoM of General Award Proceedings, Negotiation Committee Meetings etc.) regarding the transfer of lands and compensation rates has been shared. Thus, in absence of land related supporting documents for acquisition of land specific to the project activity, impact on livelihood and chances of economic displacement cannot be ruled out. In such circumstances, it is considered that there are chances of economic displacement and the livelihood resources may be affected. Livelihood Impact Assessment and Livelihood Restoration Plan for the Project Affected Persons (PAPs) is recommended at the project site (Plot No. P2) located in Thumu Kunta village of Galiveedu Mandal in Kadapa district.
	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.	May be applicable	FRV has not undertaken land acquisition. Land acquisition was undertaken by APSPCL. However it is recommended that FRV should undertake a Livelihood Impact

Title of Performance Standard	Performance Standard (PS) requirements in brief	Applicability to project (Compliance)	Actions Taken/Requirements
			Assessment (LIA) of PAPs and formulates Livelihood Restoration Plan (LRP).
	Compensation and benefits for displaced person as per Performance Standard	May be applicable	It is assumed that proper compensation is paid to the assignees of the assigned lands procured. But, to ensure that proper documents should be supplemented with. Livelihood Impact Assessment (LIA) of PAPs and Livelihood Restoration Plan (LRP) as suggested.
	Disclosure of all relevant information and consultation with affected persons and communities in decision making process related to resettlement.	May be applicable	To ensure that no resettlement has taken place due to the project activity. Livelihood Impact Assessment (LIA) is suggested.
	Establish a grievance mechanism to record and resolve communities' concerns and grievances about the relocation and compensation	During the construction and operation phase	Fotowatio Renewable Ventures (FRV) should develop their own Environment & Social Management System (ESMS). A GRM Policy should be framed under the system. It should incorporate procedures for lodging of grievances, processing of grievances, resolving grievances and closing of grievances. Grievance redressal framework for onsite implementation should also be formulated. 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.
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	Thumu Kunta RF is located within 1-2 km from P2 location and the vegetation of the project site is similar to the degraded natural vegetation found in the study area. Sloth bear and leopard are reported to be present around the project site as per consultation with the forest officials and villagers.	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.

Title of Performance Standard	Performance Standard (PS) requirements in brief	Applicability to project (Compliance)	Actions Taken/Requirements
	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.	These are protected and conserved under Indian Wildlife Protect Act (1972). **PS -6 is applicable for the project.**	• 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 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** • 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.
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	**PS 7 applicable for this project.**	According to Census, 2011, around 3% population in Thumu Kunta village belongs to ST category. The list of land owners has been provided by the project proponent. As per the list there is only one assignee of assigned lands from the ST community.

Title of Performance Standard	Performance Standard (PS) requirements in brief	Applicability to project (Compliance)	Actions Taken/Requirements
	upon, or significantly degraded. Their languages, cultures, religions, spiritual beliefs, and institutions may also come under threat. As a consequence, Indigenous People may be more vulnerable to the adverse impacts associated with project development than non-indigenous communities		As revealed in the consultation cultivation is the livelihood resource of the assignee. The assignee has given 2.79 Acres of assigned land for the project. But, no supporting documents (e.g. MoM of General Award Proceedings, Negotiation Committee Meetings etc.) regarding the transfer of lands and compensation rates has been shared. Neither any document supporting Free, Prior, Informed Consent (FPIC), as referred in IFC PS Document, of the Affected Communities has been provided yet. In such condition PS 7 is applicable for the 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 in the course of 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.**	Chance find Procedure could be formulated under PS 8 in case of discovery of any artefacts and/ or settlement of yore in the future at close proximity of the project area. Though, no such evidential proof was found in the study area village

The IFC and FMO comments on the draft report is addressed in **Appendix K**.

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 categorizes 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.

The project can be categorized as **Category B projects** based on limited environmental and social impacts envisaged.

4 DESCRIPTION OF ENVIRONMENT

This chapter describes the existing environmental settings of the project site 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 like air, water, soil and noise quality in and around the project area were assessed primarily through monitoring and analysis of samples collected from the area. Primary monitoring was conducted by a NABL certified laboratory.

Secondary information on geology, hydrology, prevailing natural hazards like floods, earthquakes etc. 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

The project site for the solar power plant is located at Thumu Kunta village in Galiveedu Mandal of Kadapa district, Andhra Pradesh. To understand and assess the environmental and social risks associated with the project the study area was divided into core area (3km around the project site) and buffer area (5 km around the project site).

4.2 Baseline Conditions

4.2.1 Climate and Meteorological Conditions

Kadapa has a tropical wet and dry climate characterised by year round high temperatures. It has a record of reaching more than 50°C. Summers are especially uncomfortable with hot and humid climate. During this time temperatures range from a minimum of 34 °C and can rise up to a maximum of 40 °C. Temperatures are range in the mid-thirties during the day. Humidity is around 75% during the summer months.

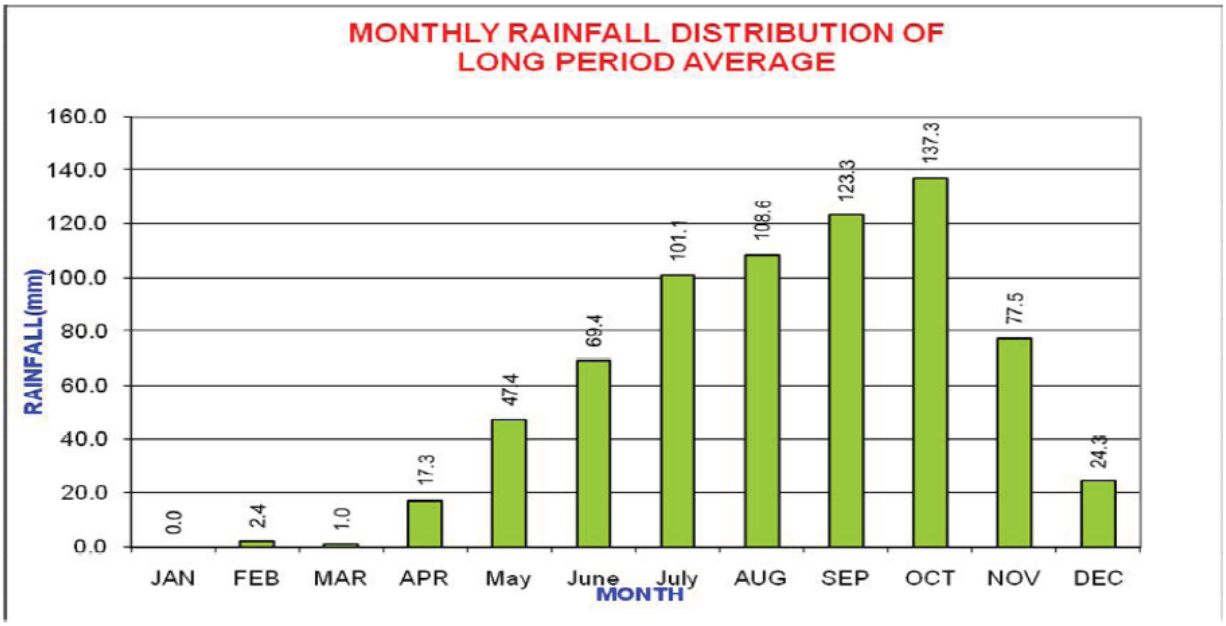
Climate data for Kadapa, Andhra Pradesh [hide]

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Average high °C (°F)	30.8 (87.4)	34.2 (93.6)	37.6 (99.7)	39.7 (103.5)	40.1 (104.2)	36.9 (98.4)	35.0 (95)	34.0 (93.2)	33.4 (92.1)	32.4 (90.3)	30.3 (86.5)	29.3 (84.7)	34.48 (94.05)
Average low °C (°F)	19.1 (66.4)	20.9 (69.6)	23.8 (74.8)	27.3 (81.1)	28.6 (83.5)	26.8 (80.2)	25.7 (78.3)	25.4 (77.7)	25.0 (77)	23.8 (74.8)	21.2 (70.2)	19.0 (66.2)	23.88 (74.98)

(Source: Climate-Data.org from https://en.wikipedia.org/wiki/Kadapa)

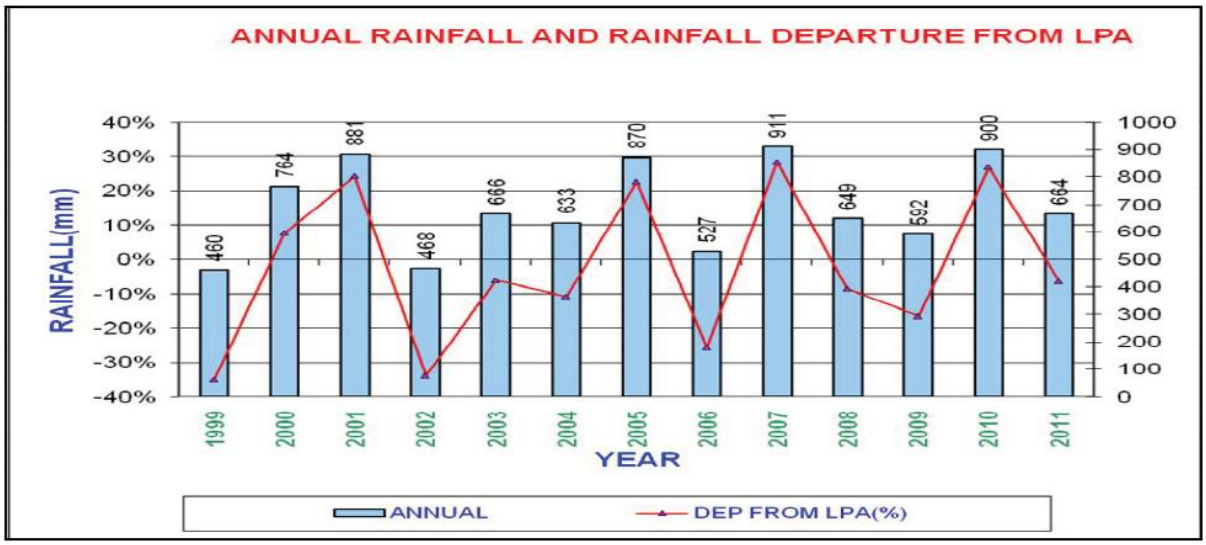
4.2.2 Rainfall

The average annual rainfall of Kadapa District is 710 mm, which ranges from nil rainfall in January to 137 mm in October. October is the wettest month of the year. The mean seasonal rainfall distribution is 402.4 mm in southwest monsoon (June-September), 239.1 mm in northeast monsoon (Oct-Dec), 2.4 mm rainfall in Winter (Jan-Feb) and 65.7 mm in summer (March – May). The percentage distribution of rainfall, season-wise, is 56.7% in southwest monsoon, 33.7 % in northeast monsoon, 0.34% in winter and 9.3 % in summer. The mean monthly rainfall distribution is as below.



Source: CGWB, Monthly rainfall distribution – Kadapa district

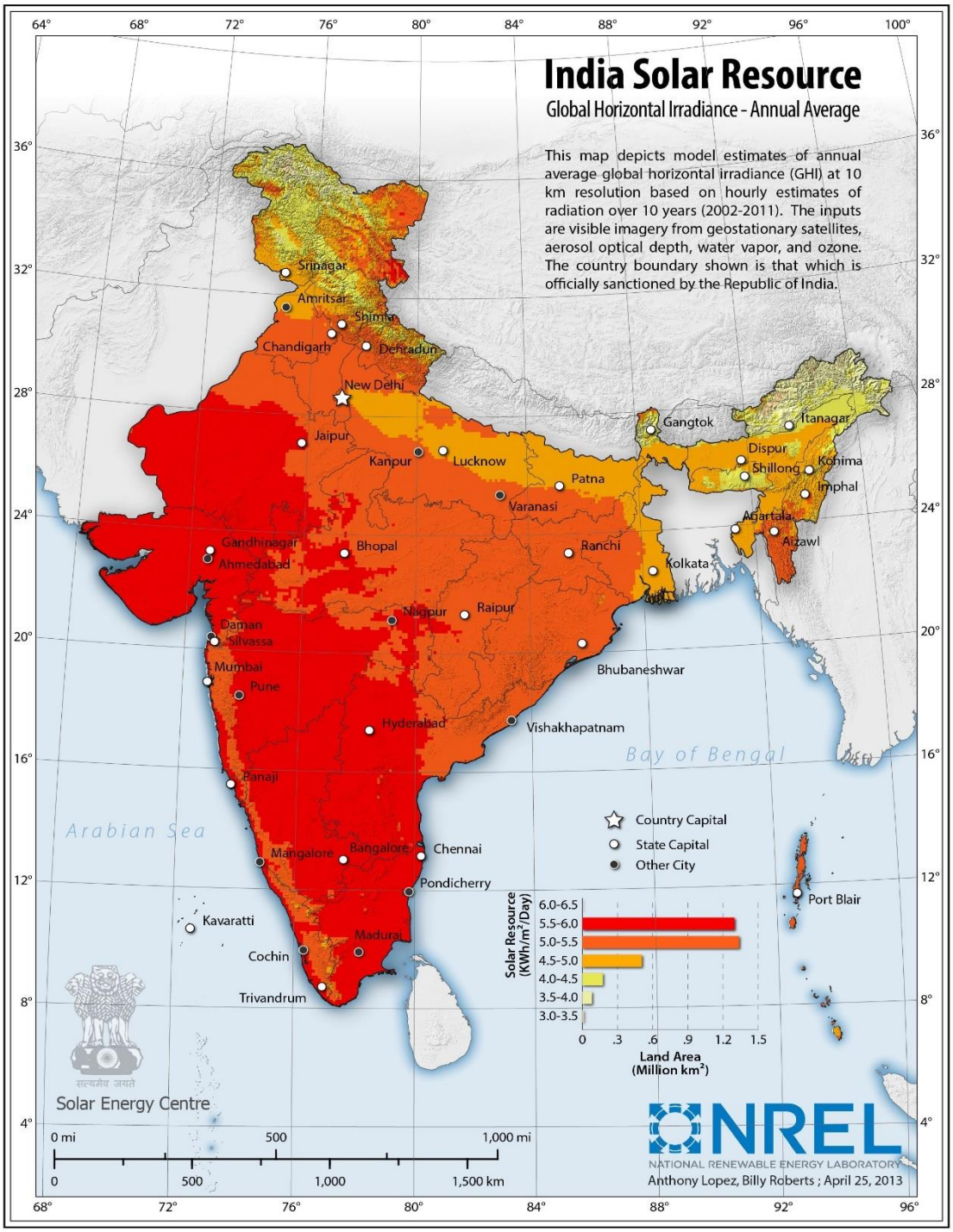
The annual rainfall ranges from 460 mm in 1999 to 910.8 mm in 2007. The annual rainfall departure ranges from -35 % in 1999 to 28 % in 2007. The south west monsoon rainfall contributes about 56.7 % of annual rainfall. It ranges from 200.6 mm in 2002 to 630.5mm in 2007. The years 1999, 2002 and 2006 experienced drought conditions in the district as the annual rainfall recorded is 35%, 34% and 26% less than the long period average (LPA) respectively. The departure of annual rainfall from LPA is presented below. It indicates that, the rainfall departure as on2011 is negative i.e. -35%, showing rainfall deficiency.



Source: India Meteorological Department and Directorate of Economics and Statistics from CGWB report-Kadapa district

Solar radiation profile of India is presented below:

India's Solar Radiation Profile



Source: National Renewable Energy Laboratory

4.2.3 Topography

The Kadapa district has an irregular landscape with a number of hill ranges and hills with intervening valleys and high lands. The highest elevation of the district is 1108 m amsl. The major rock types are quartzites, shales, limestones, phyllites, granites, granodiorites and granite gneiss in Kadapa district. These rock types occur in the southwestern part of the district. Alluvium consisting of gravel, sand, silt and clay occur along the river courses in the district.

The topography of the project site is an open area with mild undulations. The highest and lowest elevation of the site varies380 - 400m. Papagni river passes through the study area. Veligallu reservoir (dam) constructed on the Papagni river is located in the study area. Some of the site pictures are shown in **Figure 4-1.**

Figure 4-1: Digital Elevation Map

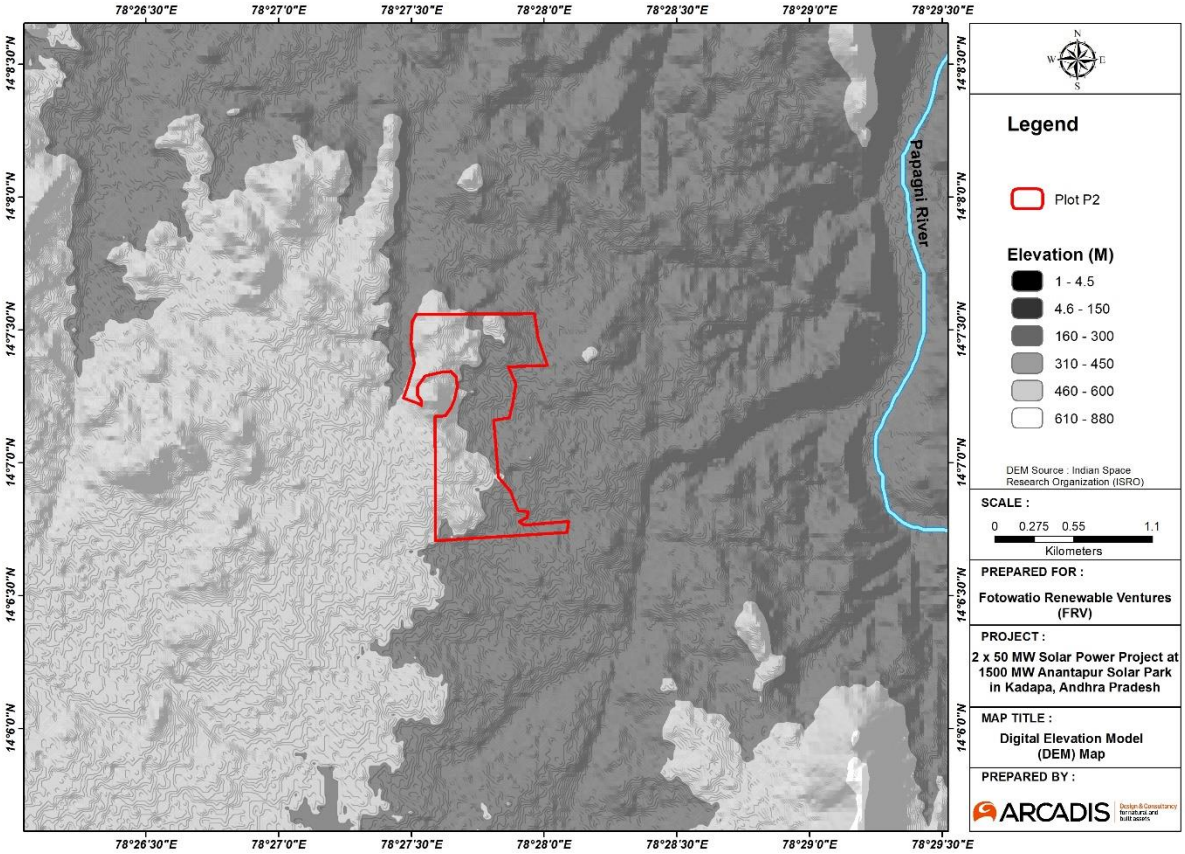
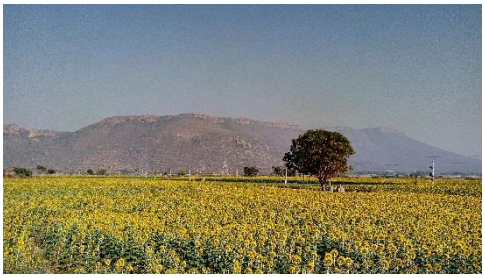


Photo 4-1: Topography of the Project Site

Land proposed for Polling Substation 1

Land proposed for Plot 2

Hillock in study area



Sunflower agriculture field in study area

4.2.4 Geology & Soil

The Kadapa district is underlain by various rock types of different age groups ranging from Archaean to Recent. These rocks consists mostly granite gneisses, migmatites and generally lack primary porosity. Kadapa formations consist of mostly shales, quartzites, lime-stones/dolomites.

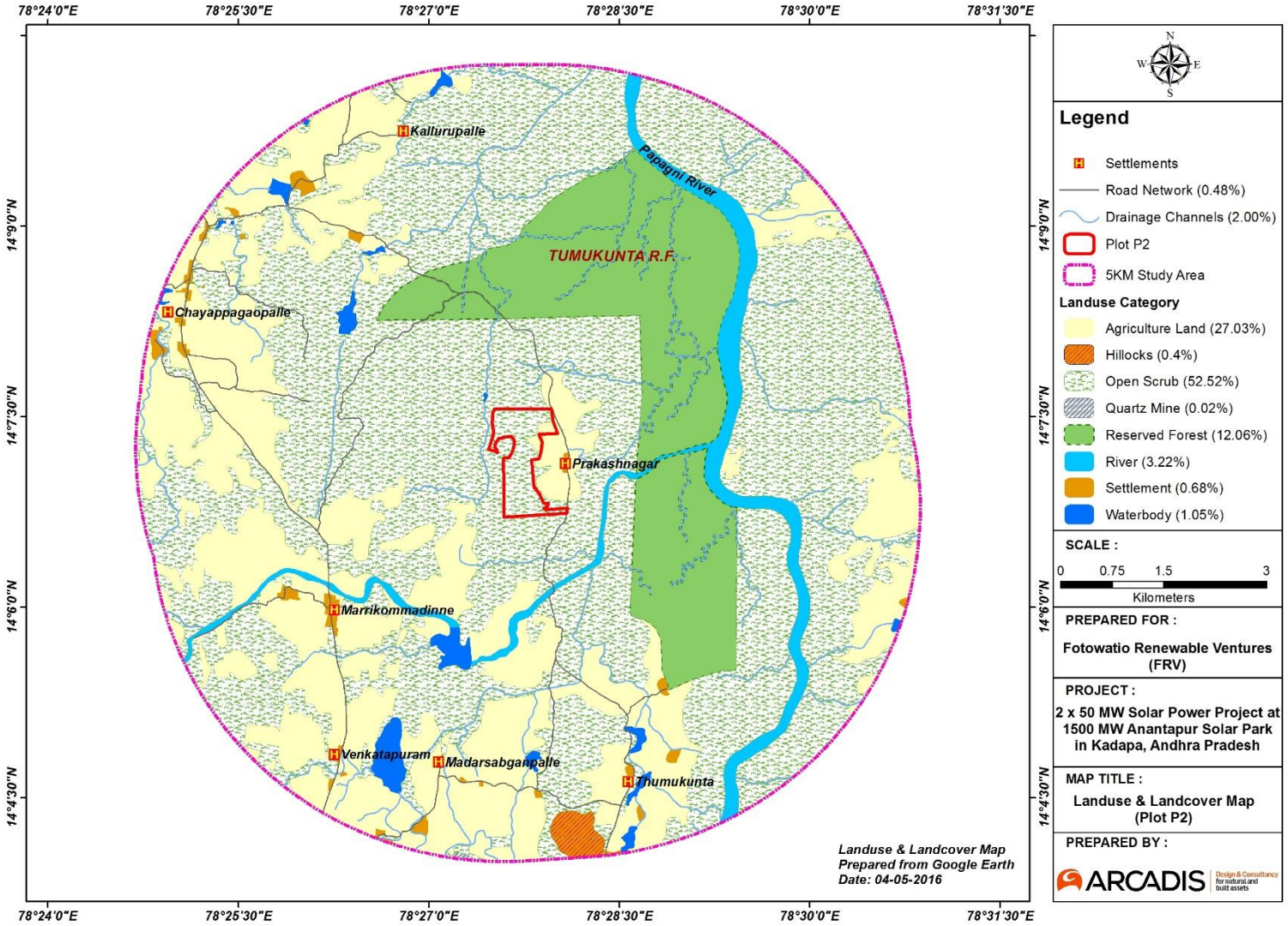
Soil characteristics of the study area were Red loamy, Red sandy, Red earths and Black cotton soils. It is revealed from the project area soils were mainly red sandy with gravels and minimum clay & silt content. These soils have a low nutrient status.

4.2.5 Landuse Analysis

The land-use and land-cover of the study area (5 kms) has been interpreted from visual interpretation, google earth satellite imagery of the area, and subsequently by ground truth verification during field surveys. The land use within study area represent agricultural land (27.03%) followed by forest area (12.6 % Reserve Forest & 43.02% Unclassified forest), Open scrub land (9.50%) and water body (6.72.%), Residential area occupies only 0.68 %. Land use map showing a radius of 5 km of the project site is provided in **Figure 4-2.**

Category	Area SqM	Area SqKM	Percentage
Agriculture Land	28233718.98	28.23	27.03
Drainage Channels	2092855.01	2.09	2.00
Hillocks	408588.35	0.41	0.40
Open Scrub	9931948.37	9.93	9.50
Quartz Mine	24423.90	0.02	0.02
Reserved Forest	13171052.76	13.17	12.60
River	3365523.21	3.37	3.22
Road Network	499312.84	0.50	0.48
Settlement	709564.01	0.71	0.68
Unclassified Forest	44932079.34	44.93	43.02
Waterbody	1083382.39	1.08	1.05

Figure 4-2: Land Use Map



4.2.6 Drainage

The State receives substantial rainfall during the north-east monsoon period. Two major perennial rivers, viz. Tungabhadra and Krishna drain the district. River Krishna with its tributaries Tungabhadra, Vedhavati, Hundri, Musi, Paleru and Munneru flows through the central parts of the State. It drains Anantapur, Kurnool, Mahabubnagar, Ranga Reddy, Nalgonda, Guntur and Krishna districts into Bay of Bengal.

The important river that drains through the Kadapa district is Pennar which is perennial and flows in NW-SE direction. Its tributaries Chitravathi, Cheyyair, Papagni, Kundair and Sagileru are intermittent in nature. The drainage pattern in general is dendraitic to sub-dendraitic and parallel. The drainage is often parallel to sub parallel indicating structural control.

Veligallu reservoir is constructed on Papagni river which is the main source of water in the region. It was reported by APSPCL that water requirement for the solar park during operation phase will be met by this reservoir. With respect to this project site, natural drainages also exist which are mostly dry and may become active in monsoon. The drainage map of project site presented in **Figure 4-3.**

Past record do not show any evidence of flood in the study project site.

Photo 4-2: Water body near Project Site

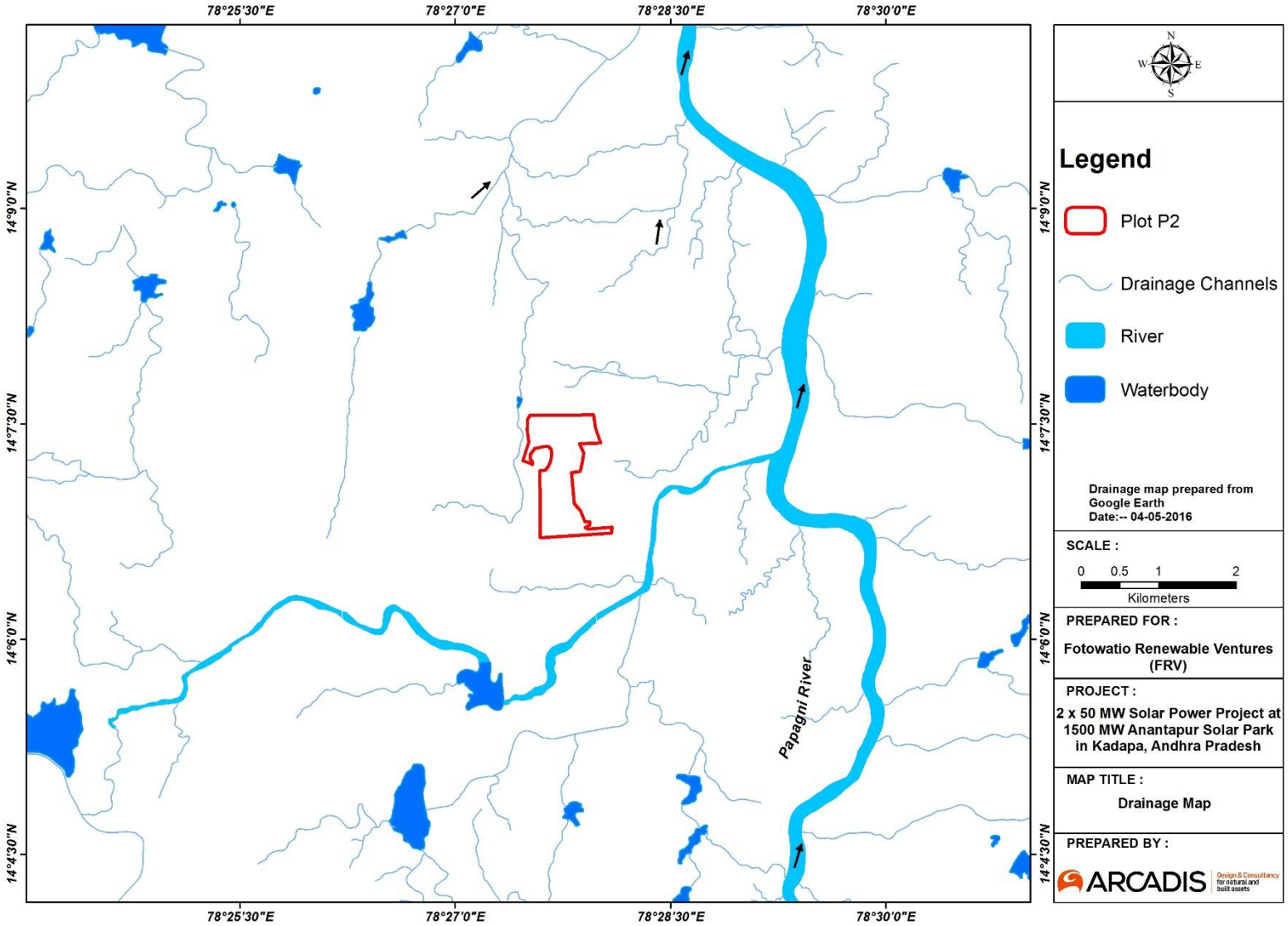
Velligallu Reservoir

Waterbody North of Tumukunda

River Chinneru

River Papagni north of Velligallu Reservoir

Figure 4-3: Drainage Map

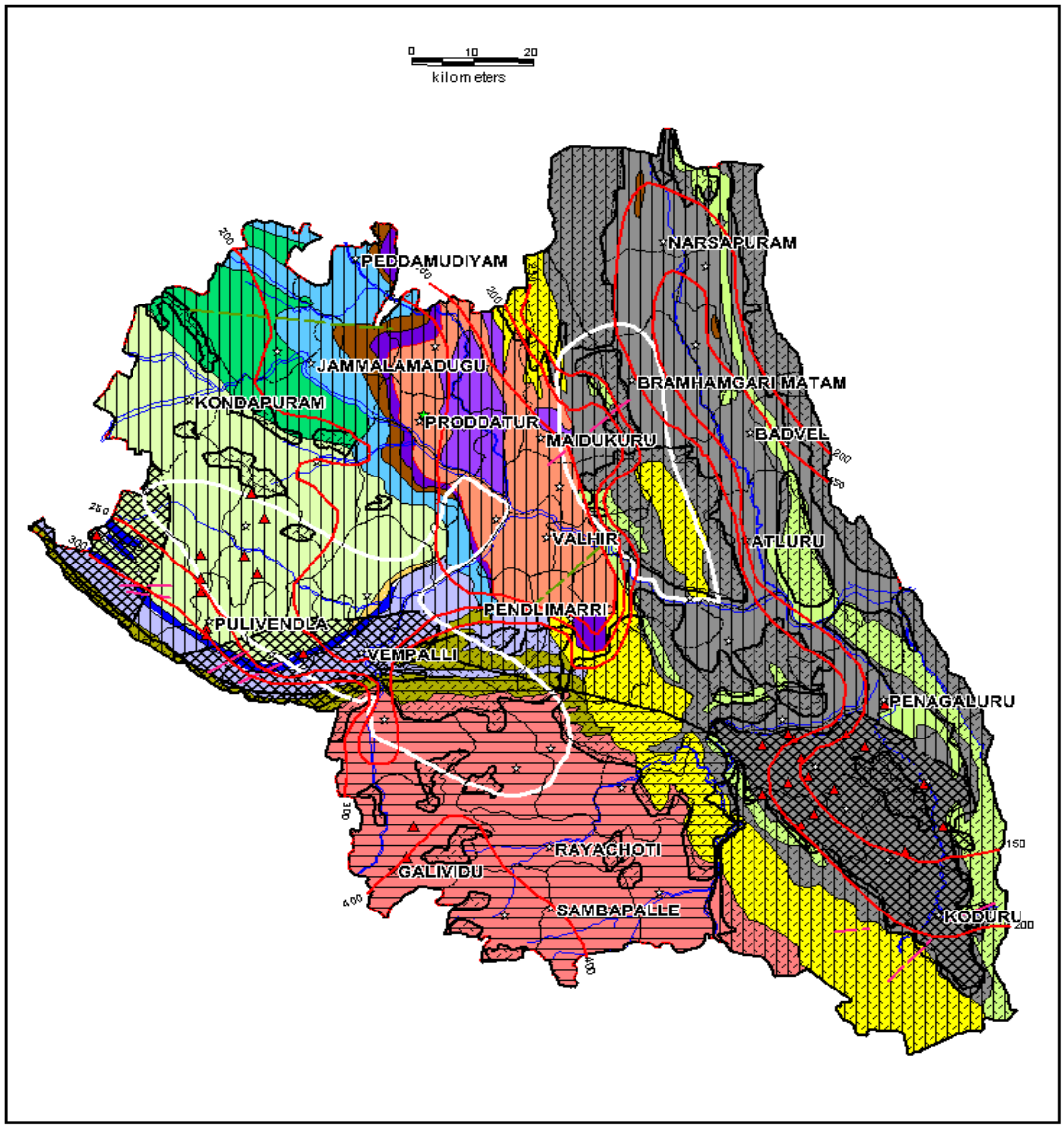


4.2.7 Hydrogeology

The Kadapa district is underlain by various rock types of different age groups ranging from Archaean to Recent. These rocks consists mostly granite gneisses, migmatites and generally lack primary porosity. However, development of secondary porosity through weathering and fracturing gives scope for occurrence of ground water. Ground water occurs under unconfined conditions in weathered portion and under semi-confined conditions in joints and fractures. The groundwater in weathered zone is developed by large diameter (6 m) dug wells and dug-cum-bore wells. Thethickness of the weathered zone is generally upto 10 m in most of the area. During the rainy season, these wells sustain pumping around 4 hrs. in a day in two spells and yields 20 to 60 cu.m/day in rainy season. However, during the Rabi season, most of the wells are likely to yield less i.e., 5 to 20 cu.m/day and in drought years, likely to be dried up.

The ground water in fractured portion is developed through construction of shallow/deep bore wells. Central Ground Water Board has carried out ground water exploration at the locations from depth ranging107.20 to 200 m bgl. The drilling data reveals that fracture zones were encountered at various depths ranging from 8.00 to 145.80 m bgl. However, generally, the potential fractures were encountered between 20 and 100 m bgl. The cumulative yield of fracture zones varies from 0.1 to 4.9 lps. However, general yield of bore wells was found to be between 1 to 3 lps sometimes even more depending upon the fractured zone encountered in the bore well. The hydrogeological conditions in the district are presented in **Figure 4-4**.

Figure 4-4: Hydrogeology Map of Kadapa district, A.P



Source: Groundwater information booklet, Kadapa district, CGWB

4.2.8 Ground Water Resources

Central Ground Water Board has carried out ground water exploration at the locations from depth ranging30 to 200 m bgl. The drilling data reveals that fracture zones were encountered at various depths ranging from 8.00 to 196.90 m bgl. However, generally, the potential fractures were encountered between 25 and120 m bgl. The cumulative yield of fracture zones varies from 0.08 to 21 lps. However, general yield of bore wells was found to be between 1 to 7 lps sometimes even more depending upon the fractured zone encountered in the bore well.

Central Ground Water Board has carried out pumping tests in bore wells to know the aquifer parameters. In Archaean formations, the dug wells sustain pumping for 3 to 7 hrs per day and capable of yielding of 101 to 217 cum/day. The Kadapa formations sustain intermittent pumping for 5 to 8 hrs/day and capable of yielding 198 to 290 cum/day. The wells in alluvium sustain pumping for 5 to 7 hrs/day and can yield 136 to 237 cum/day. The transmissivity determined from the aquifer performance tests is highly variable from 1.13 to 884.7 sqm/day. Higher values are noticed in Cheyyeru basin, comparable to the Papagni basin. The storativity values of the aquifers range from 1.0×10^{-5} to 5.19×10^{-2}. The transmissivity low yielding wells range from 0.5 to 3.7 sqm/day.

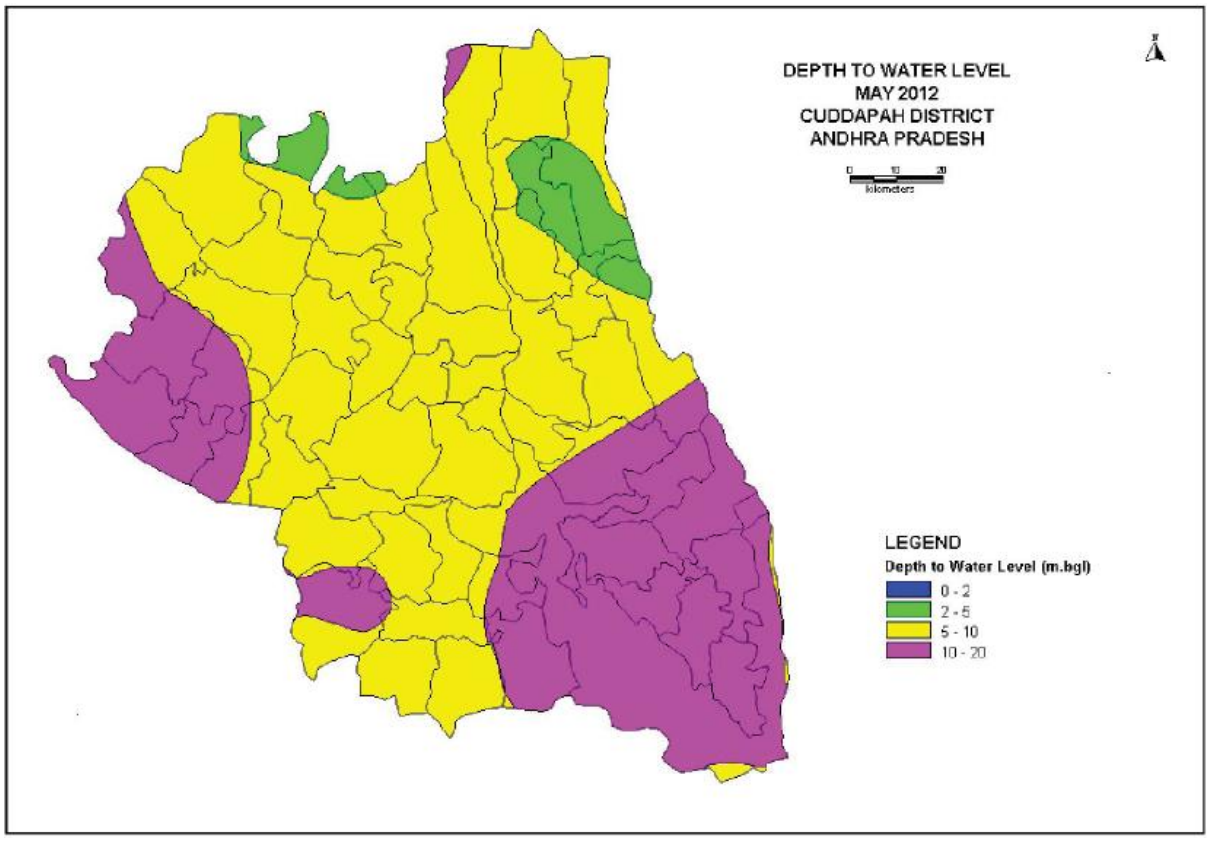
The deep fractured rocks from potential aquifers in the Archaean crystal lines. These are exploited by constructing bore wells. The depth of bore wells generally ranges from 25 to 80 m with yields varying from 0.1 to 15 liters per second (lps). The Central Ground Water Board and State Ground Water Department (SGWD) and Andhra Pradesh State Irrigation Development Corporation (APSIDC) drilled several bore wells in Archaeans. The perusal of data indicates that the total depth of the wells is shallow, ranging from 30 to 80 m bgl. With yields generally ranging from 0.5 to 10 lps.

The Central Ground Water Board has carried out the exploration between 1992- 98 and 43 exploratory wells and 32 observation wells down to a depth of 200 m. The drilling discharges are highly variable from meagre 0.01 lps to as high as 21 lps in meta sediments and from traces to 3 lps in granites. The most of the potential fractures were encountered between 20 and 100 m. However the potential fractures also occur rarely between 100 and 196 m. highly cavernous limestones occur both in Cheyair and Papaghni basins.

The depth to water level distribution maps prepared for May, 2012 (Premonsoon) and Nov, 2012 (Post monsoon) were shown in **Figure 4-5** & **Figure 4-6**.

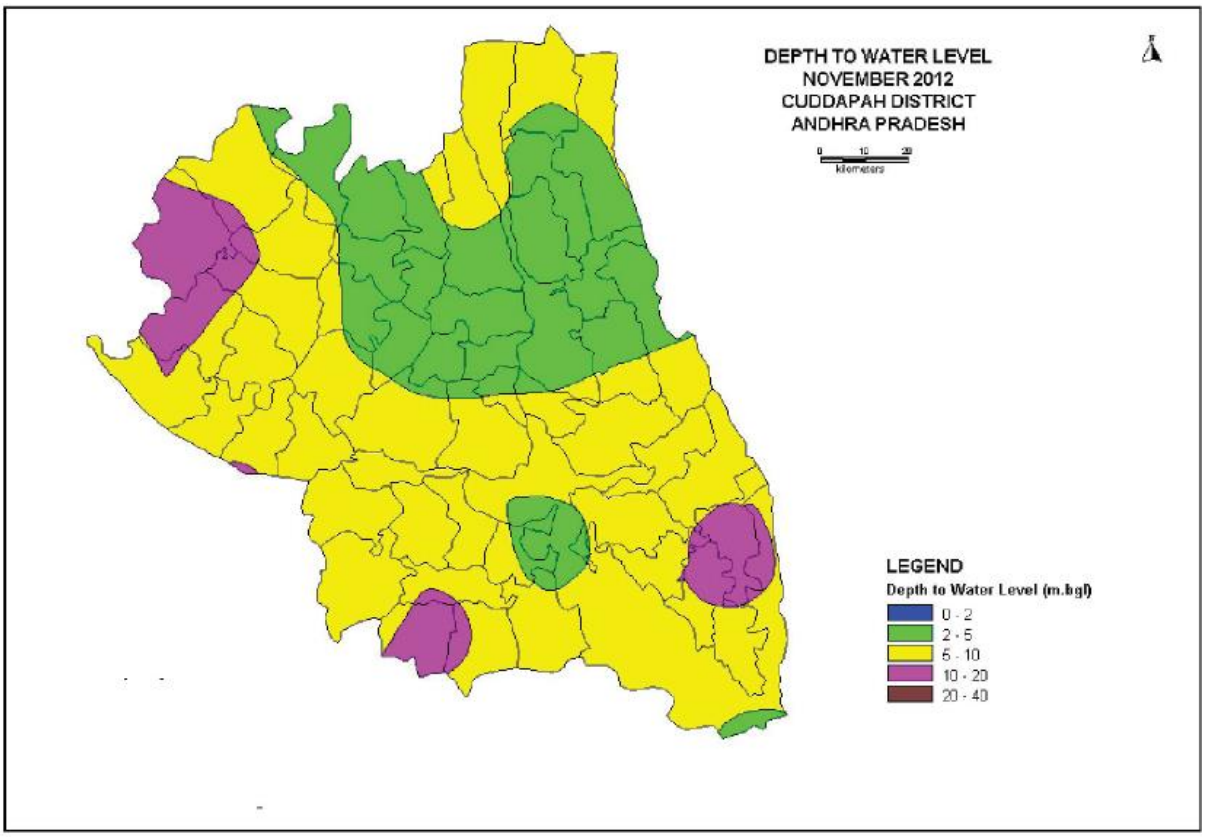
Pre-monsoon water levels: The depth to water level during pre-monsoon (2012) range from 3.13 m to17.35 m bgl. The shallow water levels of 2 to 5 m are observed in north east and north western part of the district. The depth to water levels between 5-10 m are observed in majority of the area. Deeper water levels of more than 10 m bgl are observed in the northwestern and south eastern parts of the district.

Figure 4-5: Depth to Water Level Map of Kadapa district, A.P (May 2012)



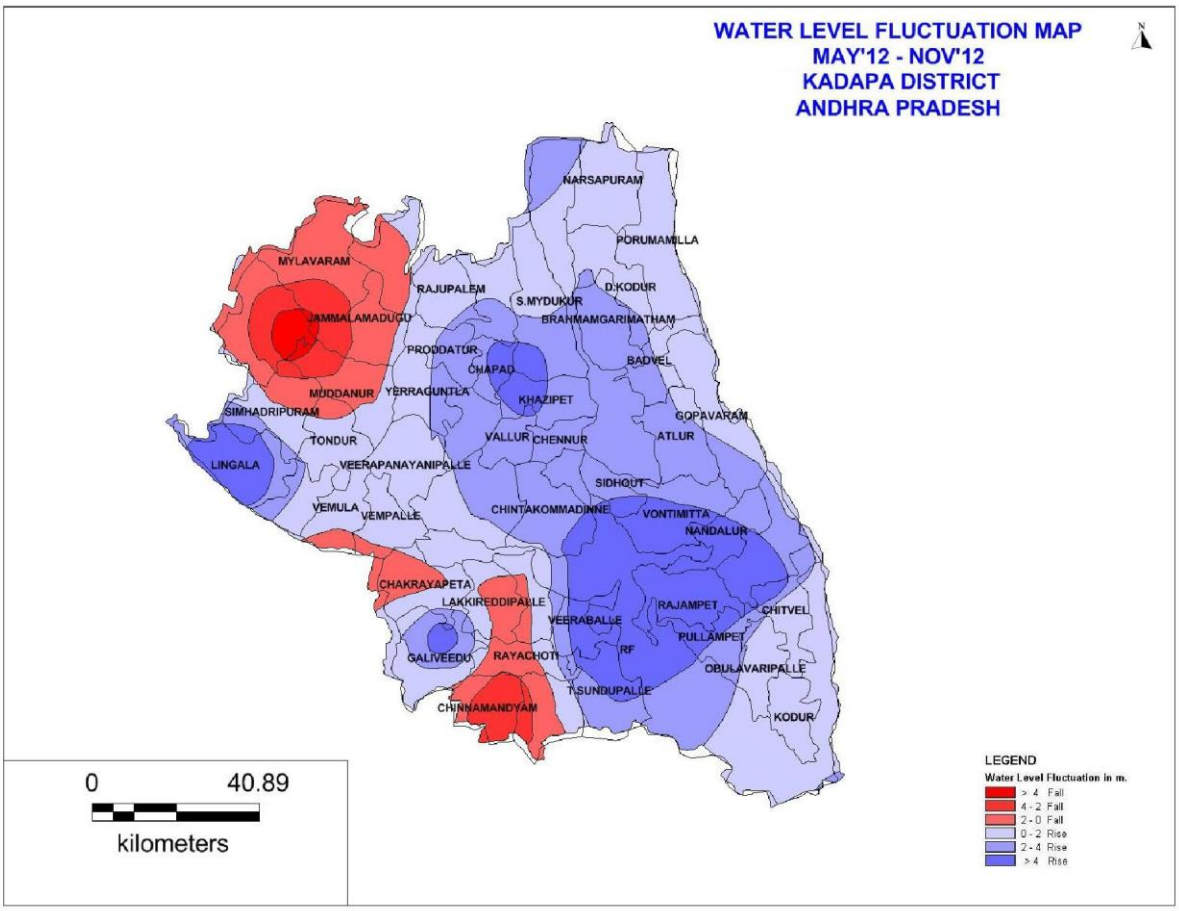
Post-monsoon water levels: The depth to Water level range from 0.85 to 12.27 m bgl during the post monsoon period (2012). The shallow water levels of less than 5 m are observed in northern and southern part of the district. The depth to water levels between 5-10 m are observed in major part of the area. The depth to water levels 10 -20 m are observed in north western and south eastern part of the district (**Figure 4-6**).

Figure 4-6: Depth to Water Level Map of Kadapa district, A.P (Nov-2012)



Water level fluctuation: Majority of the district shows rise in water level between pre and post monsoon period of 2012. Rise in water level between 0-2 m observed in north eastern, western and southern part of the district. Rise of water level between 2-4 m is observed in central and southwestern part of the district. Rise of water level of more than 4 m is observed in central and southeastern, southern and north western part of the district. Water level fall of 0-2 m is observed in very limited part of the district. Fall in the range of 2-4m is seen in north western and south western part of the district (**Figure 4-7**).

Figure 4-7: Water Level Fluctuation Map (Pre-Post) of Kadapa district, A.P (2011)

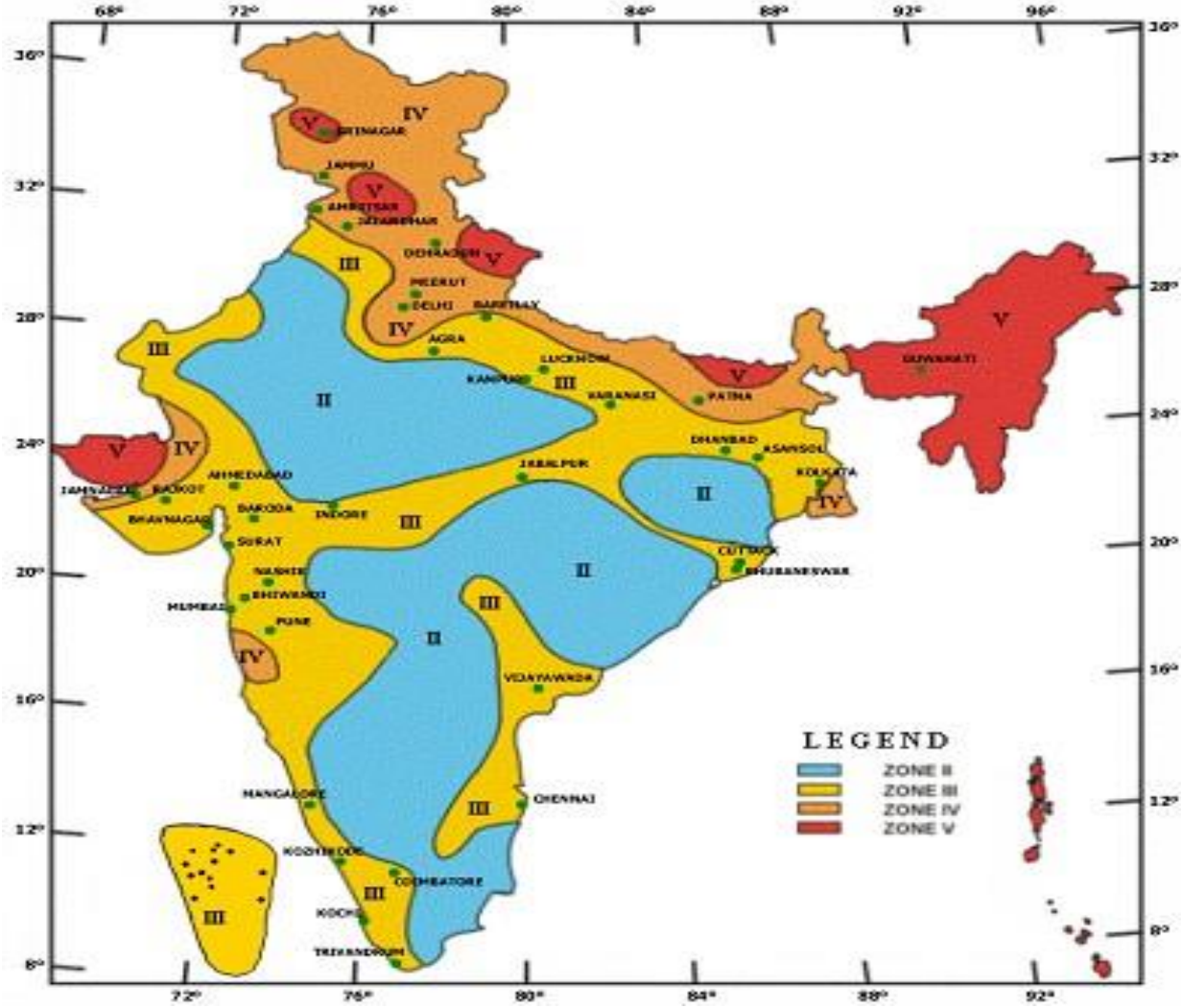


Based on the Ground Water Estimation Committee (GEC 97) norms, ground water assessment was done in 2008-09 and it is revealed that all the mandals in Kadapa district falls under safe category.

4.2.9 Seismic Hazard

The project site is located in **seismic zone II** as per the seismic zoning map of India (IS 1893–2002). Accordingly, implying that potential threats of damage due to earthquake are quite weak. The seismic zoning map of India has been shown in **Figure 4-8.**

Figure 4-8: Seismic Map

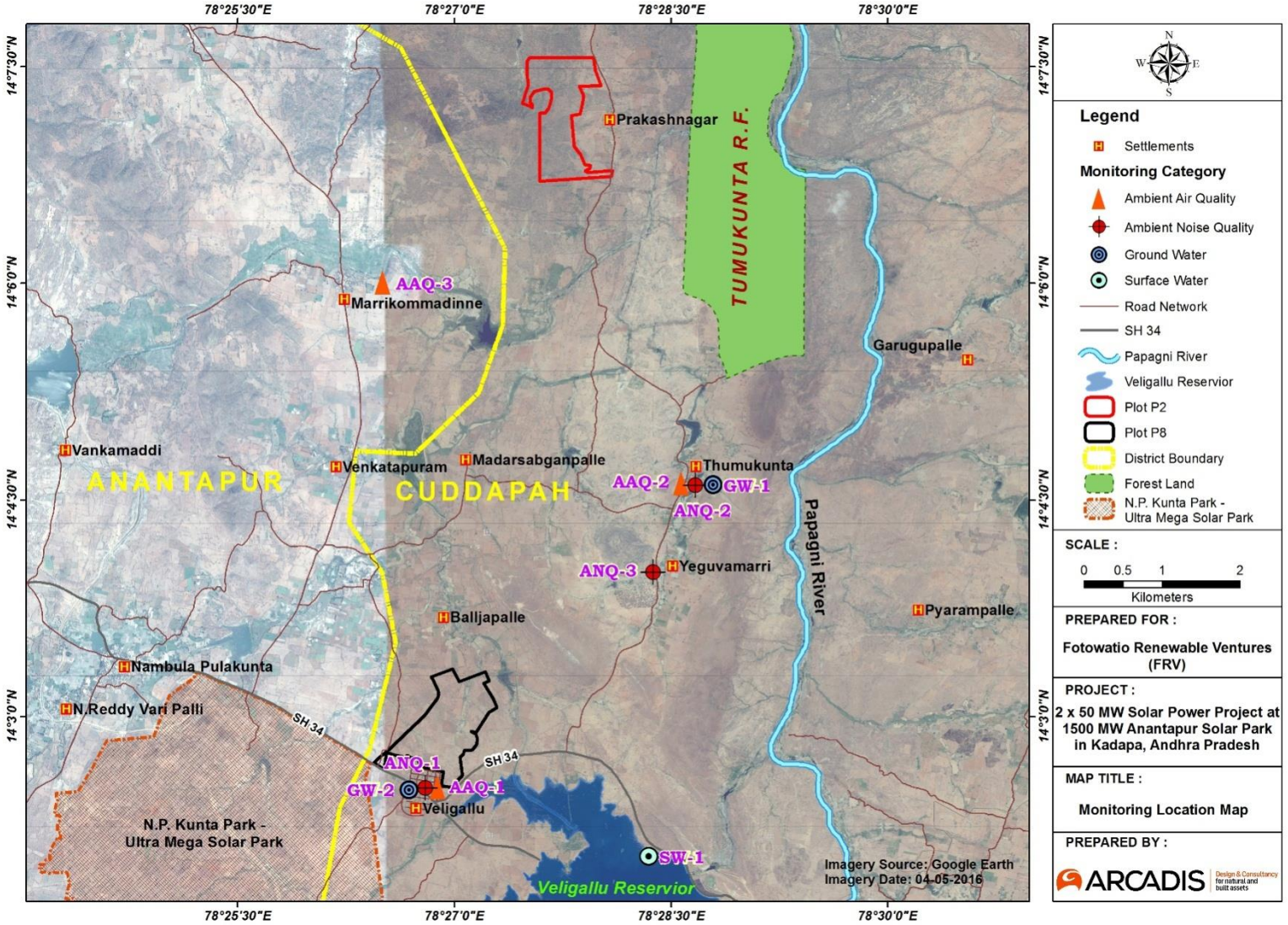


Source: www.isr.gov.in

4.3 Environmental Monitoring

The project is in the preconstruction stage during ESIA study. Baseline environmental monitoring has been carried out for ambient air quality, surface water& ground water quality, noise quality monitoring and traffic survey conducted by NABL/MOEF Accredited Laboratory as per the applicable standard methods & analysis. The result of the environmental monitoring represents the baseline environmental condition in the region. Location of environmental monitoring stations are depicted in **Figure 4-9.**

Figure 4-9: Monitoring Location Map



4.3.1 Ambient Air Quality

The existing quality of the ambient air environment serves as an index for assessing the pollution load and the assimilative capacity of any region and forms an important tool for planning project activities in the area. A detailed assessment of the existing air environment was undertaken for the purpose mentioned above. The ambient air quality monitoring was conducted at 3 representative locations during February 2017. The baseline air quality status of the study area was primarily assessed by monitoring for particulates and gaseous pollutants at these stations (**Refer table 4.4**). The monitoring network was established based on the following key criteria.

- Important receptor locations (e.g. prominent villages, ecological sensitive areas etc.);
- Site reconnaissance survey and professional judgment

The ambient air quality monitoring was carried out in accordance with guidelines of Central Pollution Control Board (CPCB) June 1998 and National Ambient Air Quality Standards (NAAQS), November 2009. Air quality monitoring was carried out for 24 hours a day for Particulate Matter (PM_{10} and $PM_{2.5}$), Sulphur Dioxide (SO_2) and Oxides of Nitrogen (NOx), 8 hours a day for Carbon Monoxide (CO).

Table 4-1: Ambient Air Quality Monitoring Results

Sl. No.	Parameter	Unit	Locations			NAAQS Limit
			Veligallu AAQ-1	Tumukunta AAQ-2	Marrikommadinne AAQ-3	
1	Particulate Matter (Size less than 10 µm or PM10)	µg/m3	52	32	38	100
2	Particulate Matter (Size less than 2.5 µm or PM2.5)	µg/m3	28	18	20	60
3	Sulphur Dioxide (SO2)	µg/m3	8.3	5.2	5.3	80
4	Nitrogen Dioxide (NO2)	µg/m3	23.5	12.1	13.5	80
5	Carbon Monoxide (CO)	mg/m3	<1.00	<1.00	<1.00	2.0

Interpretation of Air Quality Results

On comparison of obtained Ambient Air Quality Values with NAAQ Standards, the obtained values are well within the prescribed standards and no impact on the ambient air is anticipated due to project activity.

Air Quality Monitoring at Veligallu

Air Quality Monitoring at Marrikom Madinne

Air Quality Monitoring at Thumukunta

Noise Monitoring at Veligallu

4.3.2 Ambient Noise Quality

The ambient noise monitoring was conducted during the month of February at three locations (Tumukunta, Yeguvamarri, Veligallu) within the study area. The noise monitoring network was established based on the understanding of the project activities and professional judgment. The location of the ambient noise quality stations have been represented in the Figure 5.2 for reference.

Sound pressure level (SPL) measurements in dB(A) were recorded for every hour continuously for 24 hours for the aforesaid monitoring stations and equivalent noise levels in the form of Leq day and Leq night. The results so obtained were compared with the standard specified in Noise Pollution (Regulation and Control) Rules, 2000. The summary of noise quality results are presented in **Table 4-2** below.

Table 4-2: Noise Level Monitoring Results

Sl. no.	Parameter	Unit	Results		
			NQ1 (Tumukunta)	NQ2 (Yeguvamarri)	NQ3(Veligallu)
1	Leq Day	dB(A)	52.0	53.6	52.3
2	Leq Night	dB(A)	40.9	44.0	41.7

Interpretation of Noise Quality Results

On comparison of day and night equivalent values with Ambient Air Quality Standards in respect of Noise for Residential Areas the obtained values were observed to be well within the prescribed standards.

4.3.3 Transport & Communication

The project area has good road connectivity. Access roads within the study area villages are bituminous, concretized as well as kuchcha.

State Highway No. 34 crosses the project area towards Rayachotty (Kadapa District) town at the east and Kadiri (Anantapur District) town at the west. The nearest railway station to Galiveedu is Nallacheruvu which is located around 34.9 Km distance from the project site. Kadapa is one major railway station located at around 59 Km from the site. The nearest airport is at Kadapa town at around 61 km from the site. The major commercial airport Kempegowda International Airport, Devanahalli at Bengaluru (Bangalore) is about 178 Km from Galiveedu via Kadapa- Bangalore Highway.

For local commutation auto-rickshaws and two- wheelers are the used mode of transportation in the study area.

Traffic

As per traffic census 2014, the state highway connecting Rajampeta to Kadiri has the total traffic volume 6697 PCU's /day, major district road connecting Batrepalli to Nambulapulakunta (N. P. Kunta) has the total traffic volume 1937 PCU's /day and major district road connecting Babasamudram to Kick anti Pedabal NP Kunta road has the total traffic volume 2240 PCU's /day.

Traffic survey was also conducted for 24 hours during the environmental monitoring in February 2017 at two locations, Yeguvamarri on Veligallu to Tumukunta Road and Yerlocalpalli on N.P. Kunta to Marrikommadinne Road. It is noted that total fast moving vehicles plying on the road were 204 at Yeguvamarri and 188 at Yerlocalpalli.

Table 4-3: Traffic Survey Results

Location: Yeguvamarri; Name of the Road: Veligallu to Tumukunta Road; Date: 08.02.2017; UP: Veligallu to Tumukunta; DN: Tumukunta to Veligallu

Time	Fast Moving Vehicles										Slow Moving Vehicles					
	Two Wheelers		Three Wheelers		Cars/Vans		Buses & Lorries		2-Axle & 3 Axle		Cycles		Cycle Rishkaw		Cattle's	
	Up	Dn	Up	Dn	Up	Dn	Up	Dn	Up	Dn	Up	Dn	Up	Dn	Up	Dn
1.00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
2.00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
3.00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
4.00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
5.00	02	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
6.00	03	01	01	01	00	00	00	00	00	00	00	00	01	01	00	00
7.00	02	02	02	03	01	00	00	01	00	00	00	00	05	03	00	00
8.00	05	03	01	02	00	01	00	00	00	00	00	00	06	06	00	00
9.00	09	05	04	01	02	00	01	00	00	00	00	00	03	05	00	00
10.00	08	04	02	04	00	01	00	01	00	00	00	00	05	02	00	00
11.00	06	06	01	02	01	00	01	00	00	00	00	00	04	03	01	00
12.00	03	06	02	01	02	01	00	00	00	00	00	00	08	04	00	00
13.00	05	03	03	02	00	00	00	00	00	00	00	00	06	05	00	01
14.00	02	04	01	01	01	01	00	00	00	00	00	00	03	02	00	00
15.00	01	05	03	01	02	00	01	00	00	00	00	00	02	01	00	00
16.00	05	03	02	02	00	01	00	00	00	00	00	00	01	02	00	00
17.00	03	05	04	01	01	00	00	01	00	00	00	00	01	01	00	01
18.00	02	08	01	01	02	00	00	00	00	00	00	00	02	00	00	00
19.00	01	03	02	02	00	01	00	00	00	00	00	00	00	00	01	00
20.00	01	02	01	01	01	00	00	00	00	00	00	00	00	00	00	00

Time	Fast Moving Vehicles										Slow Moving Vehicles					
	Two Wheelers		Three Wheelers		Cars/Vans		Buses & Lorries		2-Axle & 3 Axle		Cycles		Cycle Rishkaw		Cattle's	
	Up	Dn	Up	Dn	Up	Dn	Up	Dn	Up	Dn	Up	Dn	Up	Dn	Up	Dn
21.00	02	01	00	00	00	01	00	00	00	00	00	00	00	00	00	00
22.00	01	01	00	00	00	00	00	00	00	00	00	00	00	00	00	00
23.00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
24.00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
Total	**61**	**62**	**30**	**25**	**13**	**7**	**3**	**3**	**0**	**0**	**0**	**0**	**47**	**35**	**2**	**2**
	Total Fast Moving Vehicles: 204										**Total Slow Moving Vehicles: 86**					

Location: Yerlocalpalli; Name of the Road: N.P. Kunta to Marrikommadinne Road; Date: 09.02.2017; UP: N.P. Kunta to Marrikommadinne; DN: Marrikommadinneto N.P. Kunta

Time	Fast Moving Vehicles										Slow Moving Vehicles					
	Two Wheelers		Three Wheelers		Cars/Vans		Buses & Lorries		2-Axle & 3 Axle		Cycles		Cycle Rishkaw		Cattle's	
	Up	Dn	Up	Dn	Up	Dn	Up	Dn	Up	Dn	Up	Dn	Up	Dn	Up	Dn
1.00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
2.00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
3.00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
4.00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
5.00	03	01	00	00	00	00	00	00	00	00	00	00	00	00	00	00
6.00	04	03	01	00	00	00	00	00	00	00	01	00	00	00	02	00
7.00	02	04	02	02	01	02	00	00	00	00	02	00	00	00	00	00
8.00	06	02	01	04	01	00	01	00	00	00	00	00	00	00	03	00
9.00	08	01	00	03	00	01	00	01	00	00	00	02	00	00	00	00
10.00	04	05	02	01	02	00	00	00	00	00	01	00	00	00	00	01
11.00	05	02	04	03	00	00	00	00	00	00	00	01	00	00	00	00

Time	Fast Moving Vehicles										Slow Moving Vehicles					
	Two Wheelers		Three Wheelers		Cars/Vans		Buses & Lorries		2-Axle & 3 Axle		Cycles		Cycle Rishkaw		Cattle's	
	Up	Dn	Up	Dn	Up	Dn	Up	Dn	Up	Dn	Up	Dn	Up	Dn	Up	Dn
12.00	02	02	03	04	01	00	00	00	00	00	00	00	00	00	02	00
13.00	04	03	02	05	01	00	01	00	00	00	00	02	00	00	00	02
14.00	03	05	00	02	02	02	00	01	00	00	00	01	00	00	00	00
15.00	02	07	01	01	00	00	00	00	00	00	02	00	00	00	00	00
16.00	06	04	03	03	01	01	00	00	00	00	03	01	00	00	00	00
17.00	02	02	02	02	01	00	01	00	00	00	00	00	00	00	00	00
18.00	05	01	01	01	00	00	00	01	00	00	00	00	00	00	00	01
19.00	04	02	02	00	00	01	00	00	00	00	01	00	00	00	01	00
20.00	02	00	01	02	00	00	00	00	00	00	00	00	00	00	00	00
21.00	00	00	00	00	00	01	00	00	00	00	00	00	00	00	00	00
22.00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
23.00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
24.00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
Total	**62**	**44**	**25**	**33**	**10**	**8**	**3**	**3**	**0**	**0**	**10**	**7**	**0**	**0**	**8**	**4**
Total Fast Moving Vehicles: 188											**Total Slow Moving Vehicles: 29**					

4.3.4 Surface Water Quality

Surface water characteristics were assessed against water quality criteria as per CPCB guidelines for water resources. The surface water sample was collected from Veligallu reservoir. The dissolved oxygen (DO) level was observed 4.8 mg/l indicating favourable conditions for the growth and reproduction of normal population of fish and other aquatic organisms in the water body. BOD level was below 4 mg/l. The surface water sample is analyzed to be neutral in nature having pH value of 7.48. Hence, the best use class of the surface water body according to the CPCB Water Use Classification conforms to Class B (Outdoor bathing (Organised)) inland surface water quality.

Table 4-4: Surface Water Monitoring Results

Sl. No	Parameters	Unit	Results Veligallu Dam Water- SW1
1.	pH at25 degC		7.48
2.	Color	Hazen	20
3.	Conductivity at 25 deg C	mS/cm	996
4.	Temperature	degC	26.0
5.	Turbidity	NTU	1.90
6.	Dissolved Oxygen	mg/L	4.8
7.	Chemical Oxygen Demand	mg/L	10
8.	Total Suspended Solids	mg/L	1.2
9.	Total Dissolved Solids	mg/L	632
10.	BOD (3 days at 27°C)	mg/L	<03
11.	Total Hardness as CaCO3	mg/L	360
12.	Chloride as Cl	mg/L	45.0
13.	Fluorides as F	mg/L	0.50
14.	Sulphate as SO4	Mg/L	25.l
15	Alkalinity	mg/L	400
16	Total Nitrogen	mg/L	4.2
17	Cyanides as CN	mg/L	<0.001
18	Calcium as Ca	mg/L	72.0
19	Magnesium as Mg	mg/L	43.2
20	Sodium as Na	mg/L	59.3
21	Potassium as K	mg/L	2.7
22	Iron as Fe	mg/L	0.12
23	Lead as Pb	mg/L	<0.001
24	Copper as Cu	mg/L	<0.001
25	Arsenic as As	mg/L	<0.02
26	Phenolics as C6H5Oh	mg/L	<0.001
27	Boron	mg/L	<0.001
28	Total Chromium as Cr	mg/L	<0.001
29	Zinc as Zn	mg/L	0.08
30	Total Phosohorus	mg/L	<0.02

Sl. No	Parameters	Unit	Results Veligallu Dam Water- SW1
31	Mercury as Hg	mg/L	<0.001
32	Oil and grease	mg/L	<1.0
33	Coli form Organisms	MPN/100 ml	98
34	Faecal Coliform	MPN/100 ml	64
35	Pesticides	µg/L	<0.001

BDL= Below Detection Limit

4.3.5 Groundwater Quality

A total of two ground water samples were collected from Thumukunta and Veligallu villages within the study area. The samples were analyzed for physicochemical and bacteriological parameters and results compared with IS: 10500 (2012) drinking water standards to identify and interpret any deviation in the statutory limits set for parameters under this standard. The results for relevant drinking water quality parameters have been discussed below.

Table 4-5: Groundwater Monitoring Results

Sl. No.	Parameters	Unit	Tumukunta GW-1	Veligallu GW-2	Specification/ IS:10500-2012 Acceptable Limit	Test Methods
1	pH at 25°C		7.40	8.48	6.5 - 8.5	IS:3025 part 11 1983 RA-2012
2	Turbidity	NTU	1.08	<1.0	5 -10	IS: 3025 Part 10 1984 RA-2002
3	Conductivity at 25°C	µMho/cm	896	596	-	IS: 3025 Part 14 1984 RA-2013
4	Total Susoended Solids	mg/L	3.4	<0.1	--	lS: 3025 Part 17 1984 RA-2012
5	Total Dissolved Solids	mg/L	570	372	--	IS: 3025 Part 16 1984 RA-2006
6	Colour	Hazen	<05	<05	5.00	IS: 3025 Part 4 1983 RA-2006
7	Taste	-	Agreeable	Agreeable	Agreeable	IS:3025 part 08 1984 RA-2002
8	Odor	-	Unobjectionable	Unobjectionable	Unobjectionable	IS:3025 part 05 1983
9	Total Alkalinity as CaCO3	mg/L	340	240	--	IS: 3025 Part 23 1986, RA-2003
10	Chlorides as Cl	mg/L	55.0	25.0	250- 1000	IS: 3025 Part 32 1988, RA-2009
11	Sulphates as SO4-2	mg/L	21.6	14.7	200 – 400	IS: 3025 Part 24 1986,RA-2003
12	Nitrates as NO3	mg/L	4.4	4.0	40 – 100	IS: 3025 Part 34 1988, RA-2003

Sl. No.	Parameters	Unit	Tumukunta GW-1	Veligallu GW-2	Specification/ IS:10500-2012 Acceptable Limit	Test Methods
13	Phosphates as PO4	mg/L	<0.02	<0.02	--	IS: 3025 Part 31 1988, RA-2003
14	Total Hardness as CaCO3	mg/L	280	140	200-600	IS: 3025 Part 21 2009
15	Calcium as Ca	mg/L	60.0	28.0	75 - 200	IS 3025 Part 40 1991, RA-2009
16	Magnesium as M	mg/L	31.2	16.8	30 - 100	IS: 3025 Part 46 1994, RA-2003
17	Sodium as Na	mg/L	73.6	69.0	--	IS: 3025 Part 45 1993, RA-2009
18	Potassium as K	mg/L	23	2.3	--	IS: 3025 Part 45 1993, RA-2009
19	Flourides as F	mg/L	0.40	0.30	1 - 1.5	IS: 3025 Part 60 2008
20	Iron as Fe	mg/L	0.12	0.08	0.3 - 1	IS: 3025 Part 53 2003, RA-2003
21	Phenolic Compounds	mg/L	<0.001	<0.001	0.001 - 0.002	APHA 22nd Edition 5330D
22	Cyanide as CN	mg/L	<0.001	<0.001	0.005	IS 3025 Part 27 1986
23	Residual Chlorine as Cl	mg/L	<0.001	<0.001	0.2	IS 3025 Part 26 1986
24	Cadmium as Cd	mg/L	<0.001	<0.001	0.01	IS 3025 Part 41 1992
25	Total Chromium as Cr	mg/L	<0.001	<0.001	5 - 15	IS 3025 Part 52 2003
26	Lead as Pb	mg/L	<0.02	<0.02	30 - 100	IS 3025 Part 47 1994
27	Zinc as Zn	mg/L	0.06	0.02	0.05 - 1.5	IS 3025 Part 49 1994
28	Manganese as Mn	mg/L	<0.001	0.008	3.0 - 5.0	IS: 3025 Part 24 2006
29	Copper as Cu	mg/L	0.014	<0.001	1.00	IS 3025 Part 42 1992
30	Nickel as Ni	mg/L	<0.001	<0.001	0.20	IS 3025 Part 54 2003
31	Boron	mg/L	<0.001	<0.001	0.01	IS 3025 Part 57 2005
32	Anionic Detergents	mg/L	< 0.001	<0.001	0.03	IS 13428 Annex K
33	Mineral Oil	mg/L	< 0.001	<0.001	0.00	APHA 2200 Edition 2012
34	Aluminium as Al	mg/L	<0.001	<0.001	<0.001	IS 3025 Part 55 2003

Sl. No.	Parameters	Unit	Tumukunta GW-1	Veligallu GW-2	Specification/ IS:10500-2012 Acceptable Limit	Test Methods
35	Mercury as Hg	mg/L	<0.0002	<0.0002	5 - 15	IS 3025 Part 48 1994
36	Pesticides	µg/L	<0.001	<0.001	30 - 100	USEPA

Interpretation of Ground Water Quality Results:

pH and Turbidity

The pH and turbidity values of water samples collected were within the desirable limit of IS: 10500 drinking water standard thereby establishing its potable use. The pH varied in the range of 7.40 to 8.48.

Total Dissolved Solids

The concentration of total dissolved solids (TDS) in ground water is a measure of its suitability for domestic use. In general, TDS values at 500 mg/l or below is considered to be most desirable for such purpose being specified under IS: 10500 drinking water standard. The TDS value for the ground water sample analyzed was found to be 570 mg/l at Tumukunta village thereby conforming to the permissible limit but not the desirable limit as per ground water standard (IS: 10500). This is probably due to no or limited recharge of ground water as the area is devoid of good rainfall.

Chlorides

With respect to IS: 10500 standards, the desirable limit of chloride is 250 mg/l while the permissible limit of the said parameter (in absence of an alternate source) is 1000 mg/l. At concentration above 250 mg/l chlorides renders a salty taste to water which may be considered to be objectionable in terms of human consumption. The chloride concentration in the ground water samples were ranges 25 -55 mg/l which is well within the desirable limit specified for domestic consumption.

Total Hardness

Hardness of water is considered to be an important parameter in determining the suitability of water for domestic uses particularly washing. Hardness of water is correlated to the presence of bivalent metallic ions viz. calcium and magnesium. Total hardness values for the ground water sample was found to be 280 mg/l at Tumukunta, which is not within the stipulated standard of 200 mg/l specified under IS: 10500.

Iron and Fluoride

Iron is considered to be an important ground water parameter since at higher concentration it interferes with laundering operations and imparts objectionable stains. The concentration of iron in ground water sample was observed to be below the limit of 0.3mg/l. Fluoride content in the ground water samples was found within the desirable limit of the potable drinking water standard of 1.0 mg/l.

Heavy Metals

The presence of heavy metals in the ground water samples were below the threshold limits.

Surface Water Collection from Velligallu Reservoir

Ground Water Collection from Velligallu Village

Ground Water Collection from Thumu kunta Village

Traffic survey at N.P. Kunta

4.4 Ecological Environment

Ecology & biodiversity study was carried out during first week of February 2017 with the aim to assess the existing ecological resources of the project site and the study area. The study was aimed to conduct primary baseline survey to assess the nature of the existing habitat, local flora and fauna, ecological sensitivity if any, locations of wetlands/water bodies, land use pattern etc. Apart from that, published / unpublished secondary information were also collected on the same from 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 Kadapa Forest Division), vegetation type (Champion and Seth, 1962), floral and faunal assemblage in the study area.

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. So 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 1st week of February 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 range office of Rayachotti, under Kadapa 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 – 6E-Deccan Peninsula-Deccan South.

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[2] 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 4-10.**

Types of Habitat in the Study area

Agricultural Field & Orchards

During survey, majority of the study area and particularly the proposed project site was found to be primarily "**Modified**" in the form of agricultural fields. Cash crops such as horse gram, Red gram, castor, Cowpea, Sorghum, are being cultivated by the farmers in this part of Andhra Pradesh.

Along with agricultural fields, mango orchards were encountered in the study area. Water sprinklers are used for watering the mango trees. These 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.

[2] *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.

Forest & Natural Vegetation

Large part of the study area is covered by forest land of Tumukunta Reserved Forest (RF). Tumukunta R.F. is located about 1.3km north and 1.2km east of proposed project site. Tumukunta R.F. falls under the Rayachotti Range of Kadapa Forest Division of Andhra Pradesh.

According to Champion and Seth (1968), natural vegetation in the study area can be classified as

1. "6A/DS1 – Southern Thorn Scrub"
2. "6A/DS2 – Southern Euphorbia Scrub"

Ecological Retrogression:

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. These fires results in the killing of soil flora and microbes and absence of moisture prevents soil microbe buildup as a result soil structure gets damaged and life and life support system on the forest floor suffers irreparable damage. Apart from forest grazing and browsing of cattle and goat leading to the ecological retrogression.

About 80% of the forest are is covered by "6A/DS 1 Southern Thorn Scrub". It is a biotic type in state of retrogression. If protected from grazing, lopping and fire it can slowly progress to Thorn forest. On contrary, it may further deteriorate to euphorbia scrub and then to dry grassland and ultimately to bare boulders. Top canopy and middle canopy is absent, only shrubs and herbs can be found growing.

In "6A/DS2 Southern Euphorbia Scrub" natural regeneration is scanty, the main reason being forest fire. Forest are completely xerophyte in character, consisting of resident thorny bushes of very low density.

Degrade scrubby vegetation covers most of the Project site. Due to pressure from grazing and fire the natural vegetation has degraded from "6A/C1 - Southern Thorn Forest" to "6A/DS1 – Southern Thorn Scrub" and "6A/DS2 – Southern Euphorbia Scrub". So it can be classified as "modified habitat". Detail Floral composition is discussed in Floral Profile Section.

Aquatic Habitat

Project area lies in the catchment area of Penna River. A prominent right bank tributary of Penna, the "Papagni" flows about 2.5km east of the proposed project site. Papagni River has its origins in the Nandi Hills of the state of Karnataka. Within the study area the river flows in a south to north orientation. Papagni River is seasonal in nature, except for few monsoon months, the river bed remains dry rest of the year. Veligallu reservoir is located at a distance of approximately 7.8 km south east from the proposed P2 project site. The dam has been constructed in 2008 on Papagni River and water remains in the reservoir throughout the year (perianal source of water). The catchment area of the reservoir holds mainly Galiveedu and Veligallu villages in Galiveedu Mandal of Kadapa district. Full and dead storage capacity of the reservoir are 4.64 TMC and 0.93 TMC, respectively. Total catchment area of the reservoir is 12.729 sq. km. Currently the reservoir water is used for irrigation purposes.

4.4.3 Flora and Faunal Profile of the Study Area

(A)Floral Profile

The proposed project site is dry and arid in nature comprising dry, thorny scrubs mixed with pockets of private agriculture land. The rainfall in the area is scanty. The primary floral survey was limited to record site specific floral species (both woody trees/small tree species as well as ephemeral ground vegetation). Assessing the existing floral profile was necessary to understand the baseline conditions of the area as the project activities might lead to loss of significant ecological resources, if present. The information will add on to the knowledge of ecological resources and help in further evaluating the possible risks due to project activities and feasibility of the proposed mitigation measures.

Floral Profile of Agricultural fields and Village Woodlot –

A few tree species such as *Acacia nilotica*, *Acacia catechu*, *Salvodara persica*, *Zyzyphus nummularia*, *Balanites agyptica, Tamarindus indica* and *Prosopis juliflora* were recoded from the primary survey. Common grasses like *Digitaria ciliaris*, *Aristida adscensionis*, *Aristida purpurea*, *Chrysopogon aciculata*, *Cynodon dactylon* etc.

Floral Profile of Scrub lands and forests –

Top Canopy

Albizzia amara, Azadirachta indica, Bauhinis racemosa, Euphorbia antiquorum etc.

Middle Storey

Cassia siamea, Cassia fistula, Zizyphus xylopyrus, Randis dumetorum, Albizia amara, Carissa carandas etc.

Ground Flora

Dadanaca viscosa, Cassia fistula, Cymbopogon martini, Cymbapogon coloratus etc.

(B) Faunal Profile

During site visit no primary evidences of large or medium mammals were found in the project site and study area. But consultation with forest department and local villagers have confirmed the presence of mammals like Sloth Bear, Wild Boar and Fox in the scrub forests of the study area. Consultation with forest department also revealed that leopards are hardly seen in the study area, but on rare circumstances leopards are blamed for cattle kill. No systematic study has been done in recent years to conclusively prove the presence of leopards in the study area, but there is a probability of leopard movement in the study area.

Following mammals can be found in scrubs and natural habitat of the study area.

Table 4-6: Mammals Found in the Forest within the Study Area

Sl. No	Common Name	Telegu Name	Scientific Name	Schedule WPA 1972	IUCN Status	Occurrence in the Study Area
1	Sloth Bear	Yelugubanti	*Melursus ursinus*	I	Vulnerable	Occational
2	Jackal	Nakka	*Canis aureus*	II	Least Concern	Common
3	Common Fox	Guntanakka	*Vulpes bengalensis*	II	Least Concern	Rare
4	Wild Boar	Adavi pandi	*Sus scrofa cristatus*	III	Least Concern	Common
5	Blacknaped Hare	Kundelu	*Lepus nigricollis*	III	Least Concern	Common
6	Hanuman Langur	Kothi	*Semnopithecus dussumieri*	II	Least Concern	Frequent
7	Bonnet Macaque	Kothi	*Macaca radiata*	II	Least Concern	Frequent
8	Indian Flying Fox	-	*Pteropus giganteus*	III	Least Concern	Common
9	Leopard	Chirutapuli	*Panthera pardus*	I	Near Threatened	Rare

Avifauna

Total 46 species of birds were sighted and recorded in the study area. 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.

Apart from these birds due to the presence of water body, birds like river tern, Grey Heron, Painted Stork, Great Cormorant, Pied Kingfisher were found in the vicinity of water bodies.

The species of birds recorded in the project area during site visit is listed in the **Table 4-7.**

Table 4-7: List of Avifauna Sighted in the Project Area

S. No.	Species	Scientific Name	IUCN Category	Schedule (WPA 1972)	Migratory Status
1.	Ashy crowned Sparrow Lark	*Eremopterix griseus*	Least Concern	Schedule IV	Resident
2.	Ashy Prinia	*Prinia socialis*	Least Concern	Schedule IV	Resident
3.	Asian Koel	*Eudynamys scolopaceus*	Least Concern	Schedule IV	Resident
4.	Bay Backed Shrike	*Lanius vittatus*	Least Concern	Schedule IV	Resident
5.	Baya Weaver	*Ploceus philippinus*	Least Concern	Schedule IV	Resident
6.	Black Winged Stilt	*Himantopus himantopus*	Least Concern	Schedule IV	Resident/ Local migratory
7.	Black winged Kite	*Elanus caeruleus*	Least Concern	Schedule IV	Resident
8.	Brahminy Kite	*Haliastur indus*	Least Concern	Schedule IV	Resident
9.	Cattle Egret	*Bubulcus ibis*	Least Concern	Schedule IV	Resident
10.	Common Babbler	*Turdoides caudata*	Least Concern	Schedule IV	Resident
11.	Common Coot	*Fulica atra*	Least Concern	Schedule IV	Resident
12.	Common Kingfisher	*Alcedo atthis*	Least Concern	Schedule IV	Resident
13.	Common Moorhen	*Gallinula chloropus*	Least Concern	Schedule IV	Resident
14.	Common Myna	*Acridotheres tristis*	Least Concern	Schedule IV	Not migratory
15.	Eurasian Collared Dove	*Streptopelia decaocto*	Least Concern	Schedule-IV	Resident
16.	Great Cormorant	*Phalacrocorax carbo*	Least Concern	Schedule-IV	Resident
17.	Great Egret	*Ardea alba*	Least Concern	Schedule-IV	Resident
18.	Green Bee Eater	*Merops orientalis*	Least Concern	Schedule IV	Not migratory
19.	Grey Francolin	*Francolinus pondicerianus*	Least Concern	Schedule IV	Resident
20.	Grey Heron	*Ardea cinerea*	Least Concern	Schedule IV	Resident
21.	Grey Hornbill	*Ocyceros birostris*	Least Concern	Schedule IV	Resident
22.	House Crow	*Corvus splendens*	Least Concern	Schedule IV	Resident
23.	House Sparrow	*Passer domesticus*	Least Concern	Schedule IV	Resident
24.	Indian Black Robin	*Saxicoloides fulicatus*	Least Concern	Schedule IV	Resident

S. No.	Species	Scientific Name	IUCN Category	Schedule (WPA 1972)	Migratory Status
25.	Indian Cormorant	*Phalacrocorax fuscicollis*	Least Concern	Schedule IV	Resident
26.	Indian Peafowl	*Pavo cristatus*	Least Concern	Schedule I	Resident
27.	Indian Silverbill	*Lonchura malabarica*	Least Concern	Schedule IV	Resident
28.	Jungle Babbler	*Turdoides striata*	Least Concern	Schedule IV	Resident
29.	Jungle Crow	*Corvus levaillantii*	Least Concern	Schedule IV	Resident
30.	Laughing Dove	*Spilopelia senegalensis*	Least Concern	Schedule IV	Resident
31.	Little Egret	*Egretta garzetta*	Least Concern	Schedule-IV	Resident
32.	Little Grebe	*Tachybaptus ruficollis*	Least Concern	Schedule-IV	Resident
33.	Little Ringed Plover	*Charadrius dubius*	Least Concern	Schedule-IV	Resident
34.	Painted Stork	*Mycteria leucocephala*	Least Concern	Schedule IV	Resident
35.	Pied Bushchat	*Saxicola caprata*	Least Concern	Schedule IV	Resident
36.	Pied Kingfisher	*Ceryle rudis*	Least Concern	Schedule IV	Resident
37.	Plain Prinia	*Prinia inornata*	Least Concern	Schedule IV	Resident
38.	Pond Heron	*Ardeola grayii*	Least Concern	Schedule IV	Resident
39.	Purple Sunbird	*Nectarinia asiatica*	Least Concern	Schedule IV	Resident
40.	Red Naped Ibis	*Pseudibis papillosa*	Least Concern	Schedule IV	Resident
41.	Red vented Bulbul	*Pycnonotus cafer*	Least Concern	Schedule IV	Resident
42.	Red wattled Lapwing	*Vanellus indicus*	Least Concern	Schedule IV	Resident
43.	River Tern	*Sterna aurantia*	Near Threatened	Schedule IV	Resident
44.	Rock Pigeon	*Petrophassa albipennis*	Least Concern	Schedule IV	Resident
45.	Rose-ringed Parakeet	*Psittacula krameri*	Least Concern	Schedule IV	Resident
46.	Shikra	*Accipiter badius*	Least Concern	Sch IV	Resident

Photo 4-3: Avian Fauna

Baya Weaver

Great Cormorant

River Tern

Red Wattled Lapwing

Brahminy Kite

Grey Heron

Grey Francolin

Black Shouldered Kite

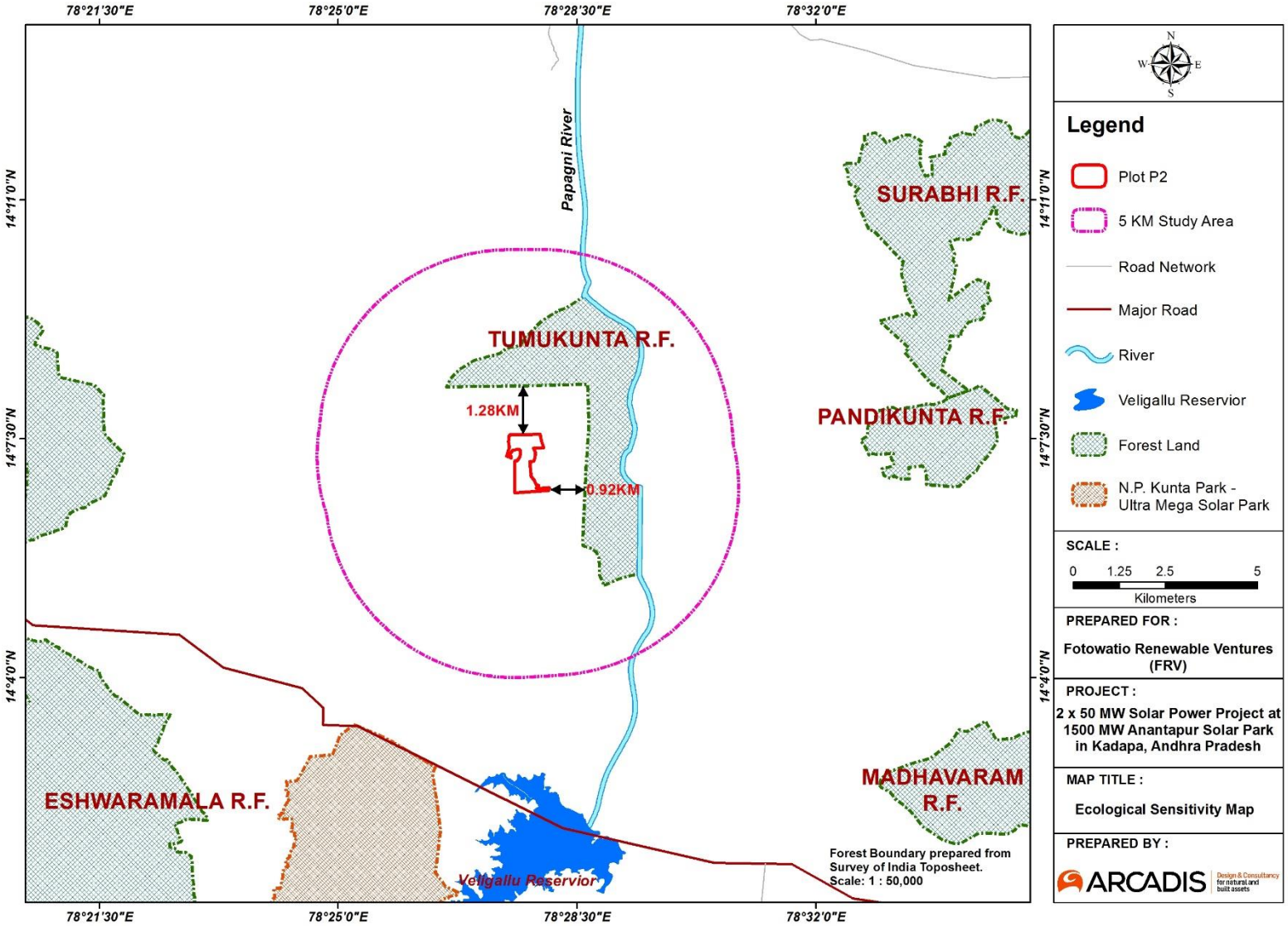
Indian Peafowl

Painted Stork

Pied Kingfisher

Red Naped Ibis

Figure 4-10: Ecology Map of the Project Surrounding



Herpeto fauna

Garden lizards were sighted during the primary survey from the project area. Agricultural fields and bushy areas are known to be the habitat of garden lizard (*Calotesversicolor).* Although no snake species was encountered during the survey, dialogue with local villagers confirmed the presence of Rat snake (*Ptyas mucosus*), Common Krait *(Bungarus caeruleus*) and Common cobra (*Naja naja*) in the project area. List of reptiles commonly found from the study area are provided in the **Table 4-8.**

Table 4-8: Reptiles of the Study Area

Species	Common name	IUCN status
Eutropis carinata (Schneider, 1801)	Keeled Grass Skink	NA
Eutropis macularia (Blyth, 1858)	Bronze Grass Skink	NA
Calotes versicolor (Daudin, 1802)	Indian Garden Lizard	LC
Psammophilus dorsalis (Gray, 1831)	Peninsular Rock Agama	LC
Sitana ponticeriana Cuvier, 1844	Fan Throated Lizard	LC
Varanus bengalensis (Linnaeus, 1758)	Common Monitor Lizard	LC
Eryx conicus (Schneider, 1801)	Common Sand Boa	NA
Eryx johni (Russell, 1801)	Red Sand Boa	NA
Boiga trigonata (Schneider, 1802)	Common Cat Snake	LC
Elaphe helena (Daudin, 1803)	Common Trinket Snake	NA
Enhydris enhydris (Schneider, 1799)	Smooth Scaled Water Snake	LC
Lycodon aulicus (Linnaeus, 1754)	Common Wolf Snake	NA
Lycodon striatus (Shaw, 1802)	Barred Wolf Snake	NA
Ptyas mucosa (Linnaeus, 1758)	Indian Rat Snake	NA
Bungarus caeruleus (Schneider, 1801)	Common Krait	NA
Naja naja (Linnaeus, 1758)	Spectacled Cobra	NA
Echis carinatus (Schneider, 1801)	Saw-scaled Viper	NA
Daboia russelli (Shaw, 1797)	Russell's Viper	NA

LC: Least Concern; NE: Not Evaluated

Ichthyofauna

Veligallu reservoir is located at a distance of approximately 7.8 km south east from the proposed P2 project site. The dam has been constructed in 2008 on Papagni river which flows about 2.5 km east of the project site in south to north direction. It is a perennial source of water. During the local consultation it is reported that around 500 fishermen are engaged with fishing activities in the reservoir. The fishes are cultivated in the reservoir mainly Jilibah (*Oreochromis niloticus*), Katla (*Catla catla)*, Rohu (*Labeo rohita*) and Murrel or white carp (*Cirrhinus mrigala)*.

4.5 Socio Economic Profile of the Study Area

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 is a part of Rayalaseema region of the south-central part of Andhra Pradesh, in YSR Kadapa district. Project area consist of agricultural land with sparsely undulating rocky and barren land.

Site visit was undertaken along with primary and secondary data collection from various sources. Interviews were also undertaken with Project Proponent - Fotowatio Renewable Ventures (FRV), Nodal Agency for the 1500 MW Solar Park- APSPCL, local villagers and government officials in different departments. Information and documents were collected from the project proponent, nodal agency for the 1500 MW Solar Power Park – Andhra Pradesh Solar Power Corporation Pvt. Ltd. (APSPCL), project site and land details as per requirements.

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 E**) Secondary data includes Census 2011, information available on the official website of the district of Anantapur (http://kadapa.ap.nic.in/) statistical data website of Andhra Pradesh (http://www.ap.gov.in/andhra-pradesh-state-statistical-abstract/) Statistical abstract of Andhra Pradesh of Directorate of Economics and Statistics, Government of Andhra Pradesh, District Census Handbook, and other available data on official Government websites.

4.5.1 Demographic Profile of District and Study Area Villages

As per 2011 census of India, Andhra Pradesh is the tenth largest state by population. On 2 June 2014, the north-western portion of the state was bifurcated to form a new state of Andhra Pradesh. In accordance with the Andhra Pradesh Reorganization Act, 2014, Hyderabad will remain the de jure capital of both Andhra Pradesh and Andhra Pradesh states for a period of time not exceeding 10 years. The new river-front proposed capital in Guntur district is Amravati, which is under the jurisdiction of Andhra Pradesh Capital Region Development Authority (APCRDA). There are two regions in the state namely Coastal Andhra and Rayalaseema. These two regions comprise 13 districts, with 9 in coastal Andhra and 4 in Rayalaseema. Rayalaseema comprises of 4 districts namely Anantapur, Chittoor, YSR Kadapa and Anantapur. In 2014 Andhra Pradesh was curtailed to two states namely Andhra Pradesh and Telangana.

Project impacted / study area village

As information provided by the project proponent FRV and the nodal agency APSPCL, the proposed 50 MW Solar Power Project is located in Thumu Kunta village in Galiveedu Mandal of YSR Kadapa District as presented in **Table 4-9.**

Table 4-9: Project location

Sl. No.	State	District	Mandal/ Tehsil	Gram Panchayat	Village
1	Andhra Pradesh	Kadappa	Galiveedu	Thumu Kunta	Thumu Kunta

Source: Fotowatio Renewable Ventures (FRV) and APSPCL

Demographic Profile

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

Population & Gender ratio[3]

State: As per details from Census 2011 and also given in Statistical Year Book, 2015 of Directorate of Economics and Statistics, Government of Andhra Pradesh, the total population of Andhra Pradesh is 84,580,777 of which male and female are 42,442,146 and 42,138,631 respectively. Sex Ratio in Andhra Pradesh is 993 female per 1000 male, which is above the national average of 940 as per census 2011. As enumerated in Census, 2011 Literacy rate in Andhra Pradesh is 67.02% of that, Male literacy and

[3]*Census 2011*

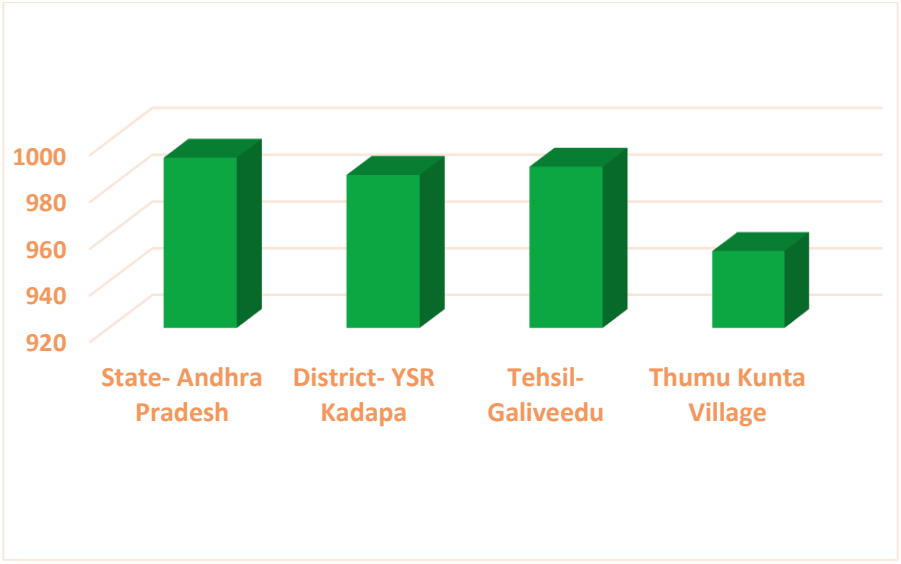
female literacy are 74.88% and 59.15%, respectively. The overall growth of total population during the decade 2001 to 2011 is 10.98%, whereas it was 13.86% in the preceding decade.4

YSR Kadapa District: Kadappa district lies between 79° 29″ and 79° 55″ eastern and 30° 43″ and 15° 14″ northern latitudes in the state of Andhra Pradesh with an area of 15359 sq.km. The district is bounded by Kurnool and Prakasam districts in the north, Nellore district in the east, Chittoor district in the south and Anantapur (Ananthapuram) district in the south. As per the district website portal of Kadappa district http://kadapa.ap.nic.in/ and also Census, 2011 the district has population of 28, 82,469 which accounts for 3.40% of the total population of the state. Among the total population of the district 14, 51, 777 are male and 14, 30, 692 female. The sex ratio of Kadapa district is 985.

Galiveedu Mandal: As mentioned earlier the proposed 50 MW Solar Power plant in Plot No. P2, awarded to Fotowatio Renewable Ventures (FRV), is located in Thumu Kunta village of Galiveedu mandal in Kadapa district. As per census 2011, the total population of Galiveedu is 50,833 of which male and female are 25, 557 and 25, 276 respectively. The sex ratio of Galiveedu mandal is 989, lower than state (993), but the higher to district (988) and national ratio (940).

***Study area village (Thumu Kunta*)**: As per Census 2011 the total population of the Thumu Kunta village is 2, 699 out of which male and female part is 1,382 are 1, 317 respectively. The gender ratio in the village is 953, which is lower from both State and District ratio. The details are presented in **Appendix G** and shown in**Figure 4-11.**

Figure 4-11: Gender ratio in study area



Source: Census 2011

Household Size: Considering the Census 2011 data of the villages, field visit observations and consultations with the community reveals that average HH size of the study area village is around 4.

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

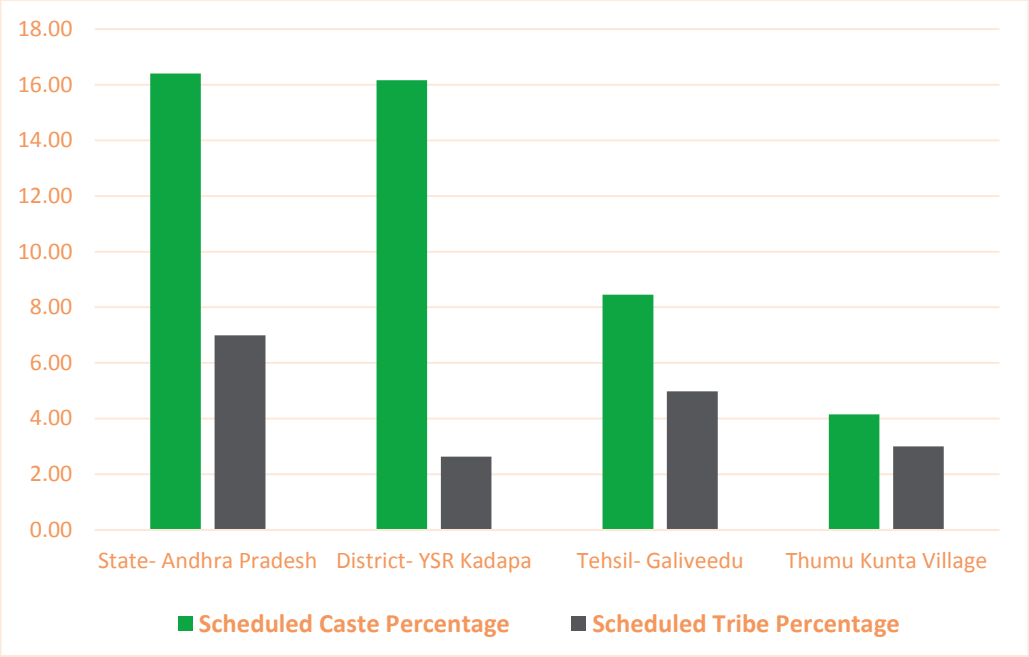
Kadapa District, Galiveedu Mandal:

As given in Census, 2011 the Schedule Caste (SC) and Scheduled Tribe (ST) population of Kadapa district is 4, 65, 794 and 75, 886 respectively. The SC & ST Population in Galiveedu Mandal is 4, 297 and 2, 533 respectively, i.e. 8.45% and 4. 98% of the total population.

[4]*Statistical Year Book, 2015 of Directorate of Economics and Statistics, Government of Andhra Pradesh*

Study area village- Thumu Kunta: As per census 2011, the SCs of the village constitute 4.15%. With regard to ST population Thumu Kunta has only 3% of the total population as STs. Details of SC & ST population in the study area is given in **Appendix H** and shown in **Figure 4-12.**

Figure 4-12: SC & ST population in study area



Source: Census, 2011

There is one small hamlet, namely Prakash Nagar in Thumu Kunta village with a few household structure located at about 900 mtrs distance from P2 plot. The inhabitants of the villages are majorly scheduled tribe.

4.5.3 Literacy

Kadapa District:

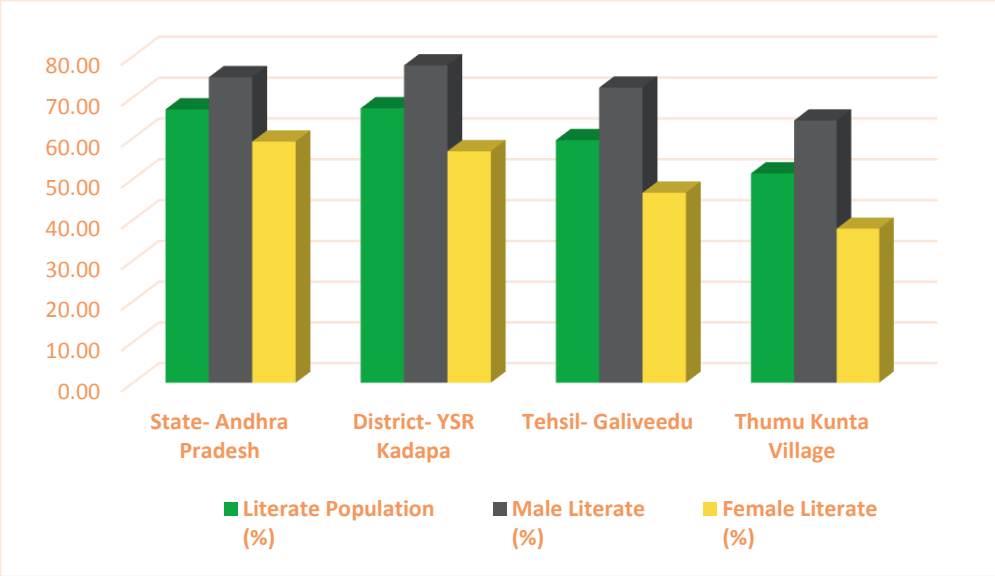
As given in Census, 2011 the literate population of Kadapa district is 17,16,766. As per Census, 2011 around 67.30% of the total population above the age of 6 years in Kadapa district are literate.

Galiveedu Mandal:

As indicated in Census, 2011 Galiveedu mandal has 26, 490 literate population. Out of which, male and female part are 16, 101 and 10, 389 respectively. As given in Census, 2011, 59.48% of total population (above the age of 6 years) of Galiveedu mandal forms the literate part.

Study area village- Thumu Kunta: As referred in Census 2011, 51.37% of Thumu Kunta village population (above the age of 6 years) are literate. About 64.29% and 37.82% of the male and female (above the age of 6 years) population of Thumu Kunta village respectively are literate.

Figure 4-13: Literacy Scenario in Study Area



Source: Census, 2011

Details of literacy scenario in the study area is provided in **Error! Reference source not found.** and shown in **Figure 4-13.**

4.5.4 Workers and Occupation

As published in the 'Report on District Level Estimates for the State of Andhra Pradesh (2013-14) Government of India' by Ministry of Labour & Employment Labour Bureau, Chandigarh, Work Force Participation Rate (WFPR) of age15 Years and above for Andhra Pradesh State is 61.7% of the total population. The Work Force Participation Rate is found to be lower as compared to male counterparts. The ratio of employed persons or Worker Population Ratio for the age group 15-29 years is estimated to be 46.6 percent at state level under the Usual Principal Status Approach.

Kadapa District:

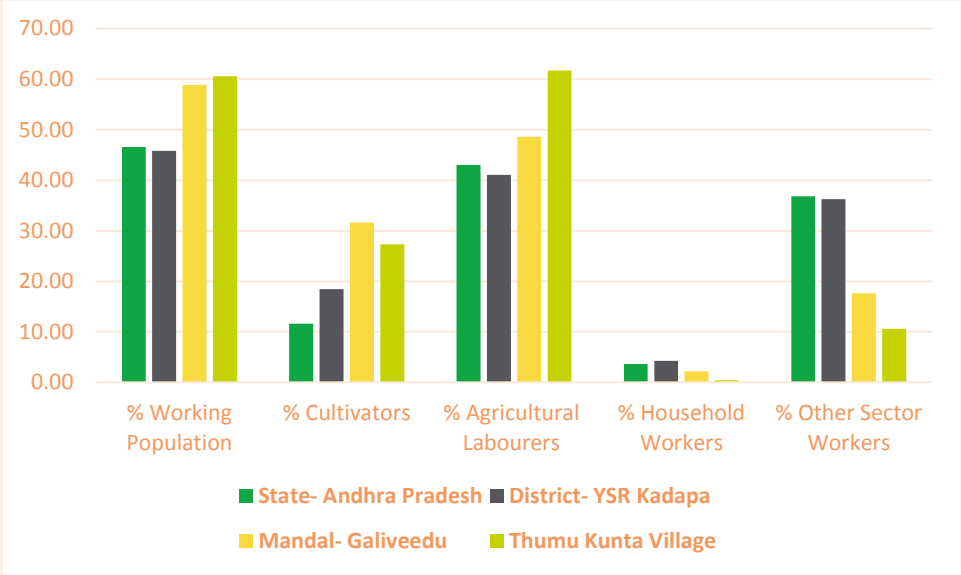
As per Census, 2011 total working population of Kadapa district is 1, 320,404 and non-working population is 6, 27, 891. Out of total working population of the district, 2, 43, 607 people are dependent on agriculture. This implies that about 41 % of the total working population in Kadapa district are involved directly on cultivation an allied activities.

Galiveedu Mandal:

As per Census, 2011 the average WFPR of Galiveedu Mandal is about 58.85%. The percentage of cultivators and agriculture labours stands at 31.60% and 48.61% respectively. Household workers in the mandal is 2. 15% of the total workforce. Other work force participation rates stands at 17.63%.

Study area village- Thumu Kunta: Comparative analysis of workforce participation data shows that major livelihood resource in the study area as given in **Appendix J** and **Figure 4-14.**

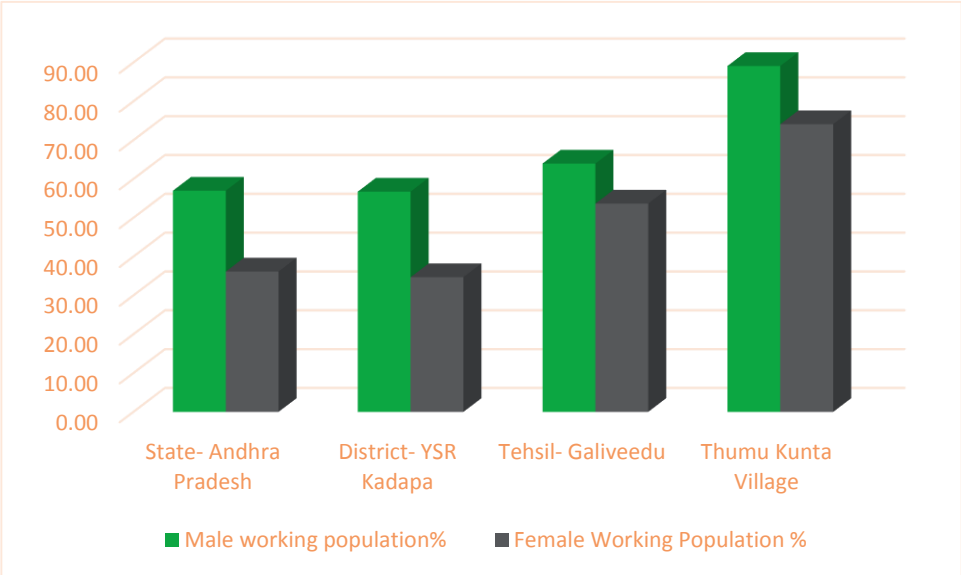
Figure 4-14: Sector wise Work Force Participation Rate in the Study Area



Source: Census, 2011

Female Workforce participation: As stated in the Report on District Level Estimates for Andhra Pradesh State, 2013- 14 by Ministry of Labour and Employment, Govt. of India the Female workforce participation rate in Andhra Pradesh State is 44.5%. Census 2011 reports that the female work participation rate in Kadapa District is 34.70%. For Galiveedu mandal the same is 53.67%. In study area village Thumu Kunta the average female work force participation rate is 52.91%. Details of Female WFPR is given in **Appendix J** and shown in **Figure 4-15.**

Figure 4-15: Gender wise Work Force Participation in Study Area



Source: Census, 2011

4.5.5 Wages

As given through circular of notification Circular. No.L1/7846/2012, Dated: 21 /01/2016 of Labour Department Andhra Pradesh Govt., Minimum Wage rule w.e.f October 1, 2015 the minimum wage for Contract Labours in all sector is Rs. 387.65, Rs. 310.73, Rs. 253.04 and Rs.214.58 for highly skilled, skilled, semi- skilled and unskilled labourers respectively.

Scehduled Employment CONTRACT LABOUR	Basic Wage (INR)
CATEGORY	
Highly Skilled	387.65
Skilled	310.73
Semi-Skilled	253. 04
Unskilled	214.58

Source: http://www.labour.ap.gov.in/documents/Wages_to_contract_labour/Wages_for_contract_labour_01102015.pdf

4.5.6 Livelihood source

Agriculture and cropping pattern: As recorded in the Census, 2011 about 54.67% of the study area villages are majorly dependent on agriculture as their main livelihood resource. Though, during observation it was noticed that due to extremely low ground water level and minimum irrigational facility along with the rising cost it is gradually becoming difficult. Yet, in absence of any other alternative source for livelihood Agriculture continuing still continuing to be the prime livelihood resource. As extracted from State Agriculture Portal of Andhra Pradesh (http://apagrisnet.gov.in/Official/actionplan.htm) and also mentioned in Agriculture Action Plan, 2015-16 Of Department of Agriculture of Andhra Pradesh Government about 29 crops in Kharif and Rabi seasons put together covering an area of about 63.64 lakh ha are cultivated during 2014-15. The important crops grown are Rice, Red gram, Horse gram Pulses etc.

Cropping Pattern

As per the account of Directorate of Economics and Statistics, Area, Yield and Production of crops grown during 2013-14 and the crops grown during 2014-15 in the state of Andhra Pradesh are shown in **Figure 4-16**.

Figure 4-16: Cropping wise cultivated and irrigated area, Andhra Pradesh State

ANNEXURE III

CROP-WISE ARA, YIELD AND PRODUCTION FOR THE YEAR 2013-14, 2014-15

S. No	CROPS	TOTAL (KHARIF + RABI)						
		Normal Area	AREA (Lakhh hect.)		YIELD (Kg./hect)		PRODUCTION (Lakh tonnes)	
			2013-14	2014-15	2013-14	2014-15	2013-14	2014-15
	CEREALS							
1	**PADDY**	**24.47**	**25.84**	**23.88**	**3094**	**3402**	**79.94**	**81.24**
2	Wheat	0.01	0.00	0.00	716	1019	0.00	0.00
3	Jowar	1.35	1.19	1.39	2247	1540	2.65	2.14
4	Bajra	0.43	0.49	0.28	1663	1289	0.82	0.36
5	Ragi	0.41	0.42	0.34	1045	1259	0.43	0.36
6	Maize	2.76	3.52	3.00	6286	6260	22.14	18.78
	Minor Millets	0.29	0.28	0.19	745	737	0.21	0.14
	Total coarse grain	**5.25**	**5.90**	**5.20**			**26.25**	**21.78**
	PULSES							
7	Bengalgram	5.04	4.72	3.41	1372	1114	6.48	3.80
8	Redgram	2.07	1.84	1.51	565	481	1.04	0.73
9	Greengram	1.34	1.33	1.67	610	599	0.82	1.00
10	Blackgram	3.74	2.65	3.17	781	681	2.07	2.16
11	Horsegram	0.33	0.28	0.36	527	452	0.15	0.16
	Other pulses(cowgram etc)	0.17	0.25	0.27	960	741	0.24	0.20
	Total Pulses	**12.70**	**11.09**	**10.39**			**10.79**	**8.05**
	Total Foodgrains	**42.43**	**42.83**	**39.47**			**116.98**	**111.07**
	OILSEEDS							
12	Groundnut	11.96	11.76	8.72	749	585	8.81	5.11
13	Sesamum	0.63	0.61	0.79	347	274	0.22	0.22
14	Sunflower	1.63	0.80	0.49	850	791	0.68	0.39
15	Safflower	0.01	0.00	0.01	558	712	0.00	0.01
16	Linseed	0.00	0.00	0.00	0	0	0.00	0.00
17	Niger seed	0.08	0.09	0.07	433	462	0.04	0.03
18	Soybean	0.02	0.03	0.01	1610	1529	0.05	0.02
19	Castor	0.87	0.49	0.47	527	574	0.26	0.27
20	Palm oil/other oilseeds	0.52	0.55	0.61	22319	21419	12.34	13.07
21	Rape & Mustard	0.05	0.03	0.06	644	1330	0.02	0.08
	Total oilseeds	**15.76**	**14.37**	**11.23**			**22.43**	**19.20**
22	Cotton (*)	4.89	6.76	8.21	550	529	21.88	25.55
23	Mesta (#)	0.19	0.09	0.07	1651	1276	0.84	0.50
24	Chillies	1.30	1.31	1.35	4584	3941	6.02	5.32
25	Sugarcane	1.50	1.53	1.39	78563	70192	120.08	97.57
26	Turmeric	0.19	0.18	0.17	8524	7329	1.52	1.25
27	Tobacco	1.38	1.44	1.42	1930	1918	2.76	2.72
28	Onion	0.29	0.26	0.33	19501	18770	5.13	6.19
29	Coriander	0.15	0.09	0.00	594	0	0.05	0.00
	Total cropped area	**68.08**	**68.86**	**63.64**				

(*) Cotton production in lakh bales of 170 kgs. of lint
(#) Mesta production in lakh bales of 180 kgs.
Source: Directorate of Economics & Statistics, AP:Hyderabad

Source: Agriculture Action Plan, 2015-16 of Department of Agriculture of Andhra Pradesh Government

Cropping Intensity

Cropping intensity is one of the indices for assessing the efficiency of crop agriculture sector. The cropping intensity i.e., the ratio of gross area sown to net area sown is 1.24 in 2011-12 and it was 1.29 during 2010-11, showing a 0.05 decrease over previous year. The level of cropping intensity move in consonance with the behaviour of the monsoon and availability of irrigation water.

Kadapa District

Crop coverage and cropping pattern:

The variation in the rainfall, source of irrigation and fertility of the soils is the main cause for the difference in the cropping pattern in the district. The principal crops of the district are Paddy, Jowar, Bajra, Maize, Ragi, Small Millers, Cotton, Castor and Pulses.

Kharif Season

Area for different crop cultivation sown in Kharif season during 2013 in Kadapa district is detailed in **Table 4-10**.

Table 4-10: Area Sown Particulars during Kharif 2013 in Kadapa district[5]

Sl.No	Crop Name	Area (in Hactres)
1	Paddy	45476
2	Jowar	3384
3	Bajra	2128
4	Maize	537
5	Ragi	14
6	Minor Millets (Korra)	149
7	Redgram	12394
8	Greengram	297
9	Blackgram	217
10	Horsegram	198
11	Other pulses	695
12	Groundnut	91964
13	Sesame	38
14	Castor	1422
15	Sunflower	2547
16	Other Oilseeds	782
17	Cotton	19249
18	Chillies	786
19	Sugarcane	516
20	Onion	2974
21	Turmeric	4574
22	Tobacco	70
23	Others	37
TOTAL		190448

Rabi Season

Area for different crop cultivation sown in Rabi season during 2013 in Kadapa district is detailed in **Table 4-11**.

Table 4-11: Area Sown Particulars and Productivity during Kharif 2013-14 in Kadapa district[6]

Sl.No	Crop Name	Area (in Hactres)
1	Paddy	11604
2	Wheat	7241
3	Bajra	1571

[5] *Source: http://www.kadapa.ap.gov.in*

[6] *Source: http://www.kadapa.ap.gov.in*

Sl.No	Crop Name	Area (in Hactres)
4	Maize	1288
5	Ragi	145
6	Minor Millets (Korra)	160
9	Bengal Gram	84173
10	Greengram	244
11	Blackgram	4275
12	Horsegram	1129
13	Other pulses	595
14	Groundnut	18704
15	Sesame	88519
16	Sunflower	64032
17	Coriander	9770
18	Others	81008
Total :		293450

Source:http://www.Anantapur.ap.gov.in/departmentView.apo?mode=getDepartment&departmentFlag=AGR&subDepartmentFlag=AGR

The productivity of different crops in Kadapa District is low as compared to the State average. Based on the cropping pattern and soil types it is contemplated to improve the productivity growth rate by 10% over the best year productivity of major crops by implementing the various ongoing schemes and also by adopting various improved technologies, situation specific approach for different crops and also through different extension strategies.

A few schemes and strategies those are being adopted to boost the agriculture and ensure productivity are given below:

- Seed Supply Plan
  - Seed is critical determinant in increasing the agricultural production.
  - The performance and the efficiency of production depends on quality of seed.
- Seed Village Programme
  - The main objective of the programme is to make available the required quality seed locally.
  - The foundation seed is supplied to the identified farmers in the selected villages and seed production will be taken up under the supervision of the department.
- Farm Mechanization
  - To supply improved Agricultural implements to save time, labour and to improve the economy of the farmer
- National Food Security Mission
  - To Increasing production of rice and pulses through area expansion and productivity enhancement in a sustainable manner.
  - Restoring soil fertility and productivity at the individual farm level.
  - Enhancing farm level economy i.e. farm profits to restore confidence amongst farmers.
- ISOPOM (Integrated scheme of Oilseeds, Pulses, Oil palm and Maize)

- The ISOPOM is providing programme support for increasing Production and Productivity of Oilseed crops, Oil palm and Maize. The scheme is implementing with the main objective to harness the best of production & productivity, processing and post-harvest management technologies to accelerate self-reliance on Oilseeds and Maize. The funding pattern is mostly on 75:25 shared by Central Govt. and State Govt. respectively

Study area - Thumu Kunta

Mentioned earlier Galiveedu mandal has been declared drought prone in 2016. As informed by the Mandal Revenue Officer (MRO) and also by the community members only a few variety of crops are cultivated in Thumu Kunta village. Red Gram, Ground Nuts and Rice are normally grown crops in the study area village. Onion is also cultivated, but productivity got declined due to low ground water level. During consultation it was revealed that due to low ground water level and irrigation problems overall cultivation was reduced and got restricted into limited scale. Crop wise productivity is given in **Table 4 12.**

Ground Nut cultivation at Thumu Kunta

Table 4-12: Productivity and Price of Crops in the Study Area

Sl. No.	Crop	Cultivation Period	Study Area Village	Productivity (q/ Acre)	Price/ Quintal (in INR)
1	Paddy	July to December	Thumu Kunta	25-32	Rs. 1700-1900
3	Red Gram	June- October		10	Rs. 18000.00
4	Ground Nut	October - January		12	Rs. 4000.00-4080.00
5	Onion* *In 2016 the cultivation has declined due to low water level	June to December		60	Rs. 2000.00-4000.00

Source: Primary Consultation in the Study Area Village and discussion with MRO

4.5.7 Livestock

Andhra Pradesh has rich livestock resources especially cattle and Sheep population accounting to 5.52% of country's population. Rural population in the State is predominantly agricultural with more than 2/3 of its workforce being engaged directly in the agriculture sector. About 29 lakh families in Andhra Pradesh State are engaged in livestock sector for their livelihood. The value of livestock produce is estimated to be Rs. 12403 crores at current prices and the livestock sector contributes 4.86% to GSDP (2010-11 Third Revised Estimates). Animal husbandry and dairy are important sources of supplementary income to farmers. [7]

The region of the State stands 10th in Livestock population, 1st in sheep population, 12th in Goat population, 5th in Poultry, 13th in Bovine population and 17th in pig population, in the country as per the Livestock Census, 2007. With an annual output of 942 crore eggs, the Andhra Pradesh stands 3rd in egg production in the country. Every eighth egg in the country comes from Andhra Pradesh. With

[7] *Source: http://apahd.gov.in/*

annual meat production of 4.29 lakh MTs Andhra Pradesh stands 6th in the country in meat production. With an annual production of 39.51 lakh MTs of milk, Andhra Pradesh occupies 13th position in the country in milk production (2012-13 approved estimates of GOI).[8] And as per 19th Livestock Census, the State has a population of 50.34 lakh cattle, 41.94 lakh buffaloes, 128.75 lakh sheep, 46.75 lakh goat and 691.59 lakh poultry.[9]

Milch animals at study area

The animal population in Thumu Kunta village consists mainly of mulch animals. Buffaloes, Cows, Sheeps and Goats are seen during field visit. During consultation, it was reported that the villages have notable number of livestock population (around 70-80% HH) i.e. Buffaloes, Cow, Goats and sheep. Animals are grazed at open fields surrounding the cultivation fields, though vegetation is very low in the area. Farmers mostly use agricultural waste after harvest as fodder for livestock.

4.5.8 Local Employment and Migration

During consultation it was observed that, labour in agriculture, daily wage labour in nearby urban areas and labour in other sectors (as porter) are important source of livelihood in study area villages. Also the same has been testified by the Census 2011. There is no big industry in the region.

Majority of the people rely on cultivation as their primary source of livelihood. Hence, migration is very less in this region. Only a handful people go to nearby towns like Rayachotty, Kadapa, Anantapur, or in bigger cities like Bangalore, Hyderabad etc. to work as mason or daily wage carpenters.

4.5.9 Gender Empowerment Status

The female work participation in Andhra Pradesh is lower than that of male. However, 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. 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.

Interaction with woman at Thumu Kunta

Around 44% of the total working population in Thumu Kunta 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. The scenario is almost the same at Thumu Kunta village. Only around 39% of the total literate population are female. Whereas, only around 42% of the total female population are literate. The details in given in **Appendix I.**

Neither the social status of the women is good as well. 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

[8] *Source: http://apahd.gov.in/*

[9] *Source: Statistical Year Book, 2015 by Directorate of Economics And Statistics, Government of Andhra Pradesh*

entirely responsible for household chores and additionally engaged as agriculture labour, harvesting, feeding the cattle, and taking care of livestock. Female labours 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 and partially engaged with SHGs under Development of Women and Children in Rural Areas (DWCRA).

4.5.10 Self Help Groups (SHGs)

"According to the National Bank for Agriculture and Rural Development (NABARD), a self-help group is a small economically homogeneous and affinity group of rural poor voluntarily coming together: to save small amounts regularly; to mutually agree to contribute to a common fund; to meet their emergency needs; to have collective decision making; to solve conflicts through collective leadership and mutual discussion"

As per the Statistical Abstract of Andhra Pradesh, 2015 during the year 2014-15 about 6, 79,932 number of SHGs are existing in Andhra Pradesh state and 70,38,911 members (cumulative) are covered under these groups. 1, 88,831 SHGs are provided bank credit with an amount of `6,089.41 crores during the year 2014-15. There are schemes under State govt. support to empower women both financially and socially through Self Help Groups in Andhra Pradesh. It is also given in the report, Anantapur district had 44,360 number of SHGs during the year 2014-15.

Development of Women and Children in Rural Areas (DWCRA)[10]

The Development of Women and Children in Rural Areas or DWCRA is a government sponsored anti-poverty programme of the Ministry of Rural Development. Each DWCRA group consists of 15 to 20 women from below poverty line rural families. In September 1982, the Government of India (GOI) launched the DWCRA programme[11] under the Integrated Rural Development Programme (IRDP)[12]. The program was started in 50 districts (all over India) on a pilot basis. This was the first rural development program which focused entirely on the development of women and children.

The scheme - DWCRA was aimed to improve the socio-economic status of the poor women in the rural areas through creation of groups of women for income-generating activities on a self-sustaining basis. The main strategy adopted under the programme was to facilitate access for poor women to employment, skill up-gradation, training credit and other support services so that the DWCRA women as a group could take up income-generating activities for supplementing their incomes. It sought to encourage collective action in the form of group activities which were known to work better and were more sustainable than the individual effort. It encouraged the habit of thrift and credit among poor rural women to make them self-reliant.

Every group chose a leader, called the organizer, who conducted group meetings and maintained the group's accounts. Initially, the focus of the groups was on saving money. Most of the groups started with the motto - 'save a rupee per day.' Every month, the savings were deposited at the post office or in the banks. The groups also extended credit to needy members from their savings. While in general, DWCRA groups met once a month, some groups got together more often. Based on their skills, the group members collectively decided on the income generation activity that they would undertake. At the monthly meetings, these women also discussed their problems and tried to find solutions. The state government deployed a *Gram Sevika* (village coordinator) for every village to oversee the implementation of the DWCRA program.

[10] *Source: http://www.icmrindia.org/*

As informed by the Sarpanch, in Thumu Kunta only around 8 DWCRA group is present in the village. SHG group members in Thumu Kunta are saving money in their funds and cook in the schools of the village area.

4.5.11 BPL Families and Vulnerability

As reported by the panchayat and community members, some vulnerable group like BPL, landless family, physically handicapped and widow are present in the village, as shown in **Table 4-13.**

Table 4-13: Vulnerable Groups in Thumu Kunta Village

BPL Families	Women headed Family	Lone Widow	Physically Handicapped	Landless HH
7	2	-	1	4

Source: Primary Consultation in Study Area Villages

The project proponent may be required to focus on providing employment opportunity to the vulnerable members and also the implementation of program under CSR activity for them. During dialogue with APSPCL representative, it was informed that land has not been acquired from any vulnerable household or family.

4.5.12 Land Holding

Andhra Pradesh accounts for 8.37% of India's total geographical area and 6.99 % of population during Census, 20911. The utilising of land as holdings has variable usage in Andhra Pradesh. The detailed information of land utilization in the State is shown in the following ***Table 4-14***[13].

Table 4-14: Distribution of Average Size per Holding - All Social Groups

State	Average size per holding in Hactre					
	Marginal	Small	Semi Medium	Medium	Large	All size groups
Andhra Pradesh	0.44	1.41	2.63	5.56	15.50	1.08

Source: Agricultural Census, 2011

According to the Agricultural Action Plan, 2015-16 of Andhra Pradesh State Government, the average size of land holding per farmer in the state during 2010-11 is at 1.12 hectares and the same is likely to fall below due to further fragmentation of the farm holdings.

Average of Landholding Size in Thumu Kunta village

During discussions with the local community, it was understood that the average land holding size in the study area villages is 5-7 acre per household. Though, most of the lands are agricultural, due to low ground water level and low rain fall.

4.5.13 Irrigation

As per CGWB report 2013 of Kadapa district the average annual rainfall is around 709 mm. But, during 2012 study year it was declined to 550 mm. It is mentioned there in the report that YSR Kadapa district is one of the chronically drought affected districts of Rayalseema Region of Andhra Pradesh. As per the CGWB Report 2013, the ground water level range in Kadapa district during is 12mbgl – 22 mbgl during pre-monsoon 2012 is 3.13 to 17.35 mbgl and in post monsoon 2012 it is 2.09 to 14.57 mbgl.

[13] *Agricultural Census, 2011*

Irrigation in the district is through major, medium and minor irrigation projects. Three are 4 major, 5 medium irrigation projects in the district. The major irrigation projects are 1) Kurnool- canal 2) TBP HLC Stage-I, 3) TBP HLC Stage-II (Mylavaram) and 4) Pulivendula Branch canal with a total ayacut of 2, 27,896 acres. The five medium irrigation projects are 1) Lower Sagilru Project 2) Upper Sagileru Project 3) Pincha Project 4) Buggavanka Project and 5) Annamayya Project with a total ayacut of 55,625 acres. The area irrigated during the year 2010-11 through these canals is 27,305 Ha., and through ground water is 1,22,781 Ha., Irrigation from the other sources (1,125 ha.) and through tanks 8,042 Ha.[14]

Notable period of the year in the study area remains dry. As information revealed during consultation with the community. Bore wells, nearby located canal and catchment area in the canal are the sources for irrigation in Thumu Kunta village.

Irrigation Canal West of the Reservoir

Irrigation Canal East of the Reservoir

4.5.14 Amenities and Infrastructure

Village and district level integrated education, health amenities data available as per census 2011, as well as from other resources and study area villages visit are described in the section below.

Medical Facilities:

District: As per Hand Book of Statistics, Kadapa district – 2013, there are 11 Govt. General Hospitals, 6 Mandal Hospitals, 72 Primary Health Centres (PHCs), 26 Homeopathic Hospital & Dispensaries, 35 Ayurvedic Dispensaries and 20 Unani Hospital & Dispensaries in Kadapa District. As per Census, 2011 the medical facility only 59.4% of the villages were covered by the govt. medical facilities during that period. It has been further enhanced to reach out the greater part of the population in the rural areas.

Schemes Sponsored by Health Department

Several schemes are adopted by both the central and state governments to reach out to the remote most rural population of the state. The same is followed by the medical administration of Kadapa district as well. A few of such programmes are, 1. Universal Immunization Program: (Immunization/Vaccination/IPPI/Vit-A, Prophylaxis) 2. Family Welfare program: (Eligible couple survey, Family Planning operations, Temporary methods incentives to beneficiaries etc.) 3. Janani Suraksha Yojana (JSY): Rs 700/- is being paid as incentive to BPL pregnant women who deliver at Govt health facilities. Rs 300 is also paid from state funds called SUKHI BHAVA. 4. Janani Shishu Suraksha Karyakram (JSSK): Under this free tests, free drugs & free diet for pregnant women, new borne child is covered in this scheme. This is implemented zero expenditure to pregnant & Lactating mothers. With the implementation of this scheme deliveries at Govt. facilities improved to 49% now. 5. National Leprosy Eradication Program (NLEP): Aimed at detecting, treating the patients suffering from leprosy. This program also focuses on preventive measures. AWARNESS IN SCHOOL- TB information card distributed in all Govt. and Private schools, reading TB news in post prayer time once in 3 months. 7. National Blindness control program: Prevention of blindness and conducting cataract surgeries. 8.

[14] *CGWB report of Kadapa district, 2013*

NVBDCP: Prevention and control of vector borne diseases like Malaria, Dengue, Chicken guinea, Filariasis, Japanese encephalitis.

Study area- Thumu Kunta village

As observed there is no health facility in Thumu Kunta village. Auxiliary Nurse and Midwife (ANM) visits only once a week for routine health checkups, immunisation and vaccinations. For emergency the local people either go to unregistered quacks. To avail hospital facility people have to go to either at Galiveedu PHC (around 7 Km) or at Govt. and private hospitals located at Rayachotty (around 30Km). Emergency No. 108 is availed for Ambulance from Govt. support in times of need. Also emergency No. 104 is availed for medical assistance. Health checkup camps, under National Health Mission (NHM), are organised once in every month in the village. As informed by the Sarpanch as well as the community members common health problems like Hypertension, Asthma, Diabetes etc. are present in the village.

Anganwadi Centre:

'Integrated Child Development Services' is a 100% centrally sponsored scheme under which six services i.e. supplementary nutrition, pre-school education, immunization, health checkup, health and nutrition education and referral services are provided to the children in the age group of 0-6 years, pregnant women & lactating mothers.

Thumu Kunta village

As observed during field visit there is one Anganwadi Centre in Thumu Kunta village (AWC). As informed by the community from the surrounding area, the Anganwadi Centre has enrolment of 22 children and 9 mothers, who visit the centre regularly. The major problem that the Anganwadi Centre is facing that they don't have own drinking water facility. Water is carried from the nearby village tap.

Anganwadi Centre at Thumu Kunta

Education:

As per Hand Book of Statistics, Kadapa district – 2013, during the period of 2012-13there were total 2913 Govt. Primary Schools, 335 Govt. Upper Primary Schools, 424 Govt. High Schools, 79 Junior Colleges, 38 Degree Colleges and 10 Post Graduate Colleges in Kadapa district during the study year 2012- 13. There is also one university namely Yogi Vemana University, which came into existence by the Act of the Andhra Pradesh State Legislative Assembly with effect from March 9th 2006. It is located 15 km away from Kadapa city on the Kadapa-Pulivendula Road.

As observed during visit Thumu Kunta has four schools. One is Mandal Parishad Upper Primary School (MPUP), Thumu Kunta up to class VII and the other two are Mandal Parishad Primary School (MPPS), Thumu Kunta up to class V. All are Telegu medium. The other Mandal Parishad Primary School is of Urdu Medium. The Upper Primary and Urdu medium Primary schools are located within same premises. No high school is located within the village. Students from Thumu Kunta village normally go to Galiveedu Mandal town or Rayachotty for availing higher educational facilities. There are "Govt. Junior Colleges" at Galiveedu Mandal town and in Rayachotty town.

Teacing Staff of Telegu medium Primary School was consulted. He informed that there are 2 teachers and 40 students in the school. Midday meal for students is provided in all the schools. All the schools have separate toilet arrangements for girls and boys. There is only no water facility within the primary school that was consulted. Water is carried from the nearby village tap.

Mandal Parishad Primary School at Thumu Kunta

Primary School (Urdu medium) at Thumu Kunta

Separate toilet arrangements at Upper Primary School, Thumu Kunta

Hand Pump located before Upper Primary School

Both the schools are facing difficulties in basic needs like sitting arrangements, running water facility and drinking water problem etc. The project proponent may consider the mentioned matters for those schools and betterment of the situation through CSR activities.

Drinking water facility:

The Drinking Water Supply is a very important issue as over 80% of health problems are due to consumption of unsafe water and increasing health awareness among the rural public, underlines the additional attention to be paid to the subject. Hence, one of the most important programs of the Government is the provision of safe drinking water to the rural population. Hand Book of Statistics, Kadapa district – 2013 states that during the study period 201-13, out of 883 inhabited villages in the district 778 have piped water supply system as drinking water source within the villages, while only 105 villages have bore-wells for the same purpose.

Dug Well at Thumu Kunta

Study area village- Thumu Kunta

During consultation, it was observed that there is one centrally located above ground tank (around 30000 Ltre capacity) in the village. Individual households are connected with pipes from the tank. Other than these a few dug wells and some scatteredly located Hand Pumps are also seen. These are reportedly inadequate to cater to the needs for drinking as well as other domestic requirement of the villagers. As reported by the villagers the ground water level is very low, specifically in the dry seasons. It goes beyond 60 m.

Above ground tank at Thumu Kunta village

Tap connection at individual households

Sanitation: As per the Hand Book of Statistics, Kadapa District - 2013 under Sanitation Programme in Rural Areas 7817 individual household latrines were constructed. During community consultation, it was observed that proper sanitation facilities are available in around 90% households in Thumu Kunta village. Thus, about 10 % of the village population are resort to open defecation. In interaction regarding the query about Swachh Bharat Mission scheme in Thumu Kunta, the villagers answered that no such initiatives are seen so far.

Cooking source: During consultation it was observed that, LPG is preferred over fuel wood in the consulted villages. On an average around 75% households use LPG and 5% use fire wood at study area villages as cooking medium. Dried biomass, cow dung briquette are the other sources of energy being practiced by the villagers for cooking and heating.

Communication and Transportation facilities

As observed during visit at study area villages State Highway No. 34 crosses close to Thumu Kunta village on route from Kadiri to Rayachotty. The village roads are both kuchcha and concretised. Mandal town Galiveedu is located at a distance of around 6.7 Km to southeast of Thumu Kunta. Kadiri town in Anantapur district is located at the south-west direction around 35 Km away.

Local Transportation system at Veligallu

State owned Andhra Pradesh State Regional Transport System (APSRTC) Bus service in an interval of half hour are available from the area. Auto rickshaw services are available for local movement. Otherwise people use their owned two wheelers.

No railway station is present near to the study area village. Mulakalacheruvu Railway station on Tirupati route of south- central railways is located at about 38 Km from the village. There is also a railway station at Kadiri town in Anantapur district.

SH 34, crossing through the area is leading towards Veligallu Dam (feeding water from Papagni River).

During site visit, it was observed that there is good road connectivity. Access roads within the study area village- Thumu Kunta are bituminous, concretized as well as Kuchcha. Telephone connectivity is also available. Hence, it can be surmised that communication facilities is satisfactory from the site areas

Power Supply: As per 41st Report of Standing Committee on Energy (2013-14) of 15th Lok Sabha on Implementation of *Rajiv Gandhi Grameen Vidyutikaran Yojana* around 102176 BPL households were provided electricity under RGGVY during the mentioned period. Thumu Kunta village said to have electricity connection for almost 100% households. While only a very few households don't have electricity connection and carrying on with Kerosene Oil and Candles for the purpose. During consultation it was said on an average duration of 22 hrs. /day electricity is available in the project locations. Besides, there is separate electricity facility available for domestic and agriculture purposes. High Tension overhead transmission line have been noticed in some places in the study area villages.

4.5.15 Common Property Resources (CPR)

During consultation with Panchayat members and villagers, it was noted that Thumu Kunta have some Common Property Resources (CPR) like Community Ponds, Temples, other Sacred Centres, Community Halls, Cremation Ground etc. as presented in **Table 4-15.** In terms of CPR, the likely impact from the project development was also observed and discussed with the villagers.

Table 4-15: Common Property Resources[15]

Study Area Village Temple	Common Property Resources (CPR)			
	Temple	Mosque	Cremation Ground	Canal
Thumu Kunta	3	1	1	1

Mosque at Thumu Kunta

Temple at Thumu Kunta

4.5.16 Archaeology and Cultural Heritage Sites study area:

As observed during field visit there is no designated archaeological or cultural heritage site within 20 Km radius of the study area village Thumu Kunta.

However, instances of the establishments of Cultural and Religious importance is noticed in the study area village Thumu Kunta.

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

4.5.17 Some Important Schemes

A few Govt. schemes that are on ground as per Andhra Pradesh Govt. Schemes' website http://www.ap.gov.in/intiativies/ are appended here below.

a) BANGARUTALLI – Maa Inti Mahalakshmi

Bangarutalli is meant to take care of the girl child in every household from her birth till she completes her graduation. If she gives birth to a baby girl, Rs 2,500 will be deposited into her account. Rs 1000 will be given for the first 2 years at the time of immunization. Rs 1,500 will be given every year to the family through Anganwadis till the baby attains the age of 5 years from 3rd year onwards. At the time of admission to school, Rs 2,000 will be given every year for her studies from the first to the fifth standard, and Rs 2,500 from sixth to eighth standard, Rs 3,000 for ninth and tenth standard. For the girls' study of Intermediate, she will be given Rs 3,500 each year, and Rs 4,000 a year during her graduation.

b) SADAREM – A Program for issuance of Disabled certificates.

Objective of the SADAREM initiative is to create a Dynamic Web enable system for comprehensive access, rehabilitation and empowerment, through automation, capacity building, assessment of persons with disabilities (PWDs) and maintaining Decision Support System (DSS).

c) STHREENIDHI Credit Co-Operative Federation Ltd.

Sthree Nidhi credit cooperative Federation Ltd., is promoted by the Government and the Mandal Samkahyas to supplement credit flow from banking sector and is a flagship programme of the Government. Sthree Nidhi provides timely and affordable credit to the poor SHG members as a part of the overall strategy of SERP for poverty alleviation.

SHGs are comfortable to access hassle free credit from Sthree Nidhi as and when required using their mobile and therefore do not see any need to borrow from other sources at usurious rates of interest. Sthree Nidhi is in a position to extend credit to the SHGs even in far flung areas of the state in 48 hours to meet credit needs for exigencies like health, education and other income generation needs like agriculture, dairy and other activities. As credit availability is linked to grading of MS and VOs, community is keen to improve functioning of the same to access higher amount of credit limits from Sthree Nidhi.

d) Bhoomi-(Land Access to Poor)

Land represents a fundamental asset to the rural families in our country which comprise a substantial majority of the population. It is a primary source of income, security, and status. Land is one asset which almost every rural man or woman relates to. In the rural areas all the socio-economic privileges and deprivations revolve round land.

e) Community Managed Sustainable Agriculture-CMSA:

Sustained efforts to make agriculture as economically viable and ecologically sustainable activity, without compromising on yields and improving returns per unit of land and water, to improve the quality of farmer's life. The Primary mission is to improve the annual incomes of farmers in Rain fed areas in particular and agriculture in general with integrated farming systems. The CMSA is for Developing new tools and equipment for reducing drudgery to women farmers, for Establishing village level infrastructure for supply of these tools, for upgrading women farmer's knowledge in eco-friendly farming technologies, for Organizing capacity building programs with new training content and improved methods for managing revolving fund for decentralized extension system leading to multiple livelihood options models to be managed communities on their own.

f) KRuSHE

For restoring the traditional art and crafts of Andhra Pradesh, KRuSHE is an attempting to link numerous artisans, craftsmen and rural producers of the state to remunerative markets, The objective is that the artisan gets the correct worth for her produce and there is a substantial increase in the income, The flourishing artisan should inspire the others in the region to take up the same occupation.

The objective is to increase the profitability of the existing SHG enterprises there by creating local employment and ensure the sustainability of the enterprises; to promote entrepreneurship in Farm and Nonfarm livelihoods among the members of rural SHG households with focus on POP on saturation basis; to increase the income and employment opportunities in the villages.

g) Community Managed Health and Nutrition:

The Community Managed Health & Nutrition project is a comprehensive package of community based interventions which include Nutrition cum Day Care Centre (NDCC), Health Savings & Health Risk Fund, Convergence of Fixed National Health Day, Water & Sanitation program, Sanjeevani Health Insurance, and Capacity Building of Health Activist (HA), Health Sub Committee (HSC), and Community Resource Person (CRP). CMH&N interventions focus on four major public health areas: maternal health, infant and child care, environmental health, community health system and communicable diseases.

h) Unnathi

The objective of Unnathi is to enable every poorest of poor family in the state to come out of poverty with increased and sustainable livelihood opportunities established with the aid of an intensive handholding support. The same has to be done in a focused and phased manner starting with organizing them, strengthening their institutions, increasing their asset base, mitigating risks, expanding the livelihoods and increasing their incomes. In concise, enhancing the income of POP family to an annual income of Rs One lakh over a period and a significant improvement in human development aspects are considered the twin mandates of the proposed strategy.

i) ABHAYA HASTHAM

Government of Andhra Pradesh introduced Velugu Pension and Insurance Scheme for the (Rural and Urban) SHG women in November 2009 to provide income security in their old age. The aim was to provide security to all enrolled SHG women with dignity in their old age. This scheme works in principal of contribution amount Rs. 365 per annum by the SHG woman and Government co contribution amount Rs. 365 per annum into her pension amount. The interest that earned from corpus generated for each member till the completion of 60 years of her age is used for giving monthly pension from Rs. 500 to Rs. 2200 based on the age of the member. Each enrolled member under the scheme is entitled to get minimum pension of Rs. 500 after completion of 60 years of her age and all the enrolled members between age group of 18 to 59 years are eligible to get Insurance coverage under JBY scheme.

j) DAIRY

IKP is has started the initiative of Profitable Dairying by Establishing Milk Procurement Centers in villages and Bulk Milk Cooling Units (BMCUs) at Mandal level through SHGs and their federations in two Mandals on Pilot basis in 2006-07 and has reached to the present level of managing 199 BMCUs with more than 4500 village level milk procurement centers and have procured 77122 MTs of milk worth Rs.16966 lakhs during the year 2009-10.

k) VADDILENI RUNNALU- LOAN INSURANCE

In the light of bank linkage program with VADDILENI RUNNALU, a huge amount of money is transacted by the SHG members in the name of total financial inclusion covering even the swapping of old debts. It is proud to inform that Govt. of AP leads in SHG Bank Linkage Program with 40% of all bank loans

given to SHGs in India. The bankers are comfortable and testifying that the recovery rate is 99%. In this back drop, SHG women evince great interest in insuring the loans taken by the members from the Commercial Banks or from their own federations as a safety net against financial risks in the event of natural and accidental mishaps, to protect their children, family members from debt traps. Hence, the scheme shall be scaled up to cover each and every SHG member. The core objective of the scheme is to protect the family members of an SHG member from financial risks, in the event of her death, to safeguard the institution of SHG from repayment burden, when a borrowing members dies, to ensure the perpetuality of the SHG, providing loan insurance to all the borrowing member, to ensure 100% repayment at all levels even in the time of turbulence and to increase the size of loans to SHG members, by creating confidence among the Bankers.

l) Child Development Schemes

- ***Immunization of Children*** under National Rural Health Mission (NRHM) launched in the year 2005, Immunization programme is a separate component 'C'. BCG, DPT and Polio are part of this component. This programme is being monitored by the Health Department at individual household level in the project area villages.
- ***Integrated Child Development Services*** is a 100% Centrally Sponsored scheme under which six services i.e. supplementary nutrition, pre-school education, immunization, Health Checkup, Health and Nutrition Education and referral services are provided to the Children in the age group of 0-6 years, pregnant women & lactating mothers. Anganwadi Centres has been seen and interaction with Anganwadi Workers have been made on this scheme at the Project area villages.

m) Under the Andhra Pradesh State Development Planning – A subsidiary of the Planning Commission is a restructured specialized body created for analyzing data, the following programmes are on board and running at present

- ***Twenty Point Programme:–***

  TPP refers to a set of socio-economic schemes delivered by states for the welfare of weaker sections. Started in 1975, the TPP monitors performance of 20 vital schemes implemented by both the Central and State governments. The schemes under TPP-2006 are in accordance with the priorities contained in the National Common Minimum Programme (NCMP), the Millennium Development Goals (MDGs) of the United Nations and SAARC Social Charter. The 20 points and 66 items which are monitored individually by different Central Nodal Ministries covers various socio-economic aspects like poverty, employment, education, housing, health, agriculture, land-reforms, irrigation, drinking water, afforestation, environment protection, energy to rural areas, welfare of weaker sections of the society and e-governance etc. AP has been in the forefront of implementation of the programme, and was ranked 9th (2009-10) and 1st in the country in 2010-11. The Planning Department is the nodal agency at the State level and reviews the programme every month with the departments concerned and ranks the districts based on their annual performance.

- ***Constituency development programme :-***

  Data collection and analysis have been mostly used for arriving at trends and in making and monitoring policies by researchers and government departments. Demographic, Economic, Sector Wise, Scheme wise data is available from varied inputs and is generally collated by the Planning Department to assist in its plans and policies. This data reaches public domain in the form of varied documents like the Statistical Abstract, Socio-economic Survey, District handbooks and other types of publications and reports. Sensing the need to create data base which can be used by political representatives in understanding the issues of concern,

performance of schemes in their constituencies, and the areas that need to be focused upon, the Planning Department of AP initiated putting the existing data in a constituency wise format.

To capture the pace of development at Assembly Constituency level, the Planning Department put together data on few indicators like Education, Health, ICDS, Housing, Flagship Programs, Rachhabanda, and Funds availability and the Millennium Development Goals (MDGs) target to be achieved by 2015. MLAS from all parties, District Collectors and allied functionaries were given the prepared information and to facilitate information aided discussion process at district / sub district levels and take the district administration on systematically triggered high growth mode of functioning.

- ***Member of Parliament Local Area Development Scheme (MPLADS):***

  In 1993-94, MPLAD Scheme was launched, an amount of Rs. 5 lakh per Member of Parliament was allotted which became Rupees one crore per annum per MP constituency from 1994-95.This was stepped up to Rs. 2 crore from 1998-99 and now it has been increased to Rs.5 crore from the financial year 2011-12.

  Under this scheme, each MP has the choice to suggest to the District Collector for, works to the tune of Rs.5 Crores per annum to be taken up in his/her constituency. The Rajya Sabha Member of Parliament can recommend works in one or more districts in the State from where he/she has been elected. The Nominated Members of the Lok Sabha and Rajya Sabha may select any Districts from any State in the Country for implementation of their choice of work under the scheme.

  The objective of the scheme is to enable MPs to recommend works of developmental nature with emphasis on the creation of durable community assets based on the locally felt needs to be taken up in their Constituencies. Right from inception of the Scheme, durable assets of national priorities viz. drinking water, primary education, public health, sanitation and roads, etc. are being created.

- ***Flagship programme:-***

  Government has initiated a number of welfare programmes to translate its promises to the people for socially just and inclusive growth. Certain ongoing programmes were consolidated or altered to increase their efficiency and certain new programmes were initiated in important areas like employment, health, education, rural infrastructure, urban renewal and providing people a legal framework for the Right to Information.

  1. ***Sarva Shiksha Abhiyan:*** It is an ongoing programme for universalisation of elementary education, was consolidated by providing additional financial allocations and creation of a dedicated *Prathmik Shiksha Kosh* through a 2% cess introduced for the first time. The provision of cooked mid-day meal was universalised.

  2. ***National Rural Health Mission:*** This mission is to move from vertical disease management programmes to comprehensive healthcare. This has been achieved through an intersectoral district health plan, which provides for a community health activist in each village, untied funds to all sub-health centres and improvement of infrastructure and standards in rural hospitals.

  3. ***Jawaharlal Nehru National Urban Renewal Mission:*** This represents the first effort of its kind where Government of India is intervening in a major way to improving the quality of living in the cities. It focuses on improving urban infrastructure, governance and services to the urban poor. Comprehensive city development plans are prepared and funded under this Mission.

4. ***NREGA*** provides a legal guarantee for 100 days of work to rural households. The programme now covers all rural districts of the country. It is the first such effort in the world to provide legal guarantee for a Right to Work and the programme is being keenly watched by development observers all over the world.

5. ***Right to Information Act:*** This act was passed in 2005. This Act is being used actively by the citizens, leading to greater transparency and accountability in public life. As the outcomes of the flagship programmes consolidate over the next few years, a new era of equalising and socially inclusive growth would become a reality.

- ***Millennium Development Goals :-***

  Reforms initiated in the 1990's to a large extent have made a positive impact on Economic development in the state. However it lags behind on several other socio-economic and human develop indicators. AP stands in the middle on the performance of a number of MDG goals in the country. Achieving all the MDG set targets in the stipulated time is a challenge that AP has to seriously start focusing upon, as the date of delivery draws close. Being on track on a number of indicators, AP is poised to achieve a large proportion of the MDGs. To keep track of AP's status quo on a number of parameters, it is essential to have an idea of the exact targets set for the state. Taking in to account the base line data figures of the nineties AP MDG targets have been quantified by a number of scholars. Few common arrived targets, and the current conditions on a number of parameters is collated to create a more broader and accepted table that contains the recognized MDG targets set for the state, and APs current position on the different indicators of MDGs. The tabular form of this is prepared to assist targeted policy interventions.

4.5.18 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 Thumu Kunta village Outcomes of the consultations are included in the above sections such as infrastructure, migration, occupation etc. Details of consultation is appended here below.

1. Consultation with Project Proponent (Fotowatio Renewable Ventures (FRV))

Representatives of the project proponent has informed the visiting ESIA Team that the land is being allocated to them on 25 Years Lease by APSPCL, in the project area village Thumu Kunta village exclusively for the purpose of 50 MW Solar Power Project owned by FRV through proper bid process. The land parcel that has being allocated to them is clearly demarcated. The allocation process was in progress till the time of ESIA Team visit. The land parcel marked for exclusively for the 50 MW FRV Project is amounted approximately around 250 Acres dedicated for 50 MW generation.

2. Consultation with Executive Engineer, APSPCL

The executive engineer of APSPCL has informed about the background of the 1500 MW Solar Park and intimated the visiting team about the land procuring process. The land for FRV 50 MW Project has been given in 25 years of lease period to FRV exclusively for the purpose of power generation.

He also mentioned that land taken for the 1500 MW Ultra Mega Solar Park at Anantapur District can majorly be distinguished in three types, i.e. Revenue or Govt. Lands, Assigned Lands (Assigned to the enjoyers by Govt.) and Private (Patta) Lands. He mentioned, that around unassigned government lands constituted 48.2%; "assigned" government lands constituted 43.2% and private lands (patta lands) were 8.6% in the entire solar park area.

He also mentioned that there is no issues regarding the land procurement, as all assigned lands are being procured through willingness of the assignees and negotiated through the combined committee of both administration and the villagers. APSPCL will remain the sole responsible agency for any land related matter. Further he mentioned that the ground water is too low in the project area, specifically in area for 50 MW FRV Solar Power Project area. To comply the need for required water during operation period will fed from Veligallu Reservoir, located around 9 Km towards the south.

Facilities like internal roads, water, lighting, Gris Sub- Station (GSS), Police Camp, Fire Station etc. will be provided by APSPCL.

3. Consultation with Community, Teachers, Sarpanch etc.

As informed during consultation, Thumu Kunta village has around 637 households (as per Census, 2011 it was 657). There are also a handful Muslim families besides the majority Hindu population. 90% of the total population are involved in cultivation activities either as cultivators or agricultural labours. Only a very few go in the Service Sector. Livestock rearing also another source of livelihood. The main crop cultivation are of Paddy, Ground Nut and Red Gram. Agriculture is mostly rain fed and irrigation through bore wells was also observed. There is one centrally located above ground Water Tank maintained by the Panchayat under Comprehensive Protected Water Supply Scheme. Water is distributed through pipe. This is the main source of drinking water. Ground water depth is more than 60 Mtr. A dug well and isolately located hand pumps were observed. The village has four Elementary Schools (One Urdu Medium and others Telegu Medium) and one Upper Primary School up to class VII. For higher education students either go to nearby Galiveedu and then to Rayachotty or Kadiri town. 90 % of the households have Sanitary Latrines at their households. Rest of the population resort to open defecation. There is no health facility in the village. Health Camps under NHM is conducted once in a month. To avail hospital facility people have to go Rayachotty or at Kadiri both about 35-36 Km from the village. Also the health care facilities available at Galiveedu Mandal Town (around 8 Km) are availed. Health workers visit the village twice/ week for health related monitoring, routine immunisation and vaccination. Emergency No. 104 and Ambulance Service No. 108 is also availed during the times of need. Average land holding size is about 5-7 acre per household. Very few of the villagers have technical skills or training.

It was informed by the Community and the Panchayat Members that they are aware of the 50 MW Solar Power project to be started in the village. They are expecting betterment in their livelihood with the initiation of the same.

4. Consultation with villagers at Prakash Nagar Colony

Prakash Nagar Colony is a small hamlet in Thumu Kunta village. Consultation was made with the residents of Prakash Nagar Colony, who are Scheduled Tribes. It was observed during consultation that the people here are in gradual transition from their traditional livelihood resources and opting for other avenues like service sector etc. Many of the younger generation are opting for higher education and moving in bigger cities for better livelihood options.

Glimpses of Prakash Nagar Colony

The people from Prakash Nagar has general aspirations of development in the locality with the upcoming Solar Power Project.

5. Consultation with assignees of assigned lands taken for the project

A few land owners were consulted at Thumu Kunta village. They understood that the assigned land was taken for them for greater cause, which they appreciate. Some of them have become landless. They are gradually shifting to other professions. They have aspirations of employment and other betterment avenues from the upcoming project. Some of them are already involved in the nearby already running Solar Power projects, e.g. NTPC, Tata etc. 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 etc. Details of the lands given by them and remaining with them is given in **Table 4-16**.

Table 4-16: Details of land information as informed by consulted land sellers

Mandal & District	Village	Land Owner Name	Amount of assigned lands given to APSPCL	Land remaining
Galiveedu Mandal, Kadapa District	Thumu Kunta	Valluri Laxmi Devi	1 Acre 15 Cents	Nil
		Naga Bhushanam	3.5 Acres	2 Acres
		S. Veera Bhadrappa Naidu	4 Acres	18 Acres
		K. Gopalaya	6 Acres 98 Cents	5 Acres
		Ramanna	1.86 Acre	Nil

6. Consultation with assignees of assigned lands from ST community

Bodagutta Anjeneyulu (Narasimhulu), an assignee of a patch of assigned land, who belongs to the ST Community, namely Erakulu community was consulted. He has given around 2.79 Acres at Thumu Kunta village for this specific 50 Mw Solar Power Project.

Erakulu is a semi-professional singers from the musician community, who sings, dance, and narrate ballads taken from the epic Ramayana.

Bodagutta Anjeneyulu (Narasimhulu) has 6 dependants in his family. His wife, one daughter (4 Years old), one son (7 years old) and parents. By profession he is a farmer. After transferring the 2.79 Acres of Assigned Land at Thumu Kunta he has now 7.1 Acres of lands remained. 4.21 Acres land in his own ownership and 2.89 Acres in his father's name. He will utilize the compensation amount for installing bore well in his cultivation land and will buy some equipments for upgradation in cultivation. He will save the rest of the money.

Details of Stakeholders consultation has been provided in **Appendix F.**

Key Findings of Consultation

Some notable key findings of different level stakeholder consultation is append below:

- APSPCL is sole authority and responsible agency for all land related matter for the entire 1500 MW Ananthaparamu Ultra Mega Solar Park. FRV had no role to play in land acquisition.
- Assigned Lands has been procured through competent authority and at a negotiated compensation amount.
- APSPCL is responsible for all the supporting facilities internal roads, lighting, water, police station, fire station etc.

- Water scarcity in the Project area will be complied by drawing water from Veligallu Dam reservoir.
- 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, Ground Nut and Bengal Gram etc.
- Rain-fed as well as irrigated 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.
- Public sanitation facilities is inadequate in the villages yet most of the households have their own sanitation facilities
- Scarcity of water is a serious issue in the study area villages, especially potable water. The groundwater depth is more than 60 meters.
- Drinking water facility is not adequate in the project area villages. Panchayat owned above ground tanks is the main source of drinking water. A few scattered hand pumps and a dug well is also located in a few locations.
- There is no health facility within the study area village, locals rely on quacks. To avail hospital facility people have to go to either at Galiveedu PHC (around 7 Km) or at Govt. and private hospitals located at Rayachotty or Kadiri (around 35 Km).
- There are three elementary schools in the village. One is of Urdu medium and the others are Telegu. There is also one Telegu medium govt. upper primary school up to Class VII. No high school is located within the village. Students from Thumu Kunta village normally go to Galiveedu Mandal town or Rayachotty for availing higher educational facilities. There are “Govt. Junior Colleges” at Galiveedu Mandal town and in Rayachotty town.
- Common health problems like Hypertension, Asthma, Diabetes etc. are present in the village.

Consultation with teachers at Mandal Parishad Primary School (Telegu Medium) at Thumu Kunta

Consultation with community at Thumu Kunta village

Consultation with Sarpanch and other land sellers Thumu Kunta village

Consultation with Assignees of Assigned Lands acquired

Consultation with Mandal Revenue Officer at her office in Galiveedu

Consultation with Assistant Executive Engineer, Veligallu Reservoir Project.

4.5.19 Grievance Redressal Mechanism (GRM)

Fotowatio Renewable Ventures (FRV) should develop their own Environmental Social Management System (ESMS) in line with the requirement of IFC guidelines. It should incorporate a GRM Policy mentioning the procedures for lodging of grievances, processing of grievances, resolving grievances and closing of grievances. Following the GRM Policy in the ESMS of Fotowatio Renewable Ventures (FRV) and the IFC guidelines issues raised through grievance redressal system should be addressed with remedial measures on site. Grievance redressal framework for onsite implementation should also be formulated for the purpose.

However, it must be ensured that:

- The grievance mechanism should be scaled to the risks and adverse impacts of the project.
- It should address affected people's concerns and complaints promptly, using an understandable and transparent process that is gender responsive, culturally appropriate, and readily accessible to all segments of the affected people at no costs and without retribution.
- The mechanism should not impede access to the country's judicial or administrative remedies. And
- The affected people will be appropriately informed about the mechanism.

4.5.20 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, Fotowatio Renewable Ventures (FRV) should develop 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 should lay down the areas of intervention, principles and mechanisms for undertaking various programs in accordance with Section 135 of the Companies Act 2013.

The '*Draft Implementation and Support Agreement for 500 MW Grid Connected SPV Project under JNNSM Phase II, Batch III Trench IV (VGF Scheme) at Galiveedu Mandal Ananthaparamu Solar Park (1500 MW),* issued by APSPCL states:

'*As per MNRE guidelines, certain percentage of the total investment made on development of the Solar Park (excluding investment on evacuation) an that for setting up solar power projects in the solar park may be kept aside for the affected area development, under solar park development account. However, the amount to be paid by the SPDs[16] has been quantified to avoid ambiguity as Rs. 5 Lakhs per MW.*

SPDs have to contribute an amount of Rs. 5 Lakhs/ MW @ Rs. 1 Lakh/ MW/ Year for 5 years after COD[17].'

As per the '*Draft Implementation and Support Agreement'* document the local area development would comprise of

a) Development of Village Panchayat

b) Development of areas other than Village Panchayat

It is also stated there in the document:

'A *Committee headed by the District Collector, will constituted with the CEO/ MD of SPIA/ SPPD [18] as Member Secretary and representatives of SPD as members.*

The MD/ CEO of APSPCL as Member Secretary of this committee will be responsible for handling funds, maintain records of all accounts and develop transparent policies for carrying and developmental activities in the affected panchayat areas'

Following the above mentioned procedure and rules FRV/ APSPCL, through the appropriate competent authority, should take some initiatives for community development under their CSR Policy in the project affected village- Thumu Kunta.

- Employment opportunities to the people who are losing their lands in a manner that is affecting their livelihood resource in project area villages;
- Creating provisions for employment opportunities to the people who are skilled and semi-skilled in project area villages;

[16] *SPD means Solar Power Developers. In this case it is APSPCL*

[17] *COD means Commercial Operation Date. It is mentioned in the 'Draft Implementation and Support Agreement 'COD shall mean 30 days subsequent to the date of commissioning of the project as certified by SECI.*

[18] *APSPCL*

- Supporting the Anganwadi Centres by facilitating them with provisions of exclusive Drinking Water and Toilet facilities for them in project area villages;
- Facilitating the Anganwadi Centres/ Local Schools by providing them with amenities like Chairs, Benches, running water facilities etc.;
- Facilitating in development and creation of Health Infrastructure in the project area villages, since there is no Health Facility at all.
- Promotion of education, including special education and employment enhancing vocation skills especially among children, women, elderly and the differently abled and livelihood enhancement projects;
- Promoting gender equality, empowering women, setting up homes and hostels for women and orphans, setting up old age homes, day care centres and such other facilities for senior citizens and measures for reducing inequalities faced by socially and economically backward groups etc.
- Thus, under their own CSR Policy and following the rules and regulations of APSPCL, FRV should create provisions for the above mentioned matters and/ or any other pertinent issues. Recommendation under CSR Policy are given in **Table 4-17**.

As informed by the Project Proponent (FRV), the amount being contributed by them towards Local Area Development Fund (CSR) is Rs 1 lakh / MW / year. Thus, cumulative amount of contribution for 5 years would be of Rs 2.5 crs.

4.5.21 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. On the basis of discussion with villagers, land sellers and Panchayat Members, following gaps have been identified which needs to be addressed:

Table 4-17: Key Needs/Gaps identified and recommendation for CSR activity

Key Areas	Gaps identified	Recommendation for CSR
Education	• Lack of higher education facilities • Low female literacy rate compared to male • Lack of vocational training in study area villages • Lack of computer literacy in the village. • Lack of sitting arrangements in Primary School	• Awareness program regarding female education at village level. This can be linked with vocational training programme of study area villages • Providing computer literacy program at village level • Providing funds for sitting arrangements
Drinking water	• Limited no. of dug wells, a few hand pumps and one panchayat owned Tank are the main source of drinking water in the study area. • As informed by the community, ground water depth is around 60 mt. • A centrally located tank, with 30000 Litres capacity and piped water system is there.	• Providing additional drinking water facilities with help of concerned government dept. • Clean or purified drinking water is expected to significantly affect the quality of life and health for the villagers.

Key Areas	Gaps identified	Recommendation for CSR
Health	• There is no Health facility within the village. • Alternate/ better health facilities are around 35 Km away from the village. • Major diseases are observed – hypertension, diabetes, asthma etc.	• Organizing awareness camp on general health awareness. • Health camps or mobile health clinics, with support of the govt. authorities, can be provided.
Infrastructure and sanitation	• Though, village approach roads are good but access roads within the villages are both paved and unpaved in the study area villages • Around 10 % of the people in the study area villages are resort to open defecation	• Organizing awareness camp on sanitation and to be linked with sanitation program in the study area villages. • Low cost community toilets based on best practices to use less water can be worked out with the panchayats intervention. Or some initiative linking with Swachh Bharat mission (SBM) can be made.
Agriculture/ Irrigation	• Agriculture is majorly dependent both on rain with irrigation through bore wells. But the project affected villages lacks adequate irrigation system.	• Proper link with irrigation programmes that can ease irrigation in the area • Rain Water harvesting should be planned wherever possible with the project site to improve groundwater recharge. • Introduction of drip irrigation and similar schemes
Employment opportunities in the area	• Only a little number of SHGs (all under Development of women and children in Rural Areas or DWCRA –DCWRA) found to be present in the study are villages • Majority of the villagers are mostly unskilled • Labourers are mostly seasonal workers and migrate only for a short while in the nearby towns, either as Masons, or carpenter or as seasonal spin mill workers.	• Organizing training/capacity building program for SHGs regarding entrepreneurship and linkages with bank. • Introduction of processing of dairy and other produce related to livestock.

4.5.22 Engagement of Labour

As 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 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

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
- Alternate location for the project

5.1 Current or No project scenario

There is a need to bridge the gap between the demand and supply, renewable/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. In Andhra Pradesh, existing renewable capacity commissioned is about 1,815 MW of which wind power contributes to 1119MW, solar power contributes to 146MW (State as well as GoI) and others (like hydro, biomass, solid waste) contributes to 550MW as on October 2015 (Status of Renewable Energy Power Projects Commissioned in Andhra Pradesh State, NREDCAP). Status of Renewable Energy Power projects commissioned in Andhra Pradesh state as on 31.12.2016 is enclosed in **Appendix L.**

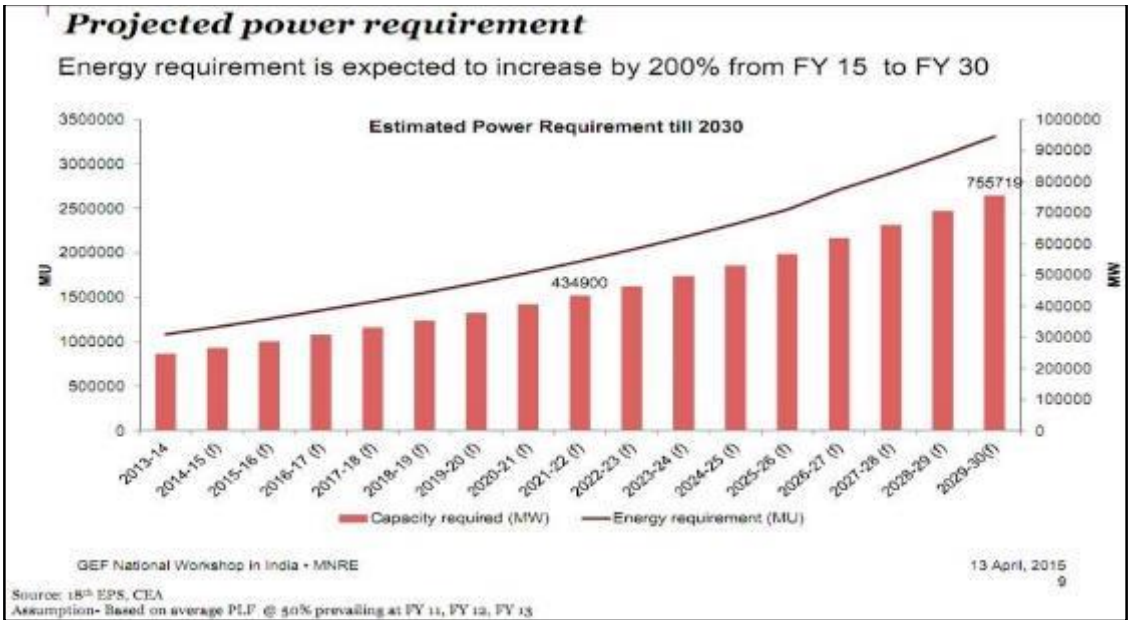
About 2,846.12 MW capacity wind power projects have been sanctioned by the Non-conventional Energy Development Corporation of Andhra Pradesh Limited (NREDCAP), the sanctioning authority in the state, out of which projects of about 103.00 MW have been commissioned till 31 during 2015-16. The project presents 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 (MoEFCC), 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 Renewable Energy (RE) sources is a logical next step. Wind 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, wind& solar power is not subject to fluctuating fuel prices which drain India’s limited foreign reserves, and in addition, wind & 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.

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.

Source of Energy	Advantages	Disadvantages
Coal	• Relatively cheap form of energy availability in large scale worldwide • Easily transported to power stations • Reliable for energy with steady output • Coal is available in India	• Non-renewable energy source • Large water requirement • High emission of air pollutants 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 of oil and gas 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. • Only a very small amount of nuclear fuel is needed to make a lot of energy.	• Expensive, especially in capital costs, maintenance costs • The waste produced from nuclear energy is radioactive and Safe long-term disposal of nuclear waste can be difficult.

Source of Energy	Advantages	Disadvantages
	• Does not produce significant atmospheric pollutants.	
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 mode available. 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 of Andhra Pradesh throughout the year.

5.4 Alternate Location for the Project

Solar energy projects are site specific and its feasibility depends on a number of factors which can be broadly categorized as solar resource assessment, land availability, cost of land and impact on community.

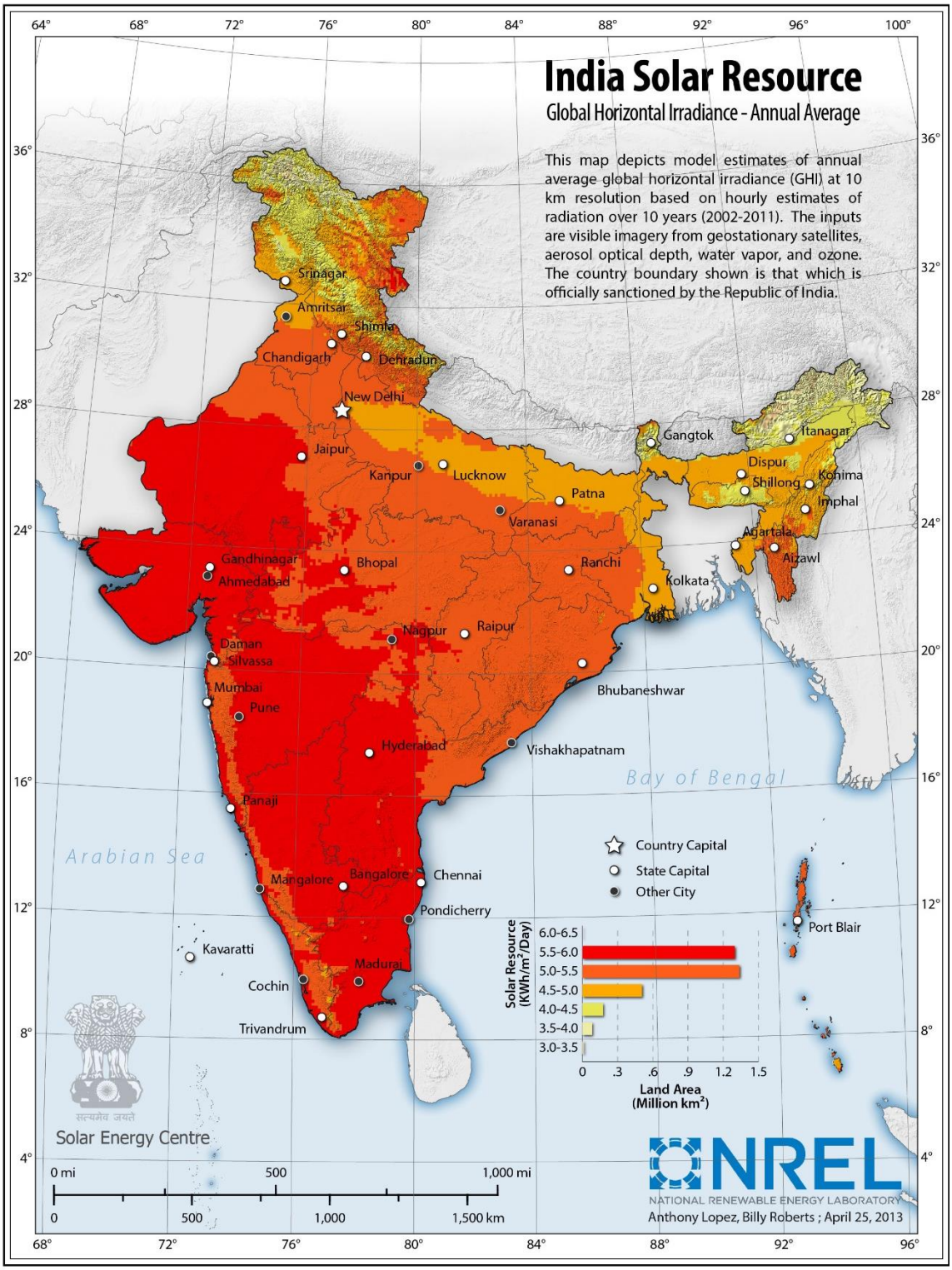
5.4.1 Identification of Sites for Solar Plant

Global horizontal irradiance map of India is shown in **Figure 5-2**. The western and southern region of India has good solar potential with solar resource within the range of 5.5-6.0 kWh/m^2/Day. Andhra Pradesh falling in the southern region also have good solar resource potential and can be harnessed.

The key factors considered for the final selection of solar plant site included the following:

- **Land Availability:** Land has been made available by APSPCL for entire solar park. APSPCL expected to be followed existing pertinent guidelines for avoiding forest and other sensitive land parcels, natural drainage channels etc. It is also expected to be considered that the Solar park plot has been excluded in power generation calculations though private developers are free to utilise the hilly area for solar power generation without disturbing the natural contours.
- **Solar radiation at the site:** Solar radiation map of India indicates that Andhra Pradesh receives a global horizontal irradiation (GHI) in the range of 5.5 to 6 kWh/ m^2/ day.
- **Topography:** The project site is spread across an open area with very mild slope in multiple directions. Erection of solar panels will be undertaken through varying the height of the poles required for mounting solar panels. Hence, the installation will be easy and reduce the cost of technical modifications required to adjust for undulations at the ground.
- **Substation proximity:** Power from the solar photovoltaic plant of 50 MW capacity will be evacuated to 33/220 kv substation (Pooling Substation), located 0.5 km away from the P2 site. The Pooling substation will be connected to a 220/400 kv grid substation (GSS). GSS is already in operational stage. Distance between PSS of P2 to GSS is approximately 8km.
- **Accessibility**: The site is easily accessible through Kadri - Rayachotty State Highway, SH-34. Existing village roads are also utilized as access road to the site. Nearest Railway station is Nallacheruvu located approximately 35 km away from the site. Kempegowda International Airport, Devanahalli at Bengaluru (Bangalore) is about 178 Km from Galiveedu via Kadapa-Bangalore Highway.
- **Geological and soil conditions:** Galiveedu Mandal has extensive undulating plains with hilly and rocky areas. The soil of the Kadapa district has been classified into red ferruginous soil and black spoil. From the observation of the existing other solar power plants within the solar park, it is anticipated that geology and soil of the area will also support the proposed structures.
- Near and far shading effects due to objects like transmission lines, trees, hills, wind farms, etc. There are no shading elements such as mountains or dense trees available on the site.
- The site is devoid of any habitation.
- Any other alternative site may not enjoy above mentioned benefits

Figure 5-2: Solar Resource Potential Map



Source: http://www.nrel.gov/international/images/india_ghi_annual.jpg

5.4.2 Alternate Routes for Transmission Lines

The planned grid connection point is located in the 220/400 kV Solar Park Substation. Project will be connected to 33 kV side of a 33/220 kV of one of the two S.P. pooling station. These pooling stations will be connected to a 220/400 kV interconnection Substation. Metering will be done in 220 KV side of the interconnection station. Maximum Output Power in connection point will be 50 MW. APSPCL will

be in charge of the Pooling Substations, Interconnection Substation and 220 KV line between them. Project Company will be in charge of lay the 33 kV cables from the project plot to the pooling Substation.

Reportedly, the route for the transmission line will be selected keeping in mind the following factors:

- Transmission line route will be planned to avoid any habitations along the route
- Areas requiring extensive clearing of vegetation will be 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.

5.5 Conclusion

Various factors will be considered such as solar resource potential at the project site, favourable environmental and social settings, lowest GHG emissions in the project life cycle, availability of land and other resources. Considering these factors, it can be concluded that the site is the good location for development of solar power project. There are also other solar power projects that are located in the same solar park which are in operation, under construction or planning. This is due to availability and suitability of solar power potential, land and other allied infrastructure availability and various government supporting policies.

6 ENVIRONMENTAL & SOCIAL IMPACT ASSESSMENT

6.1 Approach & Methodology

There may be few potential environmental & social impacts due to the project activity during construction & operation phases. During the construction phase, the impacts may be regarded as temporary or short-term ranging from 6-12 months; while a few long term impacts may also be visualized during the operation stage. Primary impacts are assessed for a radius of 3 km around the project site and secondary impacts are assessed within the study area (5 km radius from project site). Further the impacts have been assessed over the study area of 5 km radius of the project site. The project has overall positive impacts by providing a competitive, cost-effective, pollution free reliable mode of solar power. It will certainly meet the ever increasing demand of power that will bridge the gap between demand and supply of power.

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 3 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 3 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 analyse the significance of impact. Colour codes have been given to signify the impact intensity.

Significance of environmental impact has been analysed and presented in further section of this chapter. The environmental impacts associated with the project activities have been identified and analysed 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	

Distribution	Duration	Intensity	Significance
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										L				L		M	M	P			
Sourcing and transportation of construction material etc.	L	M	L	L						L							L		L	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
Access road construction		M	L	L	L		L	L		L							M	P	L	L	L
Site Clearance	L	M	L	L	M	L				L						L		P		L	M
Foundation excavation		M	L	L	L		L	L										P		L	M
Transportation of solar plant components to site and storage		M	L				L											P	L	L	M
Transformer yard construction		M	L	L	M													P		L	M
Substation construction			L	L	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
Maintenance of ancillary facilities such as store, yard, site office		L																			
Inspection of transmission lines																					L
Security of solar power plant in operation																		P			L
Operation of solar power plant																				L	L

6.2 Impacts on Physical Environment

6.2.1 Air Quality

Construction Phase:

During 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 wind blown 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
- Water sprinkling on unpaved area but ensure use of tanker water purchased from suitable authorised vendor only.
- Fine materials should be transported in covered vehicle.
- All the project vehicles shall have valid Pollution Under Control (PUC) certificate. 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 10-15 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 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 will be undertaken by FRV.
- 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.
- Broken solar panels should be stored on paved surface and be handed back to manufacturers / authorised recycler.

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.

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 amongst barren fields with no continuous noise generating sources in the vicinity of the project site. Assuming, the operation of these equipment's is expected to generate noise in a range of 75 – 90 dB (A). However, propagation of noise waves was assessed through the equation -1 and found that noise attenuates during propagation and lower down from 90 dB(A) to 47 dB(A) at 50 m distance from the source and the nearest settlement is Prakashnagar village which is located 400m (approx.) in the east of plot 2 of solar park.Also, intermittent operation in large area of project site reduces the intensity.

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 characterised 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

Water is required for various project activities, fulfilment of this water requirement through ground water may have impact on water availability. But, as reported, APSPCL will provide the water from the reservoir during operation phase of the project.

Phase	Activity	Max. Consumption
Construction	Civil works water requirement	15 KLD (1 Bore well)
	Domestic/Municipal use – drinking (during peak construction phase) considering 500 labours @ 110 lpcd	55 KLD
Operation	Washing of solar panels (1.938 m^2 each panel)	Expected to be 5500 KL p.a. for 50 MW project
	Domestic/Municipal use	

Construction Phase

In the construction phase, water requirement for construction activities and labour camp is estimated about 70 KLD (1 bore well). Further, construction activities will be limited only to 6-7 months' duration therefore a long-term water requirement is not expected. FRV has applied for withdrawal of ground water for use as construction water. Considering the limited distribution of impact (within the site), short duration of activities and low intensity, significance of impact is assessed as Low.

Operational Phase

APSPCL will provide the water to the solar park from Veligallu reservoir. In operational phase, the water requirement would approximately be 5500 KL p.a. for 50 MW project including cleaning of PV cells, domestic/ municipal consumption of water for site personnels and security guards. State Irrigation department after considering viability of reservoir for Irrigation and fisheries purpose will issue permit for water withdrawal to APSPCL from Veligellu reservoir. Considering the distribution of impact in within the site, long duration with moderate intensity, significance of impact is assessed as low**.**

Mitigation Measures:

- Ensure optimal usage of water viz., storage and reuse of wash water after module washing and plantation of low water requirement species.
- Construction 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. The broken solar panels will be properly packed and will be sent back to manufacturer/ approved vendors. 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 to the maximum extent possible.
- Ensure contractual obligation that necessitates broken solar panels will be accepted by manufacturer
- Use of proper segregation 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 of proper segregation 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 Landuse

Construction Phase

During construction phase, impact on landuse is anticipated due to various activities such as site levelling, filling and development of solar power plant. Landuse classification will change into industrial landuse after the development of solar power plant. Impact on natural drainage system may be 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 animals due to noise and movement of construction equipment and personnel.

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.

Other mammalian species like sloth bear are distributed in specific habitats within the study area which are relatively free from anthropogenic activities. Proposed project site is not their suitable habitat or any suitable den site or cavern was recorded from the project site. During construction period due to added noise and vehicular movement these animals may temporarily move away from adjacent suitable habitats like forested hillocks, but may recolonize once the construction phase is over.

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 pahse, there is a probability of “man animal conflict”. Bu 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 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.

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 hard 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 some vegetation cover to protect the soil 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.

6.3 Socioeconomic Impact

6.3.1 Key Social Impact

Construction phase:

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 analysed.

6.3.2 Loss of land/livelihood Conflict

Construction Phase

APSPCL is in the process of leasing out approximately 250 acres of lands to FRV Energies Pvt. Ltd. for implementation of 50 MWp SPV Power Project under Anantapur Ultra Mega Solar Park (1500 MW), in Kadapa District of State of Andhra Pradesh. The 50 MW solar power project site is located in contiguous land located at Thumu Kunta village of Galiveedu Mandal of Kadapa district, Andhra Pradesh. Land in the 50 MW project influenced 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 with few patches of seasonal agriculture. 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 Plot No. P2. Only a few isolated patches of cultivation marks was observed. It was informed by the local people that those were sown during monsoon as the fields were left otherwise.

Consultation with Project Proponent, APSPCL Representative as well as with the Community including the Panchayat Members, all the assigned lands are procured by APSPCL through fare compensation amount and those lands were taken through proper procedure through competent authority (District Collector). Though to gauge the real scenario a Livelihood Impact Assessment is required.

Though, in absence of proper documents it is considered that there are possibilities of livelihood impact. Though no evidence of physical or economic displacement was noticed, yet such chances can't be ruled out.

Hence, considering all the above points neither physical nor economical displacement is envisaged. 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:

- Livelihood Restoration Plan (LRP) is suggested based on the assessments and outcomes of Livelihood Impact Assessment (LIA).
- Stakeholder engagement plan and community development plan should be implemented for project involved village- Thumu Kunta and if possible it may extended up to the adjacent areas for 50 MW Solar Power Project under the APSPCL 1500 MW Solar Park.
- 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.

6.3.3 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, FRV should laid down policies through which it should demonstrate compliance to all of 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. FRV need to monitor the implementation of the policies on regular basis.

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 contractors agreement and HR policy
- Project proponent through its contractors should ensure that labour is being adequately paid by contractors. Also ensure that wages is 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 situation
- 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.

6.3.4 Labour Camp (Onsite and offsite)

Construction Phase:

There may have some chances that some kind of 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:

Fotowatio Renewable Ventures (FRV) will setup onsite labour camp for labours employed through contractors to restrict the interaction of migrated labour with local community as to avoid any conflict.

6.3.5 Social Issues Regarding ROW and Such Matter

Construction Phase:

The entire land matters has been dealt with and sorted by the prime project stakeholder APSPCL, and the land has been identified, procured/ acquired directly by them and demarcation for the entire Land of the 1500 MW Solar Park has been almost finalised. It was observed during site visit the land at Plot No. P2 for the 50 MW FRV Solar Power Project, is located in isolation and far distant from any human habitation and 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 condition and the records, information that has been received from the Project Proponent (Fotowatio Renewable Ventures (FRV)) of the 50 MW Solar Power Plant as well as from APSPCL 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

6.3.6 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- Thumu Kunta in Galiveedu Mandal of Kadapa district.

6.3.7 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 similar to 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. Fotowatio Renewable Ventures (FRV) following their 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 of Fotowatio Renewable Ventures (FRV).

Also, there can be dissatisfaction among the labourers due to many conflicts/issues unresolved, hence there should be a complaint register onsite. Fotowatio Renewable Ventures (FRV)'s contractor should ensure to have regular medical check-up of their hired labourers. Fotowatio Renewable Ventures (FRV) or their contractor should ensure to have 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 and every individual labourers are 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).
- FRV should inform the labour about the Grievance Redressal Mechanism (GRM) by which they can inform about any grievances.
- FRV should ensure that labour receive training on health and safety issues involved in the project.
- FRV should inform the labour about Emergency Preparedness Plan (EMP) and communication system to be followed during emergency situation.
- FRV 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 comes in contact with live power lines etc. The severity of the burn depends on voltage, current, time of contact etc.
- Firing due to short-circuit
- Possible injuries associated with working at height
- 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
- Prepare emergency communication system and emergency preparedness plan
- Ensure proper sanitation facilities.

6.3.8 Labour Accommodation (Onsite and offsite)

Construction Phase

As per International Labour Organisation *"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."* [19]

Considering the future construction on anvil Fotowatio Renewable Ventures (FRV) 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 Solar Park area, in Thumu Kunta village.

- 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

[19] *Source: Labour Accommodation Standards, ILO*

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:

- Fotowatio Renewable Ventures (FRV) will formulate their own Environmental Social Management System (ESMS). Following that an Emergency Preparedness Plan to deal with health and safety issues during project life cycle of a Solar Power Plant will be built.
- FRV 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. Fotowatio Renewable Ventures (FRV) should ensure that all its hired 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.

6.3.9 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 50 MW FRV Project within the 1500 MW Solar Park Area.

No such evidential proof was found even during field visit in the site area village Thumu Kunta of Galiveedu Mandal of Kadapa 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.

6.3.10 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 site at Thumu Kunta village. 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 APSPCL representative, 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.

6.3.11 Corporate Social Responsibility

Construction Phase

To empower the local community through different development and support programmes the project proponent should take some initiatives for Community Development Plan under their CSR Policy in the project affected village- Thumu Kunta in Galiveedu Mandal respectively of Anantapur District.

The project proponent will develop 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 will lay down the areas of intervention, principles and mechanisms for undertaking various programs in accordance with Section 135 of the Companies Act 2013. As per CSR Policy, FRV is committed to inclusive growth and local stakeholder involvement as a fundamental value and strives to enhance:

- Social wellbeing
- Economic wellbeing
- Environmental wellbeing
- Local community initiatives

The CSR Activities may include:

- Creating provisions for Employment opportunities to the people who are skilled and semi-skilled in project area villages;
- Supporting the Anganwadi Centres by facilitating them with provisions of exclusive Drinking Water and Toilet facilities for them in project area villages;
- Facilitating the Anganwadi Centres/ Local Schools by providing them with amenities like Chairs, Benches etc.;
- Facilitating in development and creation of Health Infrastructure in the Project Area villages, where it is found to be inadequate;
- Promotion of education, including special education and employment enhancing vocation skills especially among children, women, elderly and the differently abled and livelihood enhancement projects;
- Promoting gender equality, empowering women, setting up homes and hostels for women and orphans, setting up old age homes, day care centers and such other facilities for senior citizens and measures for reducing inequalities faced by socially and economically backward groups etc.

APSPCL has specific Implementation Mechanism under their CSR Policy. Project proponent should create provisions and support APSPCL for the above mentioned matters and any other pertinent issues. As informed by the project proponent, would contribute a cumulative amount of Rs 2.5 crs towards Local Area Development (@Rs 1 lakh / MW / year). Recommendation under CSR Policy are given in **Table 4-17**.

Operation Phase

The CSR activity may continue during Operation Phase to comply with the need and requirement of the areas development and to avoid any conflict during that phase.

6.3.12 Health and 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 similar to 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 will be enclosed or exclusive provision for women. Project proponent will follow their Environment, Health and Safety ("EHS") Management Policy and abide by 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.

Also, there can be dissatisfaction among the labours due to many conflicts/issues unresolved, hence there should be a complaint register onsite. FRV's contractor should ensure to have regular medical check-up of their hired labours. 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 and every individual labourers are 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).
- Project proponent should inform the labour about the Grievance Redressal Mechanism (GRM) by which they can inform about any grievances.
- The project proponent should ensure that labour receive training on health and safety issues involved in the project.
- Project proponent should inform the labour about Emergency Preparedness Plan (EMP) and communication system to be followed during emergency situation.
- The project proponent should involve their Welfare Coordinator that to be mentioned in their Policy.

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 comes in contact with live power lines etc. The severity of the burn depends on voltage, current, time of contact etc.
- Firing due to short-circuit:
- Possible injuries associated with working at height
- 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
- Prepare emergency communication system and emergency preparedness plan
- Ensure proper sanitation facilities.

(B) Labour Accommodation (Onsite and offsite)

Construction Phase

As per International Labour Organisation "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 will be provided to the workers/labours in the labour camp set up in the project site." [20]

Considering the future construction of the solar project 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 Solar Park 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 will be 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:

- During the site visit, the project was in pre-construction phase and land procurement was in progress by APSPCL. The plan to hire unskilled labours locally, will be given preference therefore reducing the requirement of labour camp. Labour camp will accommodate only the migrant labours till the completion of construction phase. All the basic amenities such as drinking water, kitchen, toilets will be sufficiently provided in the labour camp.
- Provision of furnished container (portable office container) with the required facilities, like toilet blocks and kitchen, centralised dining etc. will be made for onsite staff.
- During construction phase ground water will be utilised through bore well and during operation phase, APSPCL will provide water from the existing nearby reservoir. Drinking water needs during the construction phase will be met from the ground water sources. In operational phase, RO water will be made available for the drinking purpose and if necessary for cleaning of solar panel purpose too.

[20] *Source: Labour Accommodation Standards, ILO*

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

(C) Community Health & Safety

During Construction phase:

During construction phase, various project components such as transmission cable laying, switchgear, approach roads, internal road network and porta cabin construction require land clearing, levelling, excavation, grading activities, vehicle movement, DG set operation will take place. This will results in an increased level of dust and particulate matter emissions, as well as high traffic load, which in turn will directly and temporarily impact the local community. If improperly managed, there is a risk of nuisance and health effects. Taking the distribution of impact as within site, duration as short and intensity as low, the impact can be considered as **"**Low"

Mitigation Measures

- Identify route for movement of project vehicles which, should not include narrow village road and road passing through cluster of settlements
- Depute traffic escorts as and when required near project site and major settlements to guide movement of project vehicles
- Keep limited speed of project vehicles near settlements and within the project site.
- Provide necessary training to the drivers for speed restrictions and on do's and don'ts
    - During construction phase
    - Operational Phase

Operation Phase

- **Traffic Movement**: In operational phase very few (2-3 nos.) of vehicles will be required for commuting from home to site office. Therefore, impact associated with movement of project vehicles is not anticipated. Besides, there may be impact due to restriction in public access, but considering FRV/ APSPCL will construct strengthen existing roads within the village connecting the main roads and between places with different Project sites.
- **Risk of Electrocution**: Risk of Electrocution is anticipated in the operational phase of the project, which could be mitigated through boundary wall and restricted entry in project site.
- Taking all these points in consideration, with distribution buffer area, duration short and intensity low, the significance of impact can be taken as Low**.**

Mitigation Measures

- Ensuring effective work permit system for critical activities such as electrical work
- Boundary Wall and restricted entry in project site

- Prepare emergency communication system and emergency preparedness plan should be framed.

(D) 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 50 MW FRV solar project within the Solar Park Area.

So far it was informed that there is no designated or non- designated heritage site in the study area villages of the project area though no such evidential proof was found in the site area villages. In case of any 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.

(E) 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 any of the project sites. 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 in normal case, 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.

(F) Corporate Social Responsibility

Construction Phase

To empower the local community through different development and support programmes FRV should take some initiatives for Community Development Plan under their CSR Policy in the project affected villages and in the nearby area.

FRV has to develope 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. As per the CSR Policy, FRV should committed to inclusive growth and local stakeholder involvement as a fundamental value and strives to enhance:

- Social wellbeing
- Economic wellbeing
- Environmental wellbeing
- Local community initiatives

The CSR Activities may include:

- Creating provisions for Employment opportunities to the people who are skilled and semi-skilled in project area villages;
- Supporting the Anganwadi Centres by facilitating them with provisions of exclusive Drinking Water and Toilet facilities for them in project area villages;

- Facilitating the Anganwadi Centres/ Local Schools by providing them with amenities like Chairs, Benches etc.;
- Facilitating in development and creation of Health Infrastructure in the Project Area villages, where it is found to be inadequate;
- Promotion of education, including special education and employment enhancing vocation skills especially among children, women, elderly and the differently abled and livelihood enhancement projects;
- Promoting gender equality, empowering women, setting up homes and hostels for women and orphans, setting up old age homes, day care centres and such other facilities for senior citizens and measures for reducing inequalities faced by socially and economically backward groups etc.

FRV should have specific Implementation Mechanism under their CSR Policy, they should create provisions for the above-mentioned matters and any other pertinent issues. CSR can be funded as per the prevalent laws and certain percentage of profit of the project should be invested through CSR. Recommendation under CSR Policy are given in **Table 4-17.**

Operation Phase

The CSR activity should also be continued during Operation Phase to comply with the need and requirement of the areas development and to avoid any conflict during that phase.

6.3.13 Cumulative Impacts

There are other solar energy projects located within the same solar park e.g. NTPC (1000 MW) & others in the planning stage (yet to be confirmed) in the project vicinity. All these are solar power projects located near the project site.

Considering the availability of land and good solar potential in the region, establishment of some other solar power project in near future cannot be ruled out. As land acquisition is involved in the solar power project, there are possibilities of impacts on the private land owners and enjoyers of assigned lands. All the settlements are located at a distance from the solar plant, hence no issues regarding the same is noticed there. Also, no obstruction to common property resources are anticipated. One of the cumulative effects is solar reflections known as Glint and Glare. Solar panels are designed to absorb sunlight and produce electricity. However, they can also reflect it and cause solar reflections affecting drivers, residents, aviators and other receptors. With a continuous increase in both numbers and sizes of such PV developments cumulative concerns are likely to increase in the near future.

Land and access to pasture land may also be impacted considering the large trench of land being acquired for 1500 MW solar power project. Safety concerns also needs to be addressed cumulatively, whereas simultaneous construction may result in deterioration of environment and safety concern.

For total 1500 MW solar power project water will be required for construction phase as well as regular water will be used for cleaning of PV cells and other regular activity. Water for all the projects (total 150MW) will be provided by APSPCL. State Irrigation department after considering viability of reservoir for Irrigation and fisheries purpose will issue permit for water withdrawal to APSPCL from Veligallu reservoir. Considering the distribution of impact in within the site, long duration with moderate intensity, significance of impact is assessed as low**.**

Multiple projects, including several utility-scale solar energy production facilities, are proposed around the proposed project. These have the potential to result in cumulative impacts to aesthetics when considered together with the proposed project. After construction of the project, the existing visual character of the area would be altered as well as its surroundings. However, due to the flat topography of the sites and surrounding area; location of the project sites, which is removed from most public views

within an area surrounded by existing agriculture land; and, the installation of the perimeter fencing the equipment proposed to be installed on the project sites would not be visible from any surrounding view point. The proposed project is not located in a designated scenic vista, nor has an important visual resources. None of the roadways abutting or surrounding the project sites are designated or proposed scenic roadways. In addition, the sites would not be visible from any designated scenic resources or scenic highways. No historic structures or significant scenic resources exist on the proposed project sites. Accordingly, no significant cumulative impact would result from the proposed project's incremental impact on a scenic vista, or damage to scenic resources. Similar to the solar energy facility sites, the access roads are not visible from any of the public vintage points or designated scenic highways or vistas. As such, use of this road would not result in a significant impact to visual resources.

There would be no significant light sources on the project sites; lighting would be provided at substations and other structures only, and would be shielded to prevent spillover. Glare impacts are minimized by the inherent design qualities of the PV panels, which reduces reflectivity and the potential for visual discomfort or impairment. Additional PV panels in the area would not result in a greater intensity of glare due to the panel design and the law of reflectivity, which would not direct any reflected light along the ground surface. Accordingly, no significant cumulative impact would result from the cumulative scenario to which the Project's incremental impact could contribute to lighting or glare. As a result, impacts from operation of the proposed project would have a less than significant impact on aesthetics.

The projects in solar park would change the overall character of the region, and would contribute to the conversion of rural agricultural lands to landscapes with industrial character. However, no existing highly scenic views or aesthetically unique or distinctive landscape would be forfeited by the introduction of these types of projects. The project represents conversion from a natural environment of agricultural fields to built environment with an industrial character, masked with tan colored fencing. The area is unpopulated and no residents would be subject to alteration of views in association with the proposed solar projects. Therefore, there would be a weak direct cumulative impact to visual resources.

At the end of the proposed project's useful life of approximately 25 years, it would be decommissioned and dismantled. Cumulative impacts associated with decommissioning of the proposed project would include the removal of all project components, including Gen-tie Line structures and wiring, as well as all towers, wiring, PV panels, and inverter structures. After removal of project components, the project sites would return to agricultural uses, in accordance with the Agricultural Reclamation Plan. Visual recovery from land disturbance of closure and decommissioning would likely occur within a few years to allow for regrowth of vegetation. Therefore, decommissioning would temporarily impact the proposed project's contribution to local and regional cumulative impacts on visual resources. Temporary direct and indirect cumulative visual impacts would occur until re-growth of vegetation in the area is established. However, as discussed above, the project sites are void of highly scenic views or aesthetically unique or distinctive landscape, and impacts to aesthetics would remain be less than significant. When considered in combination with the impacts of other projects in the cumulative scenario, the Project's incremental contribution to aesthetics would not be cumulatively considerable.

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 impacts. In addition, organisational capacity and training requirements, required to check and ensure effectiveness of the plan throughout the lifecycle of the project, have also been discussed.

FRV is committed to implement an effective Environmental and Social Management System (hereinafter referred as ESMS) 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 & Monitoring Plan for the project, presented in **Table 6-1**.The Plan specifies measures for addressing the limited negative risks and impacts and for enhancing the beneficial impacts. In addition, organisational 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

FRV should ensure that the job specific training and EHS Induction training needs should be identified based on the specific requirements of ESMS 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 minimising 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.
- A basic occupational training program and speciality 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

In order 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, labours, suppliers and the local community impacted by the project activities and associated facilities thereby increasing the effectiveness of suggested mitigations measures. FRV 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 FRV's Personnel
2	**GROUND WATER ABSTRACTION**	Construction activities will be limited only to 6-7 months' duration therefore a long-term water requirement is not expected. FRV has applied for withdrawal of ground water for use as construction water.Considering the limited distribution of impact (within the site), short duration of activities and low intensity,	**LOW**	• During construction phase, water is being sourced from bore wells for which permission needs to be taken from CGWB. • Construct rain water harvesting pit to recharge the ground water • Reduce the frequency of washing to save water • If possible, collect the water after module wash and reuse it for module washing	**LOW**	Maximum efforts should be made to reuse and recycle water to reduce water consumption.	Project Developer/ Contractor under the supervision of FRV's Personnel

SN	Aspect	Impact	Impact Intensity without mitigation	Action	Impact Intensity with mitigation	Monitoring/training Requirement	Responsibility
		significance of impact is assessed as Low.					
3	**GROUND WATER QUALITY**	Possibility of contaminated runoff from the site entering the nearby soil/water bodies. Waste water from toilets constructed for site office can contaminate groundwater.	**LOW**	• Storage of oil shall be undertaken on paved impervious surface and secondary containment shall be provided for fuel storage tanks • Adequate drainage of road based on road width, surface material, compaction and maintenance • Leak-proof holding tanks for sanitary waste water should be constructed to protect the shallow ground water level. • Waste water holding tanks / septic tank should be located at more than 500 m away from bore wells or any other underground water holding tanks. • It should be ensured that the waste water does not find its way into surface waters or water wells.	**LOW**	• Machinery and vehicles shall be thoroughly checked for the presence of leaks if any; • 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 should be covered with tarpaulin sheet during transportation and in storage area • Practices water sprinkling wherever required on unpaved area.	**LOW**		Project Developer/ Contractor under the supervision of FRV's Personnel

SN	Aspect	Impact	Impact Intensity without mitigation	Action	Impact Intensity with mitigation	Monitoring/training Requirement	Responsibility
				• All the project vehicles shall have valid PUC certificate • Ensure regular maintenance of project vehicles during construction and operational phase • 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 MoEFCC/ CPCB.			
5	**SOIL QUALITY**	Top Soil Loss	**LOW**	• Provide appropriate storage of top soil in an isolated and covered area to prevent its loss in high wind and runoff. It is essential for top soil conservation • 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	**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 FRV's Personnel

SN	Aspect	Impact	Impact Intensity without mitigation	Action	Impact Intensity with mitigation	Monitoring/training Requirement	Responsibility
				construction, in order to reduce the risk of soil erosion			
		Soil Contamination		• In case of any accidental spill, the soil will be cut and stored securely for disposal as 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 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 MoEFCC/ CPCB	Project Developer/ Contractor under the supervision of FRV'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 MoEFCC.			
7	**SOLID WASTE**	Contamination of land	**LOW**	• Distribute appropriate number of properly contained litter bins and containers properly marked as "Municipal 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 FRV'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 ensure 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 FRV's Personnel
B	**Ecological Environmental Management Plan**						
9	**ECOLOGY**	The construction activities will lead to loss of vegetation resulting in displacement of terrestrial species	**MODERATE**	• All project activities shall be undertaken with appropriate noise mitigation measures to avoid disturbance to human as well as faunal population in the region.	**LOW IMPACT**	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		• Activities generating high noise shall be restricted to day time and will be mitigated to minimize the noise level outside the site boundary. • Recovery of ground storey (mostly grasses) vegetation under the PV panels and in other places that do not need to remain cleared shall be encouraged to grow. • Movement of construction and transport vehicles shall be restricted to dedicated paths to minimize any harm to small mammals/reptiles 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 putting signage, posters, among the staff and labourers. • 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.			FRV's Personnel

SN	Aspect	Impact	Impact Intensity without mitigation	Action	Impact Intensity with mitigation	Monitoring/training Requirement	Responsibility
				• Planting native, fast growing trees on access roads and/or in nearby barren areas/ schools/ Panchayat office which may also give an alternate habitat to the faunal species especially the bird species and maintain the ecological balance			
B	**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 • FRV 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 contractors agreement and HR policy • FRV through its contractors shall ensure that labour is being adequately paid by contractors. Also ensure that wages is being paid as per the requirement of minimum wages act • FRV shall include clause to ensure access of necessary basic amenities and facilities such as drinking water, kitchen, toilet and	**LOW IMPACT**	Periodic EHS audits should be conducted to monitor the same	Project Developer/ Contractor under the supervision of FRV's Personnel

SN	Aspect	Impact	Impact Intensity without mitigation	Action	Impact Intensity with mitigation	Monitoring/training Requirement	Responsibility
				crèches (for female workers children) • FRV shall conduct internal audits as when required to monitor the performance of contractor. • FRV through the contractor inform the labour about emergency preparedness plan and communication system to be followed during emergency situation • FRV 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**	FRV 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 FRV's Personnel
3	**LAND PROCUREMENT**	• Loss of Land • Livelihood • Obstruction to places of relevance • Manhandling Natural Resources of Utility	**Moderate**	• All the land required will be allocated to FRV by APSPCL, the prime project stakeholder, and within a specifically demarcated area dedicated to the 1500 MW Solar Park. This will be done only after finalisation of all procurement. • It should be ensured that maximum employment will be	**LOW IMPACT**	• FRV Energies Land and Project Team to understand mitigation measures • Construction contractors should adhere to social obligations, labour laws and international commitments	Project Developer/ Contractor under the supervision of FRV's Personnel Social Management team for

SN	Aspect	Impact	Impact Intensity without mitigation	Action	Impact Intensity with mitigation	Monitoring/training Requirement	Responsibility
				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; • Any waste generated during the construction phase should not be accumulated near the religious structure as this might affect the sentiment of the locals.		• FRV through contract agreement, should ensure that The contractor should provide the migrant workers adequate information on expected social behaviour and hygiene practices to be followed at site • Water usage should be monitored and controlled to minimize the wastewater generation • FRV 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	grievance Handling
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	**No Impact**	No Impact	**No Impact**	-	-

SN	Aspect	Impact	Impact Intensity without mitigation	Action	Impact Intensity with mitigation	Monitoring/training Requirement	Responsibility
		due to land intake from ST people and use of village resources					
5	**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 should be maintained onsite.	Contractor under the supervision of FRV's Personnel / PRI representatives
6	**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	**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 FRV's Personnel

SN	Aspect	Impact	Impact Intensity without mitigation	Action	Impact Intensity with mitigation	Monitoring/training Requirement	Responsibility
				• 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			
	OPERATION PHASE						
	A. PHYSICAL ENVIRONMENT MANGEMENT PLAN						
1	**HAZARDOUS WASTE MANAGEMENT**	Contamination of land and soil	**MODERATE**	• Broken solar panels, which will be collected in closed containers and will be disposed as per the standards.	**LOW**	Periodic EHS audits should be conducted to monitor the same	Project Developer/ FRV's Personnel
2	**SOLID WASTE MANAGEMENT**	Contamination of land	**MODERATE**	• Distribute appropriate number of properly contained litter bins and containers properly marked as "Municipal Waste". The waste generated should be disposed as per The Municipal Solid Wastes (Management and Handling) Rules, 2000& amended in 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	**LOW**	Periodic EHS audits should be conducted to monitor the same	Project Developer / FRV's Personnel

SN	Aspect	Impact	Impact Intensity without mitigation	Action	Impact Intensity with mitigation	Monitoring/training Requirement	Responsibility
				bins/containers and periodically sold to local recyclers.			
3	**WASTEWATER MANAGEMENT PLAN**	Degradation of ground and surface water quality	**MODERATE**	• Ensure that constructed septic tanks during operation are well contained and impermeable to prevent leakage of wastewater into soil. • 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 / FRV's Personnel
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	FRV's 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.	FRV's Personnel
				• Opportunities for contributing to the economic and developmental		Should be conducted continuously through the project cycle.	FRV's Personnel

SN	Aspect	Impact	Impact Intensity without mitigation	Action	Impact Intensity with mitigation	Monitoring/training Requirement	Responsibility
				needs of villagers through skill training will be explored.			
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 • Prepare emergency communication system and emergency preparedness plan • Ensure proper sanitation facilities.	**LOW**	Periodic EHS audits	Project Developer's / FRV's Personnel

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 FRV'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.

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	Measurement of PM10, PM2.5, SOx, NOx, CO	Village near the project location	Once 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 /canal /reservoir	Once during construction phase
A5	Soil Quality	Soil parameters viz. pH, SAR, Water holding capacity, Conductivity, Organic Carbon, NPK	Abutting village land & project site	Once during construction phase

7.5 Environmental Management Plans

The ESMP is comprised of some site-specific management plans viz. Emergency Management Plan, Waste Management Plan, Storm Water Management Plan, Environmental Monitoring Plan, Traffic Management Plan and Social Development Plan for the FRV's 50 MW Solar Power Plant at Thumu Kunta village in Kadapa District of Andhra Pradesh. The management plans will be executed through Environmental Social Management System.

7.5.1 Emergency Preparedness and Response Plan

Purpose

FRV, should develop a site-specific Emergency Management Plan 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 FRV& 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 FRV& 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 development of project sitemay 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, to prohibit public access to the plant.
- Provide fencing of an appropriate standard around the sub-station with anti-climb paint and warning signs.
- Prevent access to solar panel areas
- 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 course of 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, FRV should 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 also 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 particular 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 FRV. 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 FRV 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 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 disturbance 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 50 MW Solar Power project at Thumu Kunta 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.

Responsibility: As per norms of Solar Power Park APSPCL would take responsibility for construction of the road beyond the plot no. P2. And FRV would take responsibility internal roads within Plot No. P2. Both APSPCL and FRV would take responsibility for construction of the road before the existing road is diverted / closed for use by villagers. APSPCL/ FRV (through the implementing agency) should consult with the community to decide on the alignment of the road and also fix up the likely time line for the construction.

APSPCL/ FRV and their contractors should ensure that the sharing of community resource is minimized by organizing necessary support infrastructure/facilities within premises. However, in case where sharing would be essential APSPCL/ FRV and/ or their contractors should have an agreement with the Gram Panchayats for the sharing of the resource. In case of damage to community property APSPCL including its contractors should ensure that it is repaired or replaced to the satisfaction of the community at the earliest. APSPCL should maintain documentation of all incidents of damages to the community property. All cost for repair/replacement should be borne by APSPCL/FRV / their Contractor(s).

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. Fotowatio Renewable Ventures (FRV) needs to ensure it through its contractors.
- 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

FRV will establish a grievance redressal mechanism to receive and address specific concerns on environmental & social issues. If the client anticipates ongoing risks to or adverse impacts on affected communities, the client will establish a grievance mechanism to receive and facilitate resolution of the affected communities' concerns and grievances about the client's environmental and social performance. 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 mechanism should not impede access to judicial or administrative remedies. The client will inform the affected communities about the mechanism in the course of its community engagement process.

- In efforts to develop an effective two way communication a Grievance Redressal Mechanism should be developed by FRV. The broad outline of the mechanism is as follows:
- The decision on the grievance would be communicated to the aggrieved person within a timeframe to be stipulated during the preparation of the ESAP.
- There should be a single point of contact between the community and FRV for the Redressal of grievance.
- All grievances should be documented and indexed for future reference. The proceeding and actions against each of the grievance should be documented and should also carry this index number for easy traceability.
- If required the aggrieved community member can also be made a part of the Redressal process so he is able to place his point of view.
- The Grievance Redressal committee should meet at regular interval and discuss on the grievance and take necessary action.

Communication with Contractor Staff: During the construction phase there would be an influx of people into the project area. As these people could have cultural differences with the resident population there can be a potential of conflicts arising because of issues related to safety and privacy issues of the women in the surrounding villages, spread of various communicable diseases, nuisance caused by workers due to improper sanitation facilities, etc. It is thus a Community Interaction Brochure would be prepared specifically stating the 'Dos' and 'Don'ts' and requesting proper behavioural actions and discipline amenable with the local customs and traditions during their association with the project. The brochure would also be highlight the importance of any of nearby cultural place and need to maintain the sanctity and dignity of the place. This Community Interaction Brochure would be made available to all employees during their induction into the project and also when they report back to the project after leave or absence. A record of the induction or refresher on the community interaction would be maintained.

Responsibility: FRV would prepare all the information disclosure booklets as discussed above. They would also ensure circulation of the booklet among the community in the project affected villages.

FRV would also ensure that the system is made community friendly so that the people who have grievance are encouraged to come forward and register their grievance. It would also ensure that the grievance of the community is discussed and recorded. It would ensure that the issues are closed to the satisfaction of the community members.

During construction FRV and its contractors would ensure that each of the people working on the project is aware of the Do's and Don'ts of community interaction. FRV and their contractors would ensure that the record of the induction and refresher is maintained. All the resources required for the implementation of the different subcomponents of the plan would be provided by FRV and its contractors.

7.5.8 Road Safety and Traffic Management Plan

Scope and Purpose

The plan encompasses the addressal 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. Logistic for the solar plant may be transported from Chennai or Krishnapattanam port by road that yet to be confirmed.

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.
- 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.
- FRV and their 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 emphasised.

- 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.
- The Proponent 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

The project can be categorized as ***Category B*** as per IFC guidelines and based on this assessment is made 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.

Brief Assessment of Project:

- **Location of project site w.r.t ecologically sensitive area**: The project area is not located within any ecologically sensitive area. Three Reserve Forests are, Thumu Kunta RF located at about 1-2 km away, Pandi Kunta RF located at about 8.4 km away and Ishwaramala located at about 11.7 km away, are present in the site surrounding. Also Veligallu Reservoir is located within 8.75 km from the site. As precautionary measures fencing around the plant should have adequate height to protect the entering of wild animals into the park. It would also be expected that glare effect from the solar plant will not impact the avian species in the region as other plants are in operation phase and as such no evidence was reported.
- **Advantage of the proposed plant**: The 50 MW proposed plant is located within the existing solar park wherein land question and other facilities will be developed by APSPCL.
- **Source of Pollution**: The solar power project is based on clean technology and does not likely to cause any significant pollution. Further, the project will help to reduce GHG emissions.
- **Resettlement:** No resettlement and rehabilitation involved in the project.
- **Community Willingness**: 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 AP Solar Power Corporation Limited during land acquisition process. Hence, considering the overall factors and also as information retrieved from the community consultation Community are welcoming the project along with the rest of the development of the entire Solar Park project.
- **Project Benefit**: The produced electricity will be evacuated to the state electricity grid (GSS) and will help to cater the energy requirement
- **CSR plan**: The CSR plan focused on community development will be implemented by the FRV.
- **Livelihood Restoration Plan (LRP**) is suggested based on the assessments and outcomes of **Livelihood Impact Assessment (LIA)**. Issues, if raised, regarding the impact on Indigenous People also need to be addressed in this regard.

There is no adverse impact on the nature of habitat, any natural existing land resources and effect in the regular life of people. Most impacts are expected to occur during the construction phase which are considered to be of a temporary in nature. The main project impacts are associated with clearing of shrub vegetation, waste management and excavation and movement of soils. From this perspective, the project is expected to have a small "environmental footprint". Adequate provisions have been made for the environmental mitigation and monitoring of predicted impacts.

The project will have number of positive impacts which are:

- During the construction phase, local population often supply manpower for services such as those of drivers, vehicle vendors, contractors, watchmen etc.

- Natural drainage channels/ reservoirs in the study area should not be disturbed. To rule out future storm water problems, storm water channels are planned along the periphery of the project site.
- Water Resource will not be over exploited. During construction phase ground water will be used taking permission from competent authority. During operation phase water will be sourced from Veligallu reservoir with approval from Irrigation department.

Proper Grievance Redressal Mechanism (GRM) will have to be implemented by FRV to 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 adequate implementation of the mitigation measures identified in the ESMP.

Therefore, the solar power plant site will not degrade the quality of surrounding environment, while improving the socio-economic conditions of the surrounding area.

APPENDIX A: ANDHRA PRADESH SOLAR POLICY 2015

GOVERNMENT OF ANDHRA PRADESH
ABSTRACT

ENERGY, INFRASTRUCTURE & INVESTMENT DEPARTMENT - Development of Solar Power in Andhra Pradesh – Andhra Pradesh Solar Power Policy, 2015 – Orders – Issued.

ENERGY, INFRASTRUCTURE & INVESTMENT (PR.II) DEPARTMENT

G.O.MS.No. 8 Dated 12.02.2015
Read the following:-

1. G.O.Ms.No.39, Energy (Res) Deptt., dated 26.09.2012
2. G.O.Ms.No.44, Energy (Res) Deptt., dated 16.11.2012.
3. From the VC&MD, NREDCAP, Hyderabad Lr.No.NREDCAP / Solar Policy – 2014/2013-14, dated 25.09.2014.

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ORDER:

In order to promote Solar Power Projects, the Government of Andhra Pradesh have issued orders formulating Andhra Pradesh Solar Power Policy, 2012 vide references 1st and 2nd read above. Under the policy, 34.85 MW capacity solar power projects were only commissioned before 30th June, 2014 though it was envisaged to add 2000 MW capacity by the Group of Ministers constituted for the purpose of promotion of Renewable Energy. This policy is applicable up to the year 2017 and the incentives were applicable only for the projects commissioned up to 30th June, 2014. Further, due to bifurcation of the State, it is felt necessary to come out with a new comprehensive policy for promotion of solar power to meet the demand for power in an environmentally sustainable manner.

2. Government, after detailed discussions on the proposal vide reference 3rd cited, with various stake holders viz., APTRANSCO, APDISCOMS, NREDCAP Solar Power Developers & Solar Manufacturers Association hereby issue the Andhra Pradesh Power Policy, 2015 as mentioned below:

ANDHRA PRADESH SOLAR POWER POLICY - 2015

PREAMBLE

India is blessed with abundant sunshine and solar power is expected to play a critical role in meeting the energy needs of the country in the long run. Solar power projects can be setup in a much shorter timeframe when compared to conventional power projects and the cost of solar power has become more economical today. Solar power can also help meet energy requirements for both grid connected as well as off-grid applications such as solar powered agricultural pumpsets.

Andhra Pradesh is poised for rapid industrial growth driven by infrastructure investments and has also been selected by Ministry of Power as one of the pilot states for implementation of the 24X7 – Power for All (PFA) scheme. Solar energy can become an important source in meeting the growing power requirements of the State.

AP has large agriculture consumption constituting around 24% of the total energy consumption of the State. Solar power can also help shift the agriculture load and meet the power demand during the day time.

Contd…2

The State government is keen to tap the immense solar potential and promote this clean source of energy to meet the rising energy requirements of the State. The following factors make Andhra Pradesh an ideal location for setting up Solar Power Projects:

- Availability of about 300 sunny days in a year with solar insolation of more than 5 kWh/m²/day.
- Amongst the best performing power distributing companies in India (APEPDCL and APSPDCL).
- An efficient and strong evacuation infrastructure that can facilitate distributed generation.

The Government of Andhra Pradesh had earlier issued the "Andhra Pradesh Solar Power Policy – 2012" vide G.O.Ms.No.39 dated 26.09.2012 and G.O.Ms No.44 dated 16.11.2012 to promote solar power generation in the State. Accordingly, the incentives under the Solar Policy were available for Solar Power Projects commissioned before 30.06.2014.

To meet the twin objectives of energy security and clean energy considerations, the GoAP has felt it necessary to come out with a new policy for solar power. The policy aims to promote widespread usage of solar power and to meet the following objectives.

OBJECTIVES:

1 To target a minimum total solar power capacity addition of 5,000 MW in the next five years in the State with a view to meet the growing demand for power in an environmentally sustainable manner.

2 To develop solar park(s) with the necessary utility infrastructure facilities to encourage developers to set up solar power projects in the State.

3 To promote distributed generation that can help in avoiding upstream network cost and contribute towards loss reduction.

4 To deploy solar powered agricultural pumpsets and meet power requirements of farmers during day time.

5 To promote local manufacturing facilities which will Generate employment in the State.

1. Operative Period

This policy shall come into operation with effect from the date of issuance and shall remain applicable for a period of five (5) years and/ or shall remain in force till such time a new policy is issued.

Solar Power Projects (SPP) that are commissioned during the operative period shall be eligible for the incentives declared under this policy, for a period of ten (10) years from the date of commissioning - unless otherwise the period is specifically mentioned for any incentive.

Contd... 3

2. Eligible Developers

All registered companies, Government entities, partnership companies/ firms, individuals and all consumers of APDiscom(s) will be eligible for setting up of Solar Power Projects within the State for sale of electricity/captive use, in accordance with the Electricity Act-2003, as amended from time to time. The entity desiring to set up Solar Power Project shall intimate the Nodal Agency as per the para (5) of this policy.

3. Solar Power Projects

A. Sale of power to AP Discom(s)

The government will promote setting up of Solar Power Projects for sale of power to APDiscoms. It is envisaged that the Discoms would procure around 2,000 MW of solar power capacity in a phased manner within the next five (5) years. The Discoms would enter into long term PPA of 25 years with developers who are selected based on a competitive procurement process.

B. Third party sale / Captive use

The government will encourage solar power producers to set up Solar Power Projects for captive use within the State or third party sale within and outside the State of Andhra Pradesh. These projects will also qualify for Renewable Energy Certificates (RECs) subject to applicable regulations/ guidelines issued by the appropriate commission.

C. Solar Parks

The Govt. of A.P will develop Solar Parks with capacity additions of around 2,500 MW in the next five (5) years to promote Solar Power Projects development in clusters of 500-1000 hectares. The State Government, under this policy, will help facilitate in building up the necessary infrastructure like power evacuation, water requirements and internal roads.

Solar Park shall consist of various zones viz. Solar Power Projects, Manufacturing Zones, R & D and Training Centres. The State will extend all facilities and fiscal incentives provided by Central Government/ National Solar Mission to the manufacturers in Solar Parks.

Special Purpose Vehicle(s) (SPV's) will be established for development of infrastructure and management of Solar Park. The SPV will formulate Policy and Rules in respect of land allotment, sharing of development cost by the solar power producers and manufacturers. The SPV will develop the initial infrastructure from the funds allocated by GoI and GoAP, which will be subsequently recovered from the solar power producers whose projects are located in Solar Parks by levying development charges.

D. Solar Rooftop Projects – Gross/Net Metering

The Government will promote solar rooftop systems on public buildings, domestic, commercial and industrial establishments on gross and or net meter basis. The consumer(s) are free to choose either net or gross meter option for sale of power to Discom under this policy. The applicable tariff for either of the cases shall be equal to the average cost to serve of the Discom which will be determined by APERC every year. For example, the average cost to serve approved by APERC for FY 2013-14 is Rs 5.25 per unit. This facility shall be extended for a period of 25 years for Eligible Developers who set up solar rooftop projects within the Operating Period of this policy.

Contd…4

The metering facility will be extended for all Eligible Developers who intend to set-up solar photovoltaic plants at their premises. Eligible Developers who wish to avail the metering facility will have to apply through online mode to the Discoms – either on their websites and/or through designated mee seva / customer service centres. All approvals/clearances shall be disposed by the respective Discom within 14 days from the date of application

The projects of capacity upto 1000 KWp at a single location will be permitted.

Permission will be given to the group of persons/societies to set up Solar Power Projects and will be treated as collective generation for supply of power to the households of each society /group member. The DISCOMs will deduct the above energy from the consumed energy of individual service connections and balances (either excess or lower) can be billed on net metering basis. No Distribution losses and charges will be collected from the Group/Society/ individuals by the DISCOMs.

Eligible Developers are allowed to avail the relevant subsidies and incentives from MNRE under JNNSM scheme. The eligible subsidy for net metering systems may be processed through NREDCAP (Nodal agency) or Channel Partners of MNRE, GOI. The sanction and release of the subsidy will be as per the guidelines issued by MNRE from time to time.

The modalities for implementing the rooftop policy including metering, billing, settlement, payment(s) and technical aspects etc. shall be issued by APEPDCL within 30 days from the date of issue of this policy, which would be followed by all DISCOMS in the State.

E. Solar pumpsets

The State government in collaboration with the Central Govt/MNRE/MOP/Multilateral agencies will undertake measures to enable gradual replacement of conventional pumpsets to solar powered pumpsets through subsidy support. Nodal agency will facilitate with government agencies for availing subsidies, grants and/ or incentives on behalf of APDiscoms.

It is envisaged that 50,000 solar powered pumpsets will be operational in the State in the next five years without any additional financial burden on the farmers. The modalities of the scheme will be developed in consultation with all the stakeholders within 30 days from the date of issue of this policy.

4. Incentives from the State Government

To enable solar power capacity addition in the State, following incentives shall be provided for Eligible Developers for those projects setting-up during the operative period mentioned in the para one (1).

a) Transmission and Distribution charges for wheeling of power

Transmission and Distribution charges shall be exempted for wheeling of power generated from Solar Power Projects for only captive use/third party sale within the State.

b) Distribution Losses

Distribution losses shall be exempted only for Solar Power Projects injecting at 33 kV or below irrespective of voltage-level of the delivery point within the Discom.

Contd... 5

c) Energy Banking

Banking of 100% of energy shall be permitted for all Captive and Open Access/ Scheduled Consumers during all 12 months of the year. Banking charges shall be adjusted in kind @ 2% of the energy delivered at the point of drawal. The banking year shall be from April to March.

Drawals from banked energy shall not be permitted during five (5) month period from 1st April to 30th June and 1st February to 31st March of each financial year. In addition, drawls of banked energy during the Time of the Day (ToD) applicable during the peak hours, as specified in the respective Retail Supply Tariff Order, shall also not be permitted throughout the year. However, the provisions on banking pertaining to drawal restrictions shall be reviewed based on the power supply position in the State.

Energy injected into the grid from date of synchronization to Commercial Operation Date (COD) will be considered as deemed energy banking.

The unutilized banked energy shall be considered as deemed purchase by Discom(s) at the pooled power purchase cost as determined by the APERC for the applicable year. Energy settlement shall be done on monthly basis.

d) Open Access

Intra-state Open Access clearance for the whole tenure of the project or 25 years whichever is earlier will be granted as per the APERC Regulations amended from time to time. In absence of any response or intimation from the Nodal Agency to the generator within 21 days, then such application shall be considered to be deemed open access.

e) Electricity Duty

Electricity duty shall be exempted for captive consumption, sale to Discom(s) and third party sale provided the source of power is from Solar Power Projects setup within the State.

f) Cross Subsidy Surcharge

Cross subsidy surcharge shall be exempted for third party sale provided the source of power is from Solar Power Projects setup within the State for a period of five (5) years from the date of commissioning of the SPP.

g) Contract Demand

Scheduled Consumers shall avail reduction in Contract Demand for a period of five (5) years from the date of commissioning of the project. Scheduled consumers shall have the same meaning as defined in Balancing and Settlement Code regulations issued by APERC and amended from time to time. The demand credit shall be computed based on the average solar power consumption during hourly time block period(s). An illustration is shown below:

- Solar power consumption in a month (kVAh) = 1000
- Hourly time-blocks in a month (hours) = 24X30 = 720
- Applicable demand credit = 1000/720 = 1.38 (kW)

Contd . 6 .

h) Renewable Energy Certificate (REC)

All projects developed with the above incentives will be eligible for REC benefits subject to applicable regulations/orders of the appropriate commission. Deemed injection into the grid for in-house/co-located solar generation will also be eligible for REC benefits subject to applicable guidelines.

i) Grid Connectivity and Evacuation facility

The power generated from a Solar Power Project shall be injected at an appropriate voltage at the sub-station and/or interconnection point of the APTransco / Discom(s). The Eligible Developer shall bear the entire cost of construction of power evacuation facilities from the project upto the interconnection point and/or upto APTransco / Discom(s) substation.

The Eligible Developer shall abide by the orders, rules, regulations and terms and conditions as approved by the Commission from time to time for operation of Solar Power Projects, power evacuation, transmission and wheeling of energy. Solar Power Projects will be exempted from paying the Supervision charges to APTransco/Discom(s) towards the internal evacuation infrastructure within the project site and upto interconnection point.

APTransco /Discom(s) will dispose the proposals for the technical feasibility for evacuation within 14 days from the date of receipt of application. Any upstream system strengthening requirement shall be borne by APTransco/ Discom(s) on a priority basis.

j) Deemed Industry Status

Generation of electricity from Solar Power Projects shall be treated as eligible industry under the schemes administered by the Industries Department and incentives available to industrial units under such schemes shall be available to the solar power producers.

k) Deemed Public Private Partnership (PPP) Status

Deemed PPP status shall be provided for projects coming up under category (A) as per para (3) of this policy.

l) Non Agriculture Status

Deemed Non-Agricultural (NA) status for the land where Solar Power Projects will be accorded, on payment of applicable statutory fees.

m) Must run status

Injection from Solar Power Projects shall be considered to be deemed scheduled.

Contd....7

n) Land

It is the responsibility of the project developer to acquire the land required for the project. However, in case of land owned by Revenue Department, the land allotment shall be done as per the prevailing government policy.

o) Pollution Clearance

Solar PV power projects will be exempted from obtaining any NOC/Consent for establishment under pollution control laws from AP Pollution Control Board.

5. Nodal Agency

New and Renewable Energy Development Corporation of A.P. Ltd (NREDCAP) shall act as a Nodal Agency under this policy and as decided by the government from time to time.

The Nodal Agency and/or designated offices by the Nodal Agency shall be responsible for the following activities:

a) Facilitate in obtaining revenue land – wherever is required.

b) Facilitate in getting power evacuation and/ or Open Access as per the regulation issued by APERC and amended from time to time.

c) Facilitate water allocation from concerned departments.

d) Facilitate and process of proposals for availing subsidy for solar rooftop systems as per MNRE guidelines.

e) Co-ordinate with MNRE/SECI/APTransco/Discom(s) and any other Central/State agencies in obtaining necessary clearances, approvals, grants and subsidies.

An online system will be established by the Nodal Agency for acceptance of applications and for providing status updates. The developers will be given a login access for tracking the status updates. All approvals/clearances shall be disposed within 30 days from the date of registration.

The modalities for operating the single window clearance mechanism shall be developed within 30 days from the date of issue of this policy.

6. Administrative approval

The applications received from the Eligible Developers as per the provisions of this policy should be in the prescribed format along with a registration fee of Rs.1000 for capacities upto 5 KWp; Rs. 5,000 for capacities above 5 KWp to 100 KWp; Rs,10,000 for capacities above 100 KWp to 1000KWp and Rs.10,000 per MW for capacities more than 1000 KWp.

In addition, a facilitation fees of Rs 25 per kW shall be applicable for the Eligible Developer who seeks assistance from the Nodal Agency for obtaining single window clearance support as per the above para.

Contd . 8

7 Migration of Solar projects registered under A.P. Solar Power Policy 2012

A onetime opportunity will be extended to all Solar Power Project Developers other than those who have already signed PPAs and registered under AP Solar Power Policy 2012 and not commissioned before 30th June, 2014 to migrate to the new Policy. Such developers shall register with the nodal agency within two months from the date of notification of the new policy.

8 Project Monitoring Committee

A "High Level Committee" constituted with the following members will monitor the progress of implementation of the Solar Power Projects cleared under the policy:

1. Secretary, Energy Department
2. Chairman and Managing Director, APTransco
3. CMD of APDiscom(s)
4. VC & MD, NREDCAP(Member-Convener)
5. Representative of FAPCCI/CII
6. Representatives (2) of solar power developers

If any difficulty arises in giving effect to this policy, the High Level Committee is authorized to issue clarification as well as interpretation to such provisions, as may appear to be necessary for removing the difficultly either on its own motion or after hearing those parties who have represented.

9 Solar Manufacturing

The government intends to promote solar manufacturing facility that can help develop the solar eco-system and support job creation potential in the State. The following incentives shall be applicable for new manufacturing facilities and equipment's, ancillaries related to Solar Power Projects only.

- Priority allotment of government land in solar parks on long term lease basis
- Exemption from electricity duty for a period of ten (10) years

10 Mid-Term Review

State Govt. may undertake a mid-term review of this policy after a period of two years or as and when need arises in view of any technological breakthrough or to remove any inconsistency with Electricity Act 2003, rules and regulations made there under or any Govt. of India policy.

Contd .. . 9.

11 Power to remove difficulties

If any difficulty arises in giving effect to this policy, energy department is authorized to issue clarification as well as interpretation to such provisions, as may appear to be necessary for removing the difficulty either on its own motion or after hearing those parties who have represented for change in any provision.

(BY ORDER AND IN THE NAME OF THE GOVERNOR OF ANDHRA PRADESH)

AJAY JAIN
SECRETARY TO GOVERNMENT

To
The Vice Chairman & Managing Director, NREDCAP, Hyderabad.
The Chairman & Managing Director, APTRANSCO, Hyderabad.
The Managing Director, APGENCO, Hyderabad.
The Secretary, APERC.
The CMDs, of APSPDCL/ APEPDCL.
All Collectors & District Magistrates.
The Principal Secretary to Government, EFS&T Dept.,
The Principal Secretary to Government, Revenue Dept.,
The Principal Secretary to Govt., Finance Dept.,

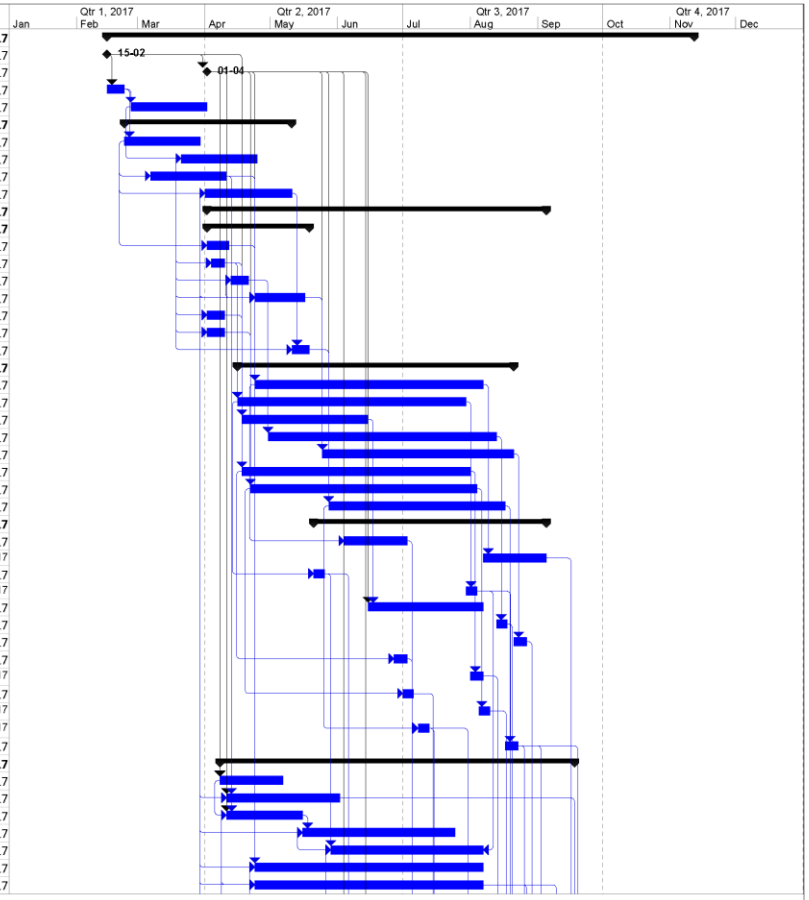
Copy to:
The Secretary to Hon'ble C.M.
The P.S. to Hon'ble Dy. Chief Minister for Revenue, Stamps & Registrations.
The P.S. to Hon'ble Minister for Finance, Planning, Commercial Taxes & Legislature Affairs.
The P.S. to Secretary, Energy, I&I
SF/SC.

// Forwarded By Order //

SECTION OFFICER

APPENDIX B: ANANTPUR SOLAR PARK_ FRV L2 SCHEDULE

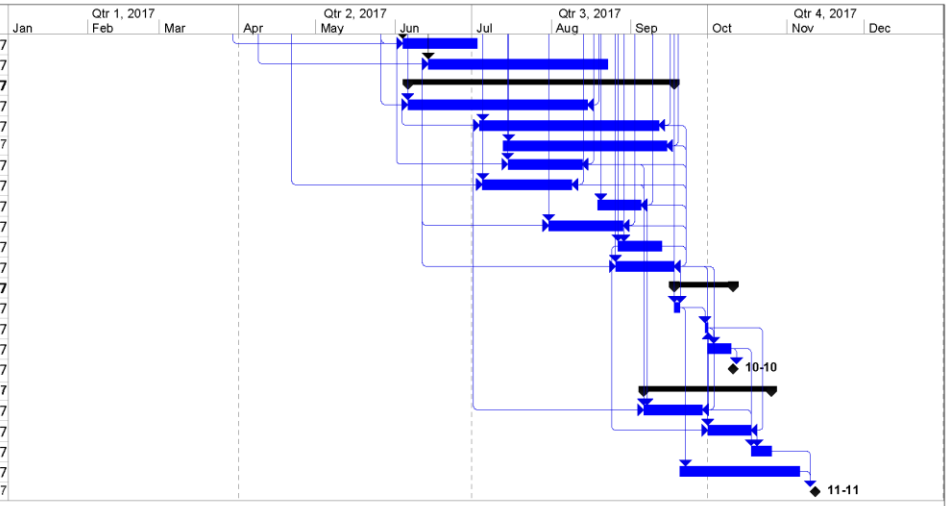
ID	Task Name	Duration	Start	Finish
1	**27122017_Anantpur Solar Park _136Mwp_FRV_L2**	**231 days**	**15 February 2017**	**11 November 2017**
2	Limited Notice to Proceed	0 days	15 February 2017	15 February 2017
3	Receiving of NTP	0 days	01 April 2017	01 April 2017
4	Site Boundaries With Coordinates	7 days	15 February 2017	22 February 2017
5	Geotech Survey	30 days	26 February 2017	01 April 2017
6	**Engineering**	**66 days**	**23 February 2017**	**10 May 2017**
7	Priority 1 Drawing Submission & Approvals	30 days	23 February 2017	29 March 2017
8	Priority 2 Drawing Submission & Approvals	30 days	21 March 2017	24 April 2017
9	Authority Approvals and Permitting	30 days	07 March 2017	10 April 2017
10	GFC Releases	35 days	01 April 2017	10 May 2017
11	**Procurement**	**134 days**	**02 April 2017**	**04 September 2017**
12	**Ordering**	**41 days**	**02 April 2017**	**18 May 2017**
13	PV Modules	9 days	02 April 2017	11 April 2017
14	MMS	5 days	04 April 2017	09 April 2017
15	HT Panel	7 days	13 April 2017	20 April 2017
16	SCADA	20 days	24 April 2017	16 May 2017
17	Inverter Station	7 days	02 April 2017	09 April 2017
18	SCB	7 days	02 April 2017	09 April 2017
19	Earthing material , Cables & Accessories	7 days	11 May 2017	18 May 2017
20	**Manufacturing Clearance,Inspection and MDCC**	**109 days**	**16 April 2017**	**20 August 2017**
21	PV Modules	90 days	24 April 2017	06 August 2017
22	MMS	90 days	16 April 2017	29 July 2017
23	Tracker	50 days	18 April 2017	14 June 2017
24	HT Panel	90 days	30 April 2017	12 August 2017
25	SCADA	75 days	25 May 2017	20 August 2017
26	Inverter Station	90 days	18 April 2017	31 July 2017
27	SCB	90 days	22 April 2017	03 August 2017
28	Earthing material , Cables & Accessories	70 days	28 May 2017	16 August 2017
29	**Transportaion**	**92 days**	**21 May 2017**	**04 September 2017**
30	PV Modules- First Lot	25 days	04 June 2017	02 July 2017
31	PV Module final Lot	25 days	07 August 2017	04 September 2017
32	MMS - First Lot	5 days	21 May 2017	25 May 2017
33	MMS - Final Lot	5 days	30 July 2017	03 August 2017
34	Tracker - Single Lot	45 days	15 June 2017	06 August 2017
35	HT Panel	5 days	13 August 2017	17 August 2017
36	Scada & Miscellaneous Items	5 days	21 August 2017	26 August 2017
37	Inverter Station - First Lot	5 days	27 June 2017	02 July 2017
38	Inverter Station - Final Lot	5 days	01 August 2017	06 August 2017
39	String Combiner Box first Lot	5 days	01 July 2017	05 July 2017
40	String Combiner Box Last Lot	5 days	05 August 2017	09 August 2017
41	Earthing material , Cables & Accessories	5 days	08 July 2017	12 July 2017
42	Earthing material , Cables & Accessories	5 days	17 August 2017	22 August 2017
43	**Construction**	**140 days**	**08 April 2017**	**17 September 2017**
44	Tempory Arrangements	25 days	08 April 2017	06 May 2017
45	Perimeter Construction	45 days	11 April 2017	01 June 2017
46	Land Preparation	30 days	11 April 2017	15 May 2017
47	MMS Augering	60 days	16 May 2017	24 July 2017
48	MMS Foundation	60 days	29 May 2017	06 August 2017
49	Inverter Station	90 days	24 April 2017	06 August 2017
50	MCR	90 days	24 April 2017	06 August 2017



Project: 27122016_ FRV L2 Schedule R0
Date: 27 December 2016

Task
Split
Milestone
Summary
Project Summary
External Tasks
External Milestone
Inactive Milestone
Inactive Summary
Manual Task
Duration-only
Manual Summary Rollup
Manual Summary
Start-only
Finish-only
External Tasks
External Milestone
Progress
Deadline

ID	Task Name	Duration	Start	Finish
51	SCB	25 days	04 June 2017	02 July 2017
52	Cable trench	60 days	14 June 2017	22 August 2017
53	**PV Plant Installations**	**89 days**	**06 June 2017**	**17 September 2017**
54	Super structure Installation	60 days	06 June 2017	14 August 2017
55	PV Module Installation	60 days	04 July 2017	11 September 2017
56	Earthing Installation	55 days	13 July 2017	14 September 2017
57	SCB Installation	25 days	15 July 2017	12 August 2017
58	Inverter Station	30 days	05 July 2017	08 August 2017
59	HT Panel	15 days	19 August 2017	04 September 2017
60	cable laying	25 days	31 July 2017	28 August 2017
61	SCADA Installation	15 days	27 August 2017	12 September 2017
62	Cable Termination	20 days	26 August 2017	17 September 2017
63	**Commissioning & Testing**	**20 days**	**18 September 2017**	**10 October 2017**
64	Electro-Mechanical Verification and checks	2 days	18 September 2017	19 September 2017
65	Grid Availability	1 day	30 September 2017	30 September 2017
66	Grid Syncronization and Stablization	8 days	01 October 2017	09 October 2017
67	Commercial Operation date	0 days	10 October 2017	10 October 2017
68	**Initial Tests**	**43 days**	**06 September 2017**	**25 October 2017**
69	Testing of Equipments	20 days	06 September 2017	28 September 2017
70	Testing of SCADA	15 days	01 October 2017	17 October 2017
71	PR Testing	7 days	18 October 2017	25 October 2017
72	As built Document Acceptance & Site Demobilization	40 days	20 September 2017	05 November 2017
73	TOC	0 days	11 November 2017	11 November 2017



Project: 27122016_ FRV L2 Schedule R0
Date: 27 December 2016

Task	Project Summary	Inactive Summary	Manual Summary	External Milestone
Split	External Tasks	Manual Task	Start-only	Progress
Milestone	External Milestone	Duration-only	Finish-only	Deadline
Summary	Inactive Milestone	Manual Summary Rollup	External Tasks	

APPENDIX C: EXEMPTION OF CONSENT TO ESTABLISH AND CONSENT TO OPERATE FOR WHITE CATEGORY INDUSTRY (SAMPLE PAGES)

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;

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'Parivesh Bhawan', East Arjun Nagar, Delhi - 110032
दूरभाष/Tel : 43102030, फैक्स/Fax : 22305792, 22307078, 22307079, 22301932, 22301948
ई-मेल/e-mail : cpcb@nic.in वेबसाईट/Website : www.cpcb.nic.in

WHEREAS , based on the series of consultations with SPCBs, different Government / Non-government Institutions including industries and MoEFCC , the following criteria on 'Range of Pollution Index 'for the purpose of categorization of industrial sectors has been finalized:

- 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

WHEREAS, based on the revised criteria, the 'Final Report on Revised Categorization of Industrial Sectors under Red/Orange/Green/White' has been evolved. The 'Categorization' is based on the relative pollution potential of the industrial sectors and grouping of the industrial sectors based on the use of raw materials, manufacturing process adopted and pollutants likely to be generated;

WHEREAS, based on relative Pollution Index, the number of industries in various categories are as under :

i. The Red category of industrial sectors: 60
ii. The Orange category of industrial sectors: 83
iii. The Green category of industrial sectors: 63 and
iv. The Newly introduced White category: 36

WHEREAS, there shall be no necessity of obtaining the Consent to Operate" for White category of industries and an intimation to concerned SPCB / PCC shall suffice;

WHEREAS, the purpose of categorization is to ensure that the industry is established in a manner consistent with the environmental objectives and to prompt industrial sectors to adopt cleaner technologies, ultimately resulting in generation of no or minimum pollutants.

WHEREAS the new categorization system shall also facilitate in self-assessment by industries;

Now, therefore, in exercise of the powers delegated to the Chairman, CPCB under Section 18(1)(b) of the Water (Prevention & Control of Pollution) Act, 1974 and Section 18(1)(b) of the Air (Prevention & Control of Pollution), Act , 1981 the earlier Directions issued in June 2012 in the context of categorisation of industries as Red, Orange & Green are withdrawn with immediate effect and following **'Directions'** are hereby issued for compliance by all SPCBs and PCCs :

APPENDIX D: 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 6, 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.

s) rest and recreation rooms and health facilities, where not otherwise available in the community.

In workers' sleeping rooms the floor area should not be less than 7.5 square metres in rooms accommodating two persons; 11.5 square metres in rooms accommodating three persons; or 14.5 square metres in rooms accommodating four persons. If a room accommodates more than four persons, the floor area should be at least 3.6 square metres per person. Rooms should indicate the permitted number of occupants.

As far as practicable, sleeping rooms should be arranged so that shifts are separated and that no workers working during the day share a room with workers on night shifts.

Sanitation facilities

➡ Adequate sanitary facilities should include a minimum of one toilet, one wash basin and one tub or shower for every six persons. They should be provided at a convenient location which prevents nuisances. Sanitary facilities provided should meet minimum standards of health and hygiene. They should also provide reasonable standards of comfort, including hot and cold fresh running water. There should be separate sanitary facilities provided for men and for women. Sanitary facilities should have ventilation to the open air, independently of any other part of the accommodation. Soap and hygienic paper should be adequately stocked.

Health and safety

➡ As far as possible, floors walls, ceilings and equipment should be constructed to minimize health risks.

The accommodations should be kept free of rats, mice, insects and vermin. In areas where mosquitoes are prevalent, workers should be provided netting.

Measures should be taken to prevent the spread of diseases. Separate facilities should be provided for sick workers to prevent the spread of transmissible diseases among the occupants. Fire safety measures should be taken, including installing and maintaining fire equipment (alarms, extinguishers, etc.). Workers should be trained in fire procedures. Bedding should not contain flammable materials. Radiators and other heating apparatus should be placed so as to avoid risk of fire, and shielded where necessary to prevent discomfort to occupants.

Safety exits should be clearly marked. Adequate means of escape should be provided and properly maintained.

Provisions should be made for workers' physical safety and well-being, and protection of their belongings. Measures should be reasonable and not unduly restrict workers' freedom of movement. Workers should be allowed visits for social relations or business, including trade union business.[12]

Inspection of premises

➡ Premises should be inspected frequently to ensure that the accommodation is clean, decently habitable and maintained in a good state of repair. The results of each such inspection should be recorded and be available for review.

Vacating the premises upon termination of employment

➡ When a worker's contract of employment is terminated, the worker should be entitled to a reasonable period of time to vacate the premises, in accordance with national law and custom.[13]

Consultation

➡ In the design of housing for workers, "every effort should be made to consult those bodies representative of future occupants best able to advise on the most suitable means of meeting their housing and environmental needs."[14]

References

➡ Workers' Housing Recommendation, 1961 (No. 115); full text available at: http://www.ilo.org/ilolex/english/recdisp1.htm.

➡ For comparison, you may also wish to consult the Maritime Labour Convention (MLC), 2006, Title 3, which gives detailed guidance for workers' accommodation for seafarers; full text available at: http://www.ilo.org/ilolex/cgi-lex/convde.pl?C186.

[12] R. 115, Suggestions Concerning Methods of Application, Part IV, paragraph 17.
[13] R. 115, General Principles, Part IV, paragraphs 12(3b) and Suggestions Concerning Methods of Application, Part IV, paragraph 15.
[14] R. 115, Suggestions Concerning Methods of Application, Part IX, paragraph 42.

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APPENDIX E: 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		Sacred 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 F: SUMMARY OF STAKEHOLDERS CONSULTATION

Stakeholder Group	Village/ Department	Name	Methodology	Findings
Project Proponent	Fotowatio Renewable Ventures (FRV)	Mr. Sushi Vohra, Vice President, Fotowatio Power India Pvt. Ltd. Mr. Sisir Kumar Mund, Head of Development India & Asia, Fotowatio Power India Pvt. Ltd.	One to one Interaction	• 50 MW Solar Power Project own by FRV through proper bid process. • Approximately 250 Acres of Land is being allocated to FRV on 25 Years Lease by APSPCL, in the project area village- Thumu Kunta exclusively for the purpose of 50 MW Project awarded to FRV • The land parcel that is being allocated to them is clearly demarcated under the land that has been identified and taken by APSPCL prior to handing over to them. • The entire area allocated for the 50 MW Project is demarcated in Plot No. P2. As informed by them the each plot is dedicated for 50 MW generation. • As per GoI notification for White Projects through CPCB no CTE & CTO is required. Hence no such requirement is essential for the 50 MW Solar Power Project. In line those are also applicable for the SPCBs and for those, including projects, who are coming under their jurisdiction. • Labours will be given all sorts safety gadget during the construction and operation stage.
Nodal Agency	APSPCL	Mr. Shiv Shankar Naidu, Assistant Divisional Engineer	One to one interaction	• APSPCL is sole authority and responsible agency for all land related matter for the entire 1500 MW Ultra Mega Solar Park • Private and Assigned Lands are being procured through competent authority and at a negotiated compensation amount. • APSPCL is responsible for all the supporting facilities internal roads, lighting, water, police station, fire station etc. • Water scarcity in the Project area will be complied by water drawn from Veligallu Dam Reservoir about 7 Km from the area.

Stakeholder Group	Village/ Department	Name	Methodology	Findings
Community	Thumu Kunta	Venkatadri Naidu Bhaskara Reddy Ankalu Sivani Jaya Meelathma	Group Discussion	• Major livelihood in this area is agriculture. • The main crops are Paddy, Ground Nut and Bengal Gram etc. • There are also Livestock Farming. • Rain-fed and a few Irrigated agriculture pattern both are practiced in project area. • The main source for Irrigation in agriculture bore well. • Female literacy rate is lower than male literacy rate in all the study area villages. • Centrally located above ground tank is the main source of drinking water • Ground water depth is more than 60 mtrs. • Minimal Health facility is available within the village. Nearest better Health Care Facilities are far enough. • Hypertension, Asthma and Diabetes are the general diseases in the area. • Routine immunization programme is conducted. • The community is aware of the upcoming 50 MW Solar Power Project and is expecting betterment in their livelihood with the initiation of the same.
Community	Prakash Nagar Colony, Thumu Kunta	Venu Gopal Naik Chandra Naik	Group Discussion	• People from the area are in gradual transition from there traditional livelihood resources and opting for other avenues like service sector etc. • Many of the younger generation from the community are opting for higher education and moving in bigger cities for better livelihood options. • The people from Prakash Nagar has general aspirations of development in the locality with the upcoming Solar Power Project.
Assignee of Assigned Land from ST Community	Thumu Kunta	Bodagutta Anjeneyulu (Narasimhulu)	Face to face	• He has 6 dependants in his family. His wife, one daughter (4 Years old), one son (7 years old) and parents. • By profession he is a Farmer.

Stakeholder Group	Village/ Department	Name	Methodology	Findings
				• After transferring the 2.79 Acres of Assigned Land at Thumu Kunta he has now 7.1 Acres of Lands remaining with him. 4.21 Acres land in his own ownership and 2.89 Acres in his Father's name. • He will utilize the compensation amount for installing bore well in his cultivation land and will buy some equipments for upgradation in cultivation. He will save the rest of the money. • It was informed by him that he doesn't know any other ST community person, who has transferred land for the Solar Power Project.
Government Official	Galiveedu Mandal Office	Ms. P. Bhavani, Mandal Revenue Officer		• The development of the Solar Park in the area may add substatntially in the overall development of the area. • The enrite Mandal has been declaed drought prone in 2016. Hence, the govt. intiative in developing solar park is utilisation of resources rightly.
School Authority/ Staff	Thumu Kunta	Teaching Staff Primary School - G. Vankata Ramana, K. Haseena Begum	Group Discussion	• There are three elementary and one upper primary school in the village • For higher education pupils have to travel at least 8 – 10 Kms at Galiveedu Mandal town. • Female literacy rate is much lower than male literacy rate in all the study area villages. • All the schools have separate toilet arrangements for boys and girls.
Panchayat Members	Thumu Kunta	S. Veera Bhadrappa Naidu (Sarpanch)	One to one interaction	• It was informed by the Sarpanch that they are aware of the 50 MW Solar Power project to be started in Solar Park area. • The local people have aspirations from the upcoming Solar Power Project. • The sanitation scenario in the village needs upgradation with all the households have own sanitary toilets.

APPENDIX G: STUDY AREA POPULATION DISTRIBUTION AND GENDER RATIO

Study Area	Total Population	Male	Female	gender Ratio
State- Andhra Pradesh	84580777	42442146	42138631	993
District- YSR Kadapa	2882469	1451777	1430692	985
Tehsil- Galiveedu	50833	25557	25276	989
Thumu Kunta Village	2699	1382	1317	953

Source: Census, 2011

APPENDIX H: STUDY AREA VILLAGE SCHEDULED CASTE & SCHEDULED TRIBE POPULATION

Study Area	Scheduled Caste Percentage	Scheduled Tribe Percentage
State- Andhra Pradesh	16.41	7.00
District- YSR Kadapa	16.16	2.63
Tehsil- Galiveedu	8.45	4.98
Thumu Kunta Village	4.15	3.00

Source: Census, 2011

APPENDIX I: LITERACY SCENARIO OF STUDY AREA VILLAGE

Study Area	Literate Population (%)	Male Literate (%)	Female Literate (%)
State- Andhra Pradesh	67.02	74.88	59.15
District- YSR Kadapa	67.30	77.78	56.77
Tehsil- Galiveedu	59.48	72.34	46.63
Thumu Kunta Village	51.37	64.29	37.82

Source: Census, 2011

APPENDIX J: WORKFORCE PARTICIPATION RATE IN STUDY AREA VILLAGE

Study Area	% Working Population	% Cultivators	% Agricultural Labourers	% Household Workers	% Other Sector Workers
State- Andhra Pradesh	46.61	11.64	43.04	3.65	36.84
District- YSR Kadapa	45.81	18.45	41.08	4.23	36.24
Mandal- Galiveedu	58.85	31.60	48.61	2.15	17.63
Thumu Kunta Village	60.58	27.34	61.71	0.37	10.58

Source: Census, 2011

Female Work Force Participation Rate

Study Area	Male working population%	Female Working Population %
State- Andhra Pradesh	56.98	36.16
District- YSR Kadapa	56.75	34.70
Tehsil- Galiveedu	63.97	53.67
Thumu Kunta Village	89.11	74.11

Source: Report on District Level Estimates for the State of Andhra Pradesh, 2015-16 & Census, 2011

APPENDIX K: IFC & FMO COMMENTS & ARCADIS RESPONSE FOR PLOT 2, THUMU KUNTA VILLAGE

Chapter	Subject	IFC Comments	FMO Comments	Response from Arcadis
			The ESIA confirms that PS1-6 have been triggered. PS7 is not (Indigenous Peoples). Nor is PS 8 although a Chance Find procedure is needed.	
Executive Summary	PS 7	There is a hamlet Prakash Nagar located close to Plot P2 on east of the plot where tribal lands are located and were avoided during acquisition. This aspect needs to be analysed from PS 5 and 7 perspective.	PS 7 is not triggered according to the ESIA. Again, land records must confirm this and this is not currently available. I had originally thought that 23% of the local village was Scheduled Tribe but it looks like its 4% Scheduled Caste and 3% Scheduled Tribe. In this case again, I think PS 7 may not be triggered but we need to ensure that the client does regular, participatory and inclusive engagement and CSR activities with this mixed community (and not just the Panchayat). We need land records to confirm and we need to ensure a proper consultation / stakeholder process. We could do DD under the assumption that PS7 is not triggered. If DD reveals otherwise, then we should have the option to step out in case our process does not fit the timeline.	Mentioned about Prakash Nagar, which is within Thumu Kunta village, is made in the Socio-Economic Baseline Section (Section No. 4.5.2) As information provided by FRV around 2.79 acres of Assigned Land bearing survey number 1108 -2 were taken from a ST Community member for Plot No. P2 in Thumu Kunta Village. Hence, PS 7 seems to be applicable.
Section No. 1.2 Project Location	TL Alignment	What is the TL alignment between Plot P2 to PSS (0.5km) and PSS to GSS (8km) - please collect TL alignment maps from APSPCL/FRV and discuss	T-Line: 250ha will be leased to the project – does this include the land take (minimal) for the t-line/laydown areas etc.? T-Lines will be 0.5 km from the project site to the pooling station and then 8 km from the	General criteria for TL alignment has been addressed. Details of TL alignment are not available. FRV will provide details about TL Lines.

Chapter	Subject	IFC Comments	FMO Comments	Response from Arcadis
		the E&S impacts including PS 5, 6 and 7 impacts due to TL, if any	pooling station to the grid pooling station. My understanding is the client is responsible for the 0.5 km while the gov't is responsible for the 8 km. Will appropriate compensation be provided for those families whose crops/fields are in the way of the t-line? Do we have some influence on this process as an associated facility? This could be a DD item.	
Section No. 1.2, Table 1.1	Cleaning Methods of Solar Panels with regard to Water consumption	Please discuss the solar panel cleaning methods to be used during operation with FRV - water consumption in the project is a critical parameter in a drought prone area and hence its assessment must be complete. Present data on water required in cum/MW/month or year and available water. What will be the cumulative impact if the entire 1500MW project enters operational phase?		It is mentioned in Section No 2.6.2 that during operation water will be required for cleaning of solar panels and also for domestic/municipal purposes for the operation staff. As informed during field visit, APSPCL will provide water for the project from the Veligallu reservoir located closely to the site during operation phase. It is anticipated that State Irrigation Department after considering the requirement of water for both irrigation and fisheries purposes will give permission to APSPCL for sourcing water from Veligallu Reservoir during operation phase.
Section No. 1.3, Table 1.2	Permission for utilization of surface water from the reservoir	Did you speak to irrigation department and sought their opinion about the Project and its water requirement - whether they will be able to support the project needs through its life? also see FMO comments on the risks and impacts on local community due to water usage and livelihood of fisherman dependent on Veligallu reservoir		Refer Sections 4.4.2 and 4.4.18, Arcadis team was consulted with Asst. Executive Engineer of Veligallu Reservoir project regarding detailed of this reservoir and its use. As information collated, the dam has been constructed in 2008 on Papagni River and water remains in the reservoir throughout the year (perianal source of water). The catchment area of the reservoir holds mainly Galiveedu and Veligallu villages in Galiveedu Mandal of Kadapa district. Full and dead storage capacity of the reservoir are 4.64 TMC and

Chapter	Subject	IFC Comments	FMO Comments	Response from Arcadis
				0.93 TMC, respectively. Total catchment area of the reservoir is 12.729 sq. km. Currently the reservoir water is used for irrigation purposes. Regarding water usage during operation of the project, APSPCL will provide water for the project from the Veligallu reservoir. It is anticipated that State Irrigation Department after considering the requirement of water for both irrigation and fisheries purposes will give permission to APSPCL for sourcing of water from Veligallu Reservoir during operation phase.
Section No. 2, Table 2. 1	Procurement of PV Module	From where will the PV module, mounting system and inverters will be procured - will there be supply chain issues under PS 2?		PV module & Inverter will be procured from China and Mounting system will be procured from India. If supply chain issues under PS2 is triggered, FRV through its EPC contractor will monitor its primary supply chain in order to identify any significant changes and if new risks or incidents of child and/or forced labour are identified, FRV/ EPC contractor will take appropriate steps to remedy them for complying with this Performance Standard.
Section No. 2.1	Usage of Roads	Discuss with FRV and APSPCL regarding the usage of road - we understand a road will be constructed through the project area which will be used for access to all the plots and tender has been issued for constructing this road by APSPCL - present the true status		APSPCL will provide the details
Figure 2-1	Source of Maps	For all the maps presented in the ESIA, provide the source details with date/year of the source map - like here forest		Source of all Maps has been given in all Maps in the report

Chapter	Subject	IFC Comments	FMO Comments	Response from Arcadis
		details must have been gathered from Forest Dept.		
Section No. 2-2	TL Alignments	As stated earlier, discuss the TL alignment and its E&S impacts		General criteria for TL alignment has been addressed. Details of TL alignment are not available. FRV will provide details about TL Lines.
Section No. 2-2	0.3 TMC Water will be withdrawn from the reservoir of the Solar Park	Is this data related to water consumption per year for the entire 1500MW during operation phase - clarify? As stated earlier, whether this consumption is agreeable to irrigation deptt., will it have E&S impacts on the local community		Yes, this data is related to water consumption per year for the entire solar park. Regarding water usage during operation of the project, APSPCL will provide water for the project from the Veligallu reservoir. It is anticipated that State Irrigation Department after considering the requirement of water for both irrigation and fisheries purposes will give permission to APSPCL for sourcing of water from Veligallu Reservoir during operation phase.
Section No. 2-6-1	Land for TL Line	This is quite prescriptive - discuss with FRV/APSPCL on the plans for access road and TL alignment and present the details here. Based on their plans, discuss the E&S impacts of the same.		The plan for TL Line and Road RoW is yet to be finalised. As mentioned in Section 6.3.5 APSPCL should minimise use of agricultural land and avoid human habitation while planning for TL and Road RoW.
Section No. 2-6-1	RoW	These statements are ambiguous and conveys that E&S impact could be significant if not planned well - close this ambiguity by analysing the actual plans		
Section No. 2-6-2	Usage of Water	See our earlier comments on water usage - impact on local community; livelihood of fisherman at reservoir; irrigation deptt views; water availability for the entire 1500MW project		Already addressed in our earlier response

Chapter	Subject	IFC Comments	FMO Comments	Response from Arcadis
Table 2-3	Water Requirement during Construction and Operation Phase	Source of this data needs to be presented - is this extracted from Technical Reports of FRV??		Data has been produced in consultation with FRV.
Section No. 2-6-3	Manpower Requirement	Provide the manpower requirement during operational phase with break-up		Manpower requirement details with break ups for both Construction and Operation Phase has been provided in Manpower Requirement in Section No. 2-6-3 as per information provided by FRV.
Section No. 2-6-7	Organisational Structure	Please discuss with FRV - we understand services of EPC contractor and Clients Engineer are going to be procured for construction and operational phases. This is very critical to assess if the PS 1 requirement of organisational capacity and competency is available.	There is no organizational chart for the project and no indication how E&S will be managed at site with the exception that they suggest through the regional office.	Project Specific Organisational Structure has been included in Section No. 2-6-7.
Section No. 2-6-8	Implementation Schedule of the Project	Need more information under this section and collect this from FRV/APSPCL - construction start date; end date for FRV projects; O&M start date; Internal access road completion date; TL construction dates; PSS and Main SS dates - all these dates are important to see if critical infrastructure will be ready before FRV project is launched Also discuss under separate section, the roles and responsibility of APSPCL towards solar park construction, O&M including: LA process, what all infra facilities will be created and	CSR is a legal requirement in India. One of the key CSR activities is to provide employment – but this will be limited to unskilled work for locals. How many will actually benefit from this and what control does the company have on this process if it will be outsourced to APSCL (as is stated in the ESIA). I would also like to understand better how the CSR component works for the developer vs. the project proponent. It's a bit confusing to me in the ESIA.	Detail information has been given in Table No. 2-4 of Section 2-6-8 with referral annexure in Appendix B. CSR Details, as available till date, has been detailed in Section No. 4-5-20 and other pertinent parts of different chapters

Chapter	Subject	IFC Comments	FMO Comments	Response from Arcadis
		provided to individual plant operators and when these infra will be made available etc. Also present the details about APSPCL view on CSR activities of plant operators; its own CSR plans; if they are willing to allow FRV to implement mitigation measures under PS 5 and 7, if need arises.		
Table 3-1:	Applicable Environmental, Health, Safety and Social Regulations	Besides, IFC PS 5 and 7, what are the implications of tribal regulations such as The ST and other forest dwellers (recognition of forest rights) Act, 2006?		Since the project area is not within the Forest Land and as informed till date no scheduled tribe land has been acquired or affected the '*Scheduled Tribe and Other Traditional Forest Dwellers Acts (Recognition of Forest Rights) Act, 2006'* is not involved. Though other pertinent law on scheduled area has already been given.
Table 3-2	Applicability of PS 5	PS 5 is applicable on the project due to economic displacement perspective. Hence the entire aspect needs to be discussed in detail here as well under socio economic impact section.	Land acquisition and compensation details have not been provided to the consultant and as such conclusions on land acquisition remain doubtful. It is said no tribal lands have been acquired. Furthermore, there are no details on the distribution of assigned/unassigned/private lands were acquired in this plot and how many people will have livelihood impacts because of the land acquisition (how many PAPs). The consultation process indicates that some families (already with very little land) have been left landless. We also do not know if there are any sharecroppers in the area who are working on the land even if they were not "assigned". Were they compensated? We know nothing	As informed by FRV around 224 Acres of the total lands in Plot No. P2 is Govt. Land, around 5 Acres are Private Lands and around 17 Acres are assigned lands. It has been referred in Section No. 2.6.1. As mentioned earlier, 2.79 Acres of lands from the total assigned lands are from one single member of ST community (under Survey No. 1108-2). As observed during visit the land are dry and there is no cultivation action activity within the area of Plot No. 2 at Thumu Kunta village. But, since lands were acquired chances of livelihood impact can't be ruled out. In such circumstances PS 5 is applicable.

Chapter	Subject	IFC Comments	FMO Comments	Response from Arcadis
			about the compensation amount and how this will catch any loss of income/livelihood. Will they be provided land elsewhere to work on (i.e. newly assigned land?) Will they be able to supplement their income some other way? The ESIA discusses that some people are looking for other professional opportunities – but how will they train themselves or be able to make this move, what other opportunities are available in the area? It is suggested that further studies are required to be done on Livelihood Impact. What is the estimated loss of income to these people? Does compensation sufficiently cover this? I think that we could move forward on DD but we would need this information prior to submission of FP. Question is will this be possible? The outcome of this report as well as a proper needs assessment should determine the CSR program and any additional livelihood support that might be required (Livelihood Restoration Plan).	
Table 3-2	Applicability of PS 7	This ambiguity needs to be removed by collecting LA data from APSPCL/FRV. PS 7 will be triggered if tribal community faces: livelihood impact, economic displacement, or loss of common/traditional assets (CPRs such as grazings lands) due to LA specifically for FRV plots P2 and P8		As information provided by FRV around 2.79 acres of Assigned Land bearing survey number 1108 -2 were taken from a ST Community member for Plot No. P2 in Thumu Kunta Village. It has been discussed in Section 2.6.1 and Table No. 3.2. Hence, PS 7 seems to be applicable.

Chapter	Subject	IFC Comments	FMO Comments	Response from Arcadis
		Please see detailed comments later in the impact assessment chapter.		
Section No. 3.3	Categorization of Projects	This categorization could be revised to A if PS 5,6,7 are getting triggered in a significant manner - so get real data/info on LA, Biodiversity impacts etc as discussed earlier		Categorisation can be revised if only further pertinent informations are available. As informed by FRV around 224 Acres of the total lands in Plot No. 2 is Govt. Land, around 5 Acres are Private Lands and around 17 Acres are assigned lands. As mentioned earlier, 2.79 Acres of lands from the total assigned lands are from one single member of S community (under Survey No. 1108-2). As observed during visit the land are dry and there is no cultivation action activity within the area of Plot No. P2 at Thumu Kunta village. But, since lands were acquired chances of livelihood impact can't be ruled out. In such condition PS 5 & PS 7 both seems to be applicable.
Section No. 4.2.9	Natural Hazards	Also discuss other natural hazards such as flood risk based on 100yr flood record, forest fire and high winds/cyclone etc. here and its impact in the next chapter		Past record shows no evidence of flood or Cyclone in the study area.
Section No. 4.4.3	Ecology	ESIA needs to present the list of mammal/faunal species, their population in numbers, their frequency of siting. If low population and rare/occasional siting is reported, it is the least preferred habitat for that particular species. Population figures for each animal listed needs to be	PS 6 relates to the forest reserve which is 1-2 km near the project site. The area is considered modified habitat. Most flora/fauna are least concern. However, noise/ dust etc. may affect the fauna in the area (leopard, sloth) but the forest is not considered a conservation site.	Refer to Table 4-6 – List of all the mammals found in the study area and their frequency of occurrence provided. No systematic study done by forest department to project movement pattern and population number. Moreover concluding that "If low population and rare/occasional siting is reported, it is the least preferred habitat for that particular species." is not scientifically accurate.

Chapter	Subject	IFC Comments	FMO Comments	Response from Arcadis
		collected from Forest Deptt if they have done any survey. Also discuss with Forest deptt on the wildlife movement beyond Thumukunta RF boundaries - do they have mapped faunal siting boundaries and verify whether the project area forms part of the wildlife movement area?		Some species are rare in terms of their distribution in their natural habitat. This does not mean that, that habitat is not the preferred or suitable habitat of that particular species.
Table 4-6	Mammals Found in the Forest within the Study Area	Present the source of this information. For all maps, tables and figures presented in the ESIA, present the source information from which the data, info and analysis are derived		Source of all the maps have been provided in the Map itself.
Section No. 4-4-3	Veligallu Reservoir	Impact on 500 fishermen livelihood if Project draws water from reservoir needs to be discussed under impact chapter		Section 2.6.2 - “During operation phase, APSPCL (as informed during field visit) will provide water for the project from the Veligallu reservoir located closely to the site. State Irrigation department after considering the requirement of water for irrigation and fisheries purpose will give permission to APSPCL for sourcing water from Veligallu Reservoir during operation phase.”
Section No. 4-5	Socio- Economic Profile of the Study Area	Were there any land brokers, middle men used during LA process??		It was mistakenly written about ‘Land aggregator’ and now omitted.
Section No. 4-5-2	ST Land involved or not??	Does this include Prakash Nagar settlement which is very close to Plot P2? This settlement is predominantly tribal one and hence needs to be assessed for risks and impacts due to LA - such as land loss, economic		Yes. Prakash Nagar is within Thumu Kunta village. It is included in Section 4-5-2 As information provided by FRV around 2.79 acres of Assigned Land bearing survey number 1108 -2 were taken from a ST Community member for Plot No. P2 in Thumu Kunta Village.

Chapter	Subject	IFC Comments	FMO Comments	Response from Arcadis
		displacement, livelihood impact, loss of access to traditional assets such as government lands for grazing etc. As pointed out earlier on emails, reservoir construction in 2006-2008 period saw few villages near Veligallu submerge and those villagers were resettled - check if they are again getting impacted due to this project		But, no supporting documents with regard to Free, Prior, Informed Consent (FPIC), as referred in IFC PS Document, of the Affected Communities has been provided. Hence, PS 7 seems to be applicable.
Section No. 5-4-1.	Land	APSPCL had followed many guidelines such as: Avoiding tribal lands; avoiding forest and other sensitive land parcels; providing every solar developer with a minimum of 15% more land to offset land lost due to hilly area, transmission line (existing and proposed) shadow effect areas, natural drainage channels etc. Hilly areas within the Solar park plot has been excluded in power generation calculations though private developers are free to utilise the hilly area for solar power generation without disturbing the natural contours. The extra land allotted is also to address project failures (sub optimal solar power production) and allow future expansion.		The following has been included in Section No. 5-4-1. "*APSPCL expected to be followed existing pertinent guidelines for avoiding forest and other sensitive land parcels, natural drainage channels etc. It is also expected to be considered that the Solar park plot has been excluded in power generation calculations though private developers are free to utilise the hilly area for solar power generation without disturbing the natural contours.*"

Chapter	Subject	IFC Comments	FMO Comments	Response from Arcadis
		Capture these points after discussing with APSPCL in detail		
Section No. 6.2.5	Cumulative Impact of Water Usage for entire 1500 MW Solar Park	Discuss the cumulative impact of 1500MW projects in operation on the local community, fisherman due to conflict of water usage-as highlighted earlier, irrigation deptt should be consulted	There is a chapter on Cumulative Impacts. It is very limited and I don't believe all of the cumulative impacts have been taken into consideration. Land conversion was touched on. Water will be used from the reservoir which is meant for irrigation. If one project is using this water for the project needs it's not such a footprint, but what would be the impact on this valuable source of water requirements for the area for a "project" of 1500MW be (especially in a drought area)? Also on the income of the 500 fishermen who use the reservoir for their livelihoods…Similarly, the number of workers coming into the area – these will have cumulative impacts on the communities (disease, stress on water resources, social impacts, noise, dust, traffic, waste etc.). Is there sufficient housing in the area to support this influx of workers (besides the labour camps that will be provided). Impact on water drainage patterns of the project is significant but what about the area as a "side effect" of the solar park. The client will need to be strict on implementation of mitigation measures in order to demonstrate that they have done their share to mitigate the scale of these impacts. I don't know if the consultant can add more detail to this ESIA on these impacts. But mitigation is for	State Irrigation department after considering viability of reservoir for Irrigation and fisheries purpose will issue permit for water withdrawal to APSPCL from Veligallu reservoir.

Chapter	Subject	IFC Comments	FMO Comments	Response from Arcadis
			our client to ensure that they are on top of their own footprint.	
Section No. 6.3.2	Impact with regard to Land & Loss of Livelihood	This is quite ambiguous-as pointed out earlier, full information on LA impacts must be available in ESIA Information such as: extent of government lands, private lands, and assigned lands acquired for solar park and FRV plots; survey numbers; land owner name; caste details; compensation amount paid; whether the compensation paid is adequate as replacement cost of land in the region etc. needs to be presented in the baseline section. As economic displacement related impacts are anticipated, as part of ESIA, "Livelihood Restoration Plan" must be presented for all the land losers. If IPs were involved additional measures as per PS7 needs to be built in the LRP. ESIA needs to assess the livelihood impact due to LA; IP dependency on any land before LA and based on that LRP needs to be formulated.		As informed by FRV around 224 Acres of the total lands in Plot No. 2 is Govt. Land, around 5 Acres are Private Lands and around 17 Acres are assigned lands. As mentioned earlier, 2.79 Acres of lands from the total assigned lands are from one single member of S community (under Survey No. 1108-2). As observed during visit the land are dry and there is no cultivation action activity within the area of Plot No. 2 at Thumu Kunta village. But, since lands were acquired chances of livelihood impact can't be ruled out. In such condition PS 5 seems to be applicable.
Section No. 6-3-13	Cumulative Impact	Please discuss the cumulative impacts for IFC PS 3, 5,6,7 aspects Discuss if all the solar plants are going to be constructed and commissioned		As informed by FRV around 224 Acres of the total lands in Plot No. 2 is Govt. Land, around 5 Acres are Private Lands and around 17 Acres are assigned lands. As mentioned earlier, 2.79 Acres of lands from the total assigned lands are from one single

Chapter	Subject	IFC Comments	FMO Comments	Response from Arcadis
		simultaneously with same schedule and what would the cumulative impact on environment and social aspects?		member of ST community (under Survey No. 1108-2). As observed during visit the land are dry and there is no cultivation action activity within the area of Plot No. 2 at Thumu Kunta village. But, since lands were acquired chances of livelihood impact can't be ruled out. In such condition PS 5 & PS 7 both seems to be applicable.

APPENDIX L: STATUS OF RENEWABLE ENERGY POWER PROJECTS COMMISSIONED IN ANDHRA PRADESH STATE AS ON 31.12.2016

NEW AND RENEWABLE ENERGY DEVELOPMENT CORPORATION OF AP LTD (NREDCAP), HYDERABAD

STATUS OF RENEWABLE ENERGY POWER PROJECTS COMMISSIONED IN ANDHRA PRADESH STATE AS ON 31.12.2016

Resource	Cumulative capacity commissioned up to 2015-16 (in MW)	Capacity commissioned during 2016-17 (in MW)	Cumulative capacity commissioned (in MW)
Wind Power	1416.32	661.10	2077.42
Solar Power (GOI)	92.392	256.034	348.426
Solar Power (State Policy)	486.80	135.25	622.05
Small Hydro	89.098	-	89.098
Biomass Based	171.25	-	171.25
Biomass Energy Co-generation (Non-Bagasse) (Captive use only)	50.37	4.77	55.14
Co-Generation with Bagasse	206.95	-	206.95
Municipal Solid Waste	6.15	-	6.15
Industrial waste	34.01	6.00	40.01
TOTAL	**2553.34**	**1063.154**	**3616.494**

NREDCAP, HYDERABAD

List of commissioned Wind Power Projects in A P State						
S.No	**Name & Address of the company**	**Location**	**District**	**Financial year**	**Date of Commissioning**	**Installed capacity in M.W**
I.1	A.P. GENCO Wind Farm	Ramagiri	Anathapuramu	1994-95	Nov' 94	2.00
2	NEDCAP WIND FARM	Kondamedapally	Anathapuramu	2000-01	31.03.2001	2.75
3	NEDCAP Wind FARM	Narasimahakonda	Nellore	2004-05	07.05.2004	2.50
II.1	The Andhra Sugars Limited,	Ramagiri,	Anathapuramu	1994-95	30.9.94	2.025
2	Deccan Cements Ltd,	Ramagiri	Anathapuramu	1994-95	26.02.95	0.90
3	Deccan Cements Ltd,	Ramagiri	Anathapuramu	1995-96	30.09.95	0.675
4	Deccan Cements Ltd,	Ramagiri	Anathapuramu	1995-96	23.03.96	0.45
5	ITW Signode Limited,	Ramagiri	Anathapuramu	1995-96	25.05.95	1.00
6	Navabharat Industrial Linings & Equipment Limited (NILE)	Ramagiri	Anathapuramu	1995-96	30.08.95	2.00
7	Renewable Energy Systems Ltd,	Ramagiri,	Anathapuramu	1995-96	26.09.95	3.00
8	Renewable Energy Systems Ltd,	Ramagiri	Anathapuramu	1995-96	22.03.96	1.50
9	Renewable Energy Systems Ltd,	Ramagiri	Anathapuramu	1996-97	26.07.96	2.00
10	Bharat Heavy Electricals Ltd	Ramagiri	Anathapuramu	1995-96	13.09.95	3.00
11	Nagarjuna Construction Co.Ltd,	Ramagiri	Anathapuramu	1995-96	30.09.95	3.00
12	A.P.S.Road Transport Corprn. Ltd,	Ramagiri	Anathapuramu	1995-96	30.09.95	5.00
13	A.P.S.Road Transport Corprn. Ltd,	Ramagiri	Anathapuramu	1995-96	09.01.96	5.00
14	Weizmann Ltd,	Ramagiri	Anathapuramu	1996-97	30-09-96	3.00
15	Infrstructure Leasing & Financial	Ramagiri	Anathapuramu	1995-96	28.12.95	6.50
16	Veeramani Biscuit Industries Ltd,	Ramagiri	Anathapuramu	1995-96	10.01.96	1.00
17	PSM Spinning Mills Ltd,	Ramagiri	Anathapuramu	1995-96	08.03.96	1.80
18	Sree Rayalaseema Alkalies and Allied Chemicals Ltd	Ramagiri	Anathapuramu	1995-96	31.03.96	2.00
19	Sree Rayalaseema Alkalies and Allied Chemicals Ltd	Ramagiri	Anathapuramu	1996-97	27.05.96	1.00

20	RES Photovoltaics Ltd,	Ramagiri	Anathapuramu	1996-97	30.09.96	1.50
21	RES Photovoltaics Ltd,	Ramagiri	Anathapuramu	1997-98	03.09.97	0.50
22	Sree Rayalaseema Power Corpn. Ltd,	Ramagiri	Anathapuramu	1996-97	31.03.97	1.89
23	IDL Industries Limited,	Ramagiri	Anathapuramu	1997-98	30.09.97	1.00
24	Weizmann Ltd,	Tallimadugula	Anathapuramu	1998-99	Aug'98	3.00
25	Weizmann Ltd,	Tallimadugula	Anathapuramu	1998-99	06.08.98	2.00
26	R C I Power Pvt. Ltd,	Kadavakallu	Anathapuramu	1998-99	Mar' 99	3.00
27	R C I Power Pvt. Ltd,	Kadavakallu	Anathapuramu	1999-2000	16.07.99	1.00
28	R C I Power Pvt. Ltd,	Kadavakallu	Anathapuramu	1999-2000	18.03.2000	3.00
29	R C I Power Pvt. Ltd,	Kadavakallu	Anathapuramu	1999-2000	31.03.2000	13.00
30	Hyderabad Chemical Supplies Ltd,	Kadavakallu	Anathapuramu	1998-99	Mar' 99	0.75
31	Hyderabad Chemical Supplies Ltd,	Kadavakallu	Anathapuramu	2000-01	30.09.2000	0.50
32	Hyderabad Chemical Supplies Ltd,	Kadavakallu	Anathapuramu	2001-02	30.03.2002	0.75
33	Hyderabad Chemical Supplies Ltd,	Kadavakallu	Anathapuramu	2004-05	30.03.2005	3.75
34	Hyderabad Chemical Supplies Ltd,	Kadavakallu	Anathapuramu	2004-05	30.03.2005	0.75
35	Hyderabad Chemical Supplies Ltd,	Kadavakallu	Anathapuramu	2011-12	30.6.2011	5.10
36	Hyderabad Chemical Products Ltd,	Kadavakallu	Anathapuramu	1998-99	Mar' 99	0.25
37	Vasavi Industries (p) Ltd	Kadavakallu	Anathapuramu	1999-2000	Aug' 99	1.00
38	Bharat Heavy Electricals Ltd	Kadavakallu	Anathapuramu	1999-2000	23.09.99	4.00
39	WESCARE (India) Ltd,	Kadavakallu	Anathapuramu	1999-2000	31.03.2000	4.25
40	Sri Sarita Software & Industries Ltd,	Kadavakallu	Anathapuramu	2000-01	30.08.2000	1.00
41	Tirumala Tirupati Devastanam,Tirumala	Kakulakonda, Tirumala Hills	Chittor	2003-04	19.02.2004	6.00
42	Tirumala Tirupati Devastanam,Tirumala	Kakulakonda, Tirumala Hills	Chittor	2003-04	27.09.2003	0.23
43	Tirumala Tirupati Devastanam,Tirumala	Kakulakonda, Tirumala Hills	Chittor	2003-04	19.02.2004	0.80
44	Dr. Kasu Prasad Reddy,	Kadavakallu	Anathapuramu	2004-05	31.03.2005	0.45
45	Maxivision Laser Centre Pvt.Ltd	Kadavakallu	Anathapuramu	2004-05	31.03.2005	0.45

46	V.V.Agro Foods,	Kadavakallu	Anathapuramu	2005-06	29.09.2005	0.225
47	Vimal Roller Flour Mills,	Kadavakallu	Anathapuramu	2005-06	29.09.2005	0.225
48	Enercon(India) Limited,	Kondamedapally	Kurnool	2009-10	31.3.2010	12.80
49	Enercon(India) Limited,	Kondamedapally	Kurnool	2010-11	30.6.2010	2.40
50	Enercon(India) Limited,	Kondamedapally	Kurnool	2009-10	31.3.2010	0.80
51	Enercon(India) Limited,	Kondamedapally	Kurnool	2010-11	3.08.2010	1.60
52	Enercon(India) Limited,	Kondamedapally	Kurnool	2010-11	2.08.2010	4.80
53	Enercon(India) Limited,	Kondamedapally	Kurnool	2010-11	Sept,2010	13.60
54	Enercon(India) Limited,	Kondamedapally	Kurnool	2010-11	Dec,2010	18.40
55	Enercon(India) Limited,	Kondamedapally	Kurnool	2010-11	22.01.2011	4.00
56	Enercon(India) Limited,	Kondamedapally	Kurnool	2010-11	28.02.2011	0.80
57	Enercon(India) Limited,	Kondamedapally	Kurnool	2010-11	31.3.2011	8.80
58	Enercon(India) Limited,	Kondamedapally	Kurnool	2011-12	31.05.2011	1.60
59	Enercon(India) Limited,	Kondamedapally	Kurnool	2011-12	30.09.2011	12.80
60	Sai Silk Kalamandir, Hyderabad	Kondamedapally	Kurnool	2010-11	31.3.2011	1.00
61	Sai Silk Kalamandir, Hyderabad	Kondamedapally	Kurnool	2011-12	16.7.2011	1.00
62	Indian Oil Corporation Ltd	Vajrakarur	Anathapuramu	2011-12	31.3.2012	16.80
63	Indian Oil Corporation Ltd	Vajrakarur	Anathapuramu	2012-13	31.5.2012	10.50
64	Indian Oil Corporation Ltd	Gandikota	Kadapa	2013-14	03.04.2013	14.70
65	Indian Oil Corporation Ltd	Gandikota	Kadapa	2013-14	31.03.2014	6.30
66	National Aluminum Company Ltd (NALCO)	Gandikota	Kadapa	2012-13	30.12.2012	50.40
67	Tirumala Cotton & Agro Products Ltd	Gandikota	Kadapa	2013-14	17.07.2013	2.10
68	Sri Venkateswara Pipes Ltd	Gandikota	Kadapa	2013-14	17.07.2013	2.10
69	KPR Infra & Projects Ltd	Gandikota	Kadapa	2013-14	17.07.2013	2.10
70	KRBL Ltd	Gandikota	Kadapa	2013-14	17.07.2013	2.10
71	Weld Fuse Private Ltd	Gandikota	Kadapa	2013-14	17.07.2013	2.10

72	Mytrah Vayu (Pennar) Pvt. Ltd	Vajrakarur	Anathapuramu	2011-12	31.03.2012	8.40
73	Mytrah Vayu (Pennar) Pvt. Ltd	Vajrakarur	Anathapuramu	2012-13	30.04.2012	6.30
74	Mytrah Vayu (Pennar) Pvt. Ltd	Vajrakarur	Anathapuramu	2012-13	31.05.2012	2.10
75	Mytrah Vayu (Pennar) Pvt. Ltd	Vajrakarur	Anathapuramu	2012-13	31.10.2012	42.0
76	Mytrah Vayu (Pennar) Pvt. Ltd	Vajrakarur	Anathapuramu	2012-13	20.12.2012	4.20
77	NREDCAP	Rekulakunta	Anathapuramu	2011-12	29.3.2012	5.95
78	NREDCAP	Kondamedapalli	Kurnool	2011-12	31.3.2012	1.60
79	Tadas Wind Energy Ltd	Nallakonda	Anathapuramu	2012-13	07.07.2012	18.40
80	Tadas Wind Energy Ltd	Nallakonda	Anathapuramu	2012-13	09.07.2012	3.20
81	Tadas Wind Energy Ltd	Nallakonda	Anathapuramu	2012-13	15.07.2012	9.60
82	Tadas Wind Energy Ltd	Nallakonda	Anathapuramu	2012-13	17.07.2012	19.20
83	Vish Wind Infrastructure LLP	Nallakonda	Anathapuramu	2012-13	09.07.2012	8.00
84	Vish Wind Infrastructure LLP	Nallakonda	Anathapuramu	2012-13	15.07.2012	12.80
85	**MGM Springs Private Limited**	Nallakonda	Anathapuramu	2012-13	09.07.2012	0.80
86	**Protectron Electromech Pvt. Ltd.**	Nallakonda	Anathapuramu	2012-13	18.07.2012	0.80
87	Sukaso ceracolors Pvt Ltd	Nallakonda	Anathapuramu	2012-13	29.09.2012	1.60
88	Oil country tubular Ltd	Nallakonda	Anathapuramu	2012-13	29.09.2012	0.80
89	RV Consulting Services Pvt Ltd	Nallakonda	Anathapuramu	2012-13	31.03.2013	0.80
90	Kandke Wind Energy Pvt Ltd. (Phase – I)	Nallakonda	Anathapuramu	2012-13	31.03.2013	2.40
91	Kandke Wind Energy Pvt Ltd(Phase-II)	Nallakonda	Anathapuramu	2013-14	04.05.2013	3.20
92	Kandke Wind Energy Pvt Ltd(Phase-II)	Nallakonda	Anathapuramu	2013-14	08.06.2013	3.20
93	Kandke Wind Energy Pvt Ltd(Phase-III)	Nallakonda	Anathapuramu	2013-14	11.07.2013	4.00
94	Kandke Wind Energy Pvt Ltd(Phase-IV)	Nallakonda	Anathapuramu	2013-14	25.07.2013	2.40
95	Saptagir Camphor Limited	Nallakonda	Anathapuramu	2013-14	26.07.2013	0.80
96	Kandke Wind Energy Pvt Ltd(Phase-V)	Nallakonda	Anathapuramu	2013-14	06.09.2013	4.00
97	Kandke Wind Energy Pvt Ltd(Phase-V)	Nallakonda	Anathapuramu	2013-14	25.09.2013	4.00

98	Kandke Wind Energy Pvt Ltd(Phase-VI)	Nallakonda	Anathapuramu	2013-14	30.11.2013	8.00
99	Hetero Wind Power Ltd	Tirumalaipalli	Kadapa	2012-13	28.02.2013	9.00
100	Hetero Wind Power Ltd	Tirumalaipalli	Kadapa	2013-14	16.06.2013	45.00
101	Beta Wind Farm Pvt Ltd	Kadavakallu	Anathapuramu	2013-14	27.07.2013	43.20
102	Beta Wind Farm Pvt Ltd	Kadavakallu	Anathapuramu	2014-15	26.11.2014	3.60
103	Beta Wind Farm Pvt Ltd	Kadavakallu	Anathapuramu	2014-15	21.02.2015	3.60
104	Ravali Spinners Pvt Ltd	Vajrakarur	Anathapuramu	2013-14	15.10.2013	4.20
105	Tirumala Cotton & Agro Products Ltd	Vajrakarur	Anathapuramu	2013-14	17 .12.2013	2.10
106	Hi-tech Systems & Services Ltd	Vajrakarur	Anathapuramu	2013-14	28.03.2014	4.20
107	Woodside Fashions Limited	Vajrakarur	Anathapuramu	2013-14	28.03.2014	2.10
108	En En Electrical Engineers Pvt Ltd	Vajrakarur	Anathapuramu	2014-15	14.11.2014	2.1
109	Shantiram Wind Power Pvt Ltd	Vajrakarur	Anathapuramu	2014-15	06.12.2014	2.1
110	Tirumala Cotton & Agro Products Pvt Ltd	Vajrakarur	Anathapuramu	2014-15	31.03.2015	2.1
111	Rayala wind power company Pvt Ltd	Balavenkatapuram	Anathapuramu	2013-14	29.11.2013	25.6
112	Rayala wind power company Pvt Ltd	Balavenkatapuram	Anathapuramu	2013-14	21.12.2013	25.6
113	Rayala wind power company Pvt Ltd	Balavenkatapuram	Anathapuramu	2013-14	21.02.2014	14
114	Rayala wind power company Pvt Ltd	Balavenkatapuram	Anathapuramu	2013-14	15.03.2014	34
115	Rayala wind power company Pvt Ltd	Balavenkatapuram	Anathapuramu	2014-15	26.07.2014	2
116	Rayala wind power company Pvt Ltd	Balavenkatapuram	Anathapuramu	2014-15	26.07.2014	30
117	Rayala wind power company Pvt Ltd	Balavenkatapuram	Anathapuramu	2015-16	06.05.2015	20
118	Rayala wind power company Pvt Ltd	Balavenkatapuram	Anathapuramu	2015-16	15.09.2015	8
119	Anantpura Wind Energies Pvt Ltd	Atmakur	Anathapuramu	2015-16	19.05.2015	10
120	Rayalaseema Wind Energies Pvt Ltd	Cholasamudram	Anathapuramu	2015-16	19.05.2015	10
121	Mytrah Vayu (Krishna) Pvt Ltd	Burgula	Kurnool	2013-14	21.02.2014	22.1
122	Mytrah Vayu (Krishna) Pvt Ltd	Burgula	Kurnool	2013-14	15 .03.2014	15.3
123	ITC Ltd (Paper Board & Specialty Papers Division)	Tagguparthi	Anathapuramu	2014-15	25.06.2014	16

124	ITC Ltd (Paper Board & Specialty Papers Division)	Tagguparthi	Anathapuramu	2014-15	26.06.2014	30
125	Energon Power Resources Pvt Ltd	Tagguparthi	Anathapuramu	2014-15	07.08.2014	48
126	Energon Power Resources Pvt Ltd	Tagguparthi	Anathapuramu	2014-15	20.08.2014	6
127	Blyth Wind Park Pvt ltd	Kalyandurg	Anathapuramu	2014-15	01.09.2014	16
128	Blyth Wind Park Pvt ltd	Kalyandurg	Anathapuramu	2014-15	07.01.2015	8
129	Blyth Wind Park Pvt ltd	Kalyandurg	Anathapuramu	2015-16	09 .04.2015	1.6
130	Karam Chand Thapar & Bros (Coal Sales)Ltd	Borampalli, Kalyandurg (M)	Anathapuramu	2015-16	10.08.2015	24
131	The KRBL Ltd, Delhi	Tallimadugula	Anathapuramu	2014-15	21.11.2014	8.4
132	Rajasthan Gum Pvt Ltd	Tallimadugula	Anathapuramu	2014-15	31.12.2014	2.1
133	Sterling Agro Industries	Tallimadugula	Anathapuramu	2014-15	29.01.2015	4.2
134	Hi-Tech Systems & Services Ltd	Tallimadugula	Anathapuramu	2015-16	02.06.2015	2.1
135	Vijayeebhava Enterprises Ltd	Tallimadugula	Anathapuramu	2015-16	01.08.2015	2.1
136	BNR Constructions	Kondameedapalli	Kurnool	2014-15	19.12.2014	1
137	Energon Power Resources Pvt Ltd	Tagguparthi, Beluguppa (M)	Anathapuramu	2014-15	11.03.2015	100
138	Jindal Aluminum Ltd	Vajrakarur, Uravakonda near	Anathapuramu	2015-16	25.08.2015	25.2
139	Sun Win Powertech LLP	Singanamala	Anathapuramu	2015-16	28.11.2015	4.00
140	Vibrant Green Tech India Pvt Ltd	Singanamala	Anathapuramu	2015-16	28.11.2015	0.80
141	Vibrant Green Tech India Pvt Ltd	Singanamala	Anathapuramu	2015-16	15.12.2015	8.00
142	Mytrah Vayu (Indravathi) Pvt Ltd	Pottipadu, Vajrakarur (M)	Anathapuramu	2015-16	31.12.2015	23.10
143	Mytrah Vayu (Indravathi) Pvt Ltd	Pottipadu, Vajrakarur (M)	Anathapuramu	2015-16	05.03.2016	8.40
144	Mytrah Vayu (Indravathi) Pvt Ltd	Pottipadu, Vajrakarur (M)	Anathapuramu	2015-16	06.03.2016	44.10
145	Mytrah Vayu (Indravathi) Pvt Ltd	Pottipadu, Vajrakarur (M)	Anathapuramu	2015-16	26.03.2016	8.40
146	Mytrah Vayu (Indravathi) Pvt Ltd	Pottipadu, Vajrakarur (M)	Anathapuramu	2015-16	27.03.2016	21.00
147	Rambhadra Industries Ltd	Talaricheruvu, Tadiparthi (M)	Anathapuramu	2015-16	20.02.2016	2.00
148	Idupulapadu Cotton Mills Pvt Ltd	Talaricheruvu, Tadiparthi (M)	Anathapuramu	2015-16	20.02.2016	4.00
149	Srinivasa Cotton & Oil Mills Pvt Ltd	Talaricheruvu, Tadiparthi (M)	Anathapuramu	2015-16	20.02.2016	2.00

150	Viswateja Spinning Mills Ltd	Talaricheruvu, Tadiparthi (M)	Anathapuramu	2015-16	20.02.2016	2.00
151	Orange Ananthapur Wind Power Pvt Ltd	Honnura - Palturu	Anathapuramu	2015-16	28.03.2016	100.00
152	Sai Pet preforms	Beluguppa	Anathapuramu	2015-16	24.03.2016	2.10
153	Mangalam Fashions Limited	Beluguppa	Anathapuramu	2015-16	24.03.2016	2.10
154	Woodside Fashions Limited	Beluguppa	Anathapuramu	2015-16	24.03.2016	2.10
155	Hi-Tech Systems & Services Ltd.	Beluguppa	Anathapuramu	2015-16	27.03.2016	2.10
156	Levelstate Systems Pvt. Ltd.	Beluguppa	Anathapuramu	2015-16	24.03.2016	2.10
157	Rajasthan Gum Private Limited	Beluguppa	Anathapuramu	2015-16	30.03.2016	8.40
158	Kaushaliya Devi Dhoot	Beluguppa	Anathapuramu	2015-16	29.03.2016	2.10
159	Dinesh Enterprises	Beluguppa	Anathapuramu	2015-16	31.03.2016	2.10
160	Jai Bharat Gum & Chemicals Ltd.	Beluguppa	Anathapuramu	2015-16	31.03.2016	2.10
161	Satya Narayan Dhoot	Beluguppa	Anathapuramu	2015-16	29.03.2016	2.10
162	Prince Art Exporter	Beluguppa	Anathapuramu	2015-16	27.03.2016	4.20
163	Shree Ram Industries	Beluguppa	Anathapuramu	2015-16	24.03.2016	4.20
164	OM Prakash Soni	Beluguppa	Anathapuramu	2015-16	24.03.2016	2.10
165	Imperial Arts	Beluguppa	Anathapuramu	2015-16	27.03.2016	2.10
166	Shri Nath Gum & Chemicals	Beluguppa	Anathapuramu	2015-16	24.03.2016	2.10
167	Manoj Agarwalla	Beluguppa	Anathapuramu	2015-16	24.03.2016	2.10
168	Eenadu Television Private Limited	Beluguppa	Anathapuramu	2015-16	27.03.2016	2.10
169	Ushodaya Enterprises Pvt. Ltd	Beluguppa	Anathapuramu	2015-16	27.03.2016	4.20
170	Heritage Foods ltd	Pottipadu	Anathapuramu	2015-16	27.03.2016	2.10
171	Chimique (India) Ltd	Pottipadu	Anathapuramu	2015-16	30.03.2016	2.10
172	Kalpataruvu Spinning Mills P Ltd	Pottipadu	Anathapuramu	2015-16	30.03.2016	2.10
173	Sri Dhanalaxmi Cotton & Rice Mills P Ltd	Pottipadu	Anathapuramu	2015-16	26.03.2016	6.30
174	Sandla Wind Projects Pvt Ltd	Vidapanakallu	Anathapuramu	2015-16	31.03.2016	6.30
175	Sandla Wind Projects Pvt Ltd	Vidapanakallu	Anathapuramu	2016-17	20.05.2016	18.90

176	KCT Renewable Energy Pvt Ltd	Molagavalli	Kurnool	2016-17	14.07.2016	20.40
177	KCT Renewable Energy Pvt Ltd	Molagavalli	Kurnool	2016-17	14.07.2016	18.70
178	JED Solar Parks Pvt Ltd	Mallapuram	Anathapuramu	2016-17	23.07.2016	24.00
179	Poly Solar Parks Pvt Ltd	Idukal	Anathapuramu	2016-17	23.07.2016	24.00
180	Sandla Wind Project Pvt Ltd	Vidappanakallu	Anathapuramu	2016-17	16.07.2016	23.10
181	Orange Uravakonda Wind Projects Pvt Ltd	Beluguppa	Anathapuramu	2016-17	28.07.2016	14.70
182	Ostro Ananthapur Pvt Ltd	Nimbagal(Paltur), Urvakonda(M)	Anathapuramu	2016-17	21.07.2016	50.00
183	Sandla Wind Projects Pvt Ltd	Vidapanakallu	Anathapuramu	2016-17	16.07.2016	2.10
184	Hetero Wind Power Pennar Pvt Ltd	Tirumalayapalli	Kadapa	2016-17	19.06.2016	10.50
185	Hetero Wind Power Pennar Pvt Ltd	Tirumalayapalli	Kadapa	2016-17	13.07.2016	6.00
186	Hetero Wind Power Pennar Pvt Ltd	Tirumalayapalli	Kadapa	2016-17	21.08.2016	24.00
187	Ranganayaka Spinning Mills Pvt Ltd	Valasala(V), Dhone(M)	Kurnool	2016-17	03.08.2016	2.00
188	Vasundhara Cotton Mills Pvt Ltd	Valasala(V), Dhone(M)	Kurnool	2016-17	03.08.2016	2.00
189	Jyotirmaye Textiles Pvt Ltd	Valasala(V), Dhone(M)	Kurnool	2016-17	03.08.2016	6.00
190	Sterling Agro Industries Ltd	Nallakonda	Anathapuramu	2016-17	17.08.2016	3.20
191	ZR Renewable Energy Pvt Ltd	Talaricheruvu	Anathapuramu	2016-17	27.08.2016	16.00
192	Orange Uravakonda Wind Project Pvt Ltd	Beluguppa	Anathapuramu	2016-17	9.08.2016	18.90
193	Orange Uravakonda Wind Project Pvt Ltd	Beluguppa	Anathapuramu	2016-17	18.08.2016	8.40
194	Orange Uravakonda Wind Project Pvt Ltd	Beluguppa	Anathapuramu	2016-17	20.08.2016	6.30
195	Orange Uravakonda Wind Project Pvt Ltd	Beluguppa	Anathapuramu	2016-17	26.08.2016	2.10
196	ReNew Wind Energy Pvt Ltd	Elutla	Anathapuramu	2016-17	24.08.2016	10.50
197	ReNew Wind Energy Pvt Ltd	Elutla	Anathapuramu	2016-17	31.08.2016	10.50
198	Danu Wind Parks Pvt. Ltd.	Chinnakolumalapalli	Kurnool	2016-17	07.09.2016	12.80
199	Danu Wind Parks Pvt. Ltd.	Chinnakolumalapalli	Kurnool	2016-17	29.09.2016	4.80
200	Natco Power Pvt. Ltd.	Chinnakolumalapalli	Kurnool	2016-17	09.09.2016	1.60
201	Jai Bharat Gum & Chemicals	Vajrakarur	Anantapur	2016-17	20.09.2016	2.1
202	RBA Properties Ltd	Vajrakarur	Anantapur	2016-17	20.09.2016	2.1

203	Heritage Foods Ltd	Vajrakarur	Anantapur	2016-17	20.09.2016	2.1
204	Orange Uravakonda Wind Project Pvt Ltd	Beluguppa	Anantapur	2016-17	28.09.2016	42
205	ReNew wind Energy (Shivpur) Pvt Ltd	Elutla	Anantapur	2016-17	29.09.2016	23.1
206	Ostro Anantapur Private Limited	Honnura/Paltur	Anantapur	2016-17	30.09.2016	22.00
207	Atria Wind Power Pvt Ltd	Gangadevipalli	Kadapa	2016-17	29.09.2016	17.00
208	Mytrah Vayu (Tungabhadra) Pvt Ltd	Aspiri	Kurnool	2016-17	15.10.2016	51.00
209	Mytrah Vayu (Tungabhadra) Pvt Ltd	Aspiri	Kurnool	2016-17	20.10.2016	28.90
210	ReNew wind Energy (Shivpur) Pvt Ltd	Elutla	Anantapur	2016-17	13.10.2016	10.50
211	Ostro Anantapur Private Limited	Honnura/Paltur	Anantapur	2016-17	26.10.16	28.00
212	ReNew wind Energy (Shivpur) Pvt Ltd	Elutla/Madugupalli	Anantapur	2016-17	08.11.2016	10.50
213	ReNew wind Energy (Shivpur) Pvt Ltd	Elutla/Madugupalli	Anantapur	2016-17	29.11.2016	23.10
214	Orange Uravakonda Wind Energy Project Pvt Ltd	Belugappa	Anantapur	2016-17	30.11.2016	8.40
215	Sterling Agro Industries Ltd	Nallakonda	Ananthapuramu	2016-17	21.12.2016	4.00
216	Danu Wind Parks Pvt. Ltd.	Chinnakolumalapalli	Kurnool	2016-17	26.12.2016	4.8
217	Tata Power Renewable Energy Limited	Honnura -Paltur	Ananthapuramu	2016-17	27.12.2016	40.00
	Total					**2077.42**

COMMISSIONING STATUS OF GRID CONNECTED SOLAR PROJECTS

Sl No	Name of the Project Proponent	Capacity (in MW)	Location of the Project	Date of commissioning	Schemes {State owned / Govt. of India owned / Others(including REC)}
1	M/s Sri Power Generation Ltd	02.00	Chervi (V), Satyavedu (M), Chittoor Dt.	Feb. 2011	MNRE – Grid interactive demonstration programme
2	M/s Sri Power Generation (India) Private Limited,	1.00	Kotagullu (V), Kadiri (M), Ananthapur District	14.01.2012	JNNSM, Government of India (RPSSGP)
3	M/s Amrit Jal Ventures Pvt. Ltd	1.00	Kotagullu (V), Kadiri (M), Ananthapur District	07.03.2012	-do-
4	M/s Kishore Electro Infra Pvt. Ltd.	1.00	Perecherla (V), Guntur Rural, Guntur District	13.03.2012	-do-
5	M/s Gajanan Financial Services Pvt. Ltd.	1.00	Laddagiri (V), Kurnool District	14.03.2012	-do-
6	M/s Andhra Pradesh Industrial Infrastructure Corporation Ltd,	1.00	Industrial Park, Gooty, Anantapur District	15.03.2012	-do-
7	M/s. Saisudhir Energy Ltd	5.00	T.Veeravaram (V), Rayadurg (M), Anantapur District	05.01.2012	JNNSM, Government of India (Phase-I, Batch-I)
8	M/s.Welspun Solar Pvt.Ltd,	5.00	Pulivendula (V&M) Kadapa District	31.12.2011	-do-
9	M/s. Rithwik Projects Private Limited	2.00	Kadiri (V & M), Anantapur Dt	25.4.2012	-do-
10	M/s. MEIL Green Power Ltd	50.00	Nagalapuram (V), Peddavadugu (M), Anantapur Dt	04.11.2014	-do- (Thermal)
11	M/s. Saisudhir Energy Ltd,	20.00	Borampally (V), Kalyandurg (M), Anantapur District	26.4.2013 (10 MW) 24.7.2013 (10 MW)	JNNSM, Government of India (Phase-I, Batch-II)
12	B.G.Channappa, Class-I, K.P.W.D.Contractor	4.00	Gowriganipalli, Manepalli (V), Lepakshi (M), Anantapur Dt	22.04.2013	State Policy
13	M/s. Value Labs LLP	5.00	Maddimadugu, Nallacheruvu (M),	24.04.2013	-do-

			Ananatpur Dt		
14	M/s. Emmvee Energy Private Limited	10.00	Gowriganipalli, Manepalli (V), Lepakshi (M), Anantapur Dt	04.05.2013	-do-
15	M/s. The KCP Limited	1.15	Muktyala (V), Jaggayyapet (M), Krishna District	06.06.2013	-do-
16	M/s. Rithwik Projects Private Limited	3.00	Kadiri (V & M), Anantapur Dt	05.07.2013	JNNSM, Government of India (Phase-I, Batch-I)
17	M/s Sri City Power Private Limited	3.00	Chervi (V), Satyavedu (M), Chittoor Dt.	29.10.2013	State Policy (Open Access)
18	M/s Ravali Spinners Pvt. Ltd	1.00	Tanuku, West Godavari dist.	05.01.2014	-do-
19	M/s Trimax Sands Pvt. Ltd	1.00	Vatsavalasa (V), Gara (M), Srikakulam dist.	26.03.2014	-do-
20	M/s Solarays Eco Energy Inc.	2.00	Beechiganipalli (V)& (M), Ananthapuramu Dist.	29.04.2014	-do-
21	Meda Sreedhar	2.00	Beechiganipalli (V)& (M), Ananthapuramu Dist.	29.04.2014	-do-
22	M/s. Prakasha Motors,	1.00	Beechiganipalli (V)& (M), Ananthapuramu Dist.	29.04.2014	-do-
23	M/s. Prakash Agencies,	1.00	Beechiganipalli (V)& (M), Ananthapuramu Dist.	29.04.2014	-do-
24	M/s. Emmvee Energy Pvt. Ltd.,	4.00	Beechiganipalli (V)& (M), Ananthapuramu Dist.	29.04.2014	-do-
25	M/s. The Andhra Sugars Ltd	2.50	Kovvur (V & M), West Godavari District	21.06.2014	-do-
26	M/s. Indira Power Pvt. Ltd	0.70	Karur(V), Tada (M), SPSR Nellore District	28.06.2014	-do-
27	M/s Savitha Renewable Energy Pvt Ltd	1.00	Kamepalli Brahmanapalli (V), Piduguralla (M), Guntur District	19.01.2015	State Policy (Open Access)
28	M/s Arkha Solar Pvt. Ltd	1.00	Elakolanu (V), Rangampeta (M), E.G.Dist.	Jan. 2015	-do-
29	M/s. Amaravathi Textiles Pvt Ltd	5.00	Atmakur, Nellore District	31.03.2015	-do- (PPA-Bidding route)
30	M/s. Varshini Exim Pvt Ltd	2.40	Nagari Madugu-SS(V), Voyalpadu(M), Chittoor District	13.04.2015	State Policy
31	M/s. Emmvee Energy Pvt Ltd	5.40	Gowriganipalli (V), Lepakshi(M),	17.07.2015	-do-

			Ananthapuramu District		
32	M/s. Laxmi Venkateswara Green Energy Pvt Ltd	1.00	Morasapudi, Nuziveedu (M), Krishna District	30.06.2014	PPA-Bidding route (Phase-I) (Rs.6.49/unit)
33	M/s. Abhedya Power Pvt Ltd	2.00	Ubicherla, Nallacheruvu, Ananthaur District	08.08.2014	-do-
34	M/s. Vuddanda Solar Projects (P) Ltd	3.0	Chinthamakulapalli (V), Sadum (M), Chittoor District	01.10.2015	State Policy (Open Access)
35	M/s Sai Achyuth Energy Pvt Ltd	5.00	Jagadurthy (V), Dhone (M), Kurnool District	18.10.2015	Open Offer Competitive Bidding 2012 (Rs. 6.45 / unit)
36	M/s. Rajaratna Energy Holdings Pvt Ltd	5.00	Maddimadugu (V), Nallacheruvu (M), Kadiri Town, Ananthapur District	19.11.2015	PPA – Bidding route (Rs. 5.99 /unit with 3% escalation for 10 years)
37	M/s Sri Vijaya Visakha Milk Producers Co.Ltd	1.65	Malicherla (V) Vizianagaram (M) and Dist.	27.11.2015	State Policy (Open Access)
38	M/s Pragathi Group, Hyderabad	2.00	Kanupade (V), urlagudem Panchayath, Chintalapudi (M) W.G.Dist.	31.12.2015	-do-
39	M/s. Amaravathi Textiles Pvt Ltd	5.00	Atmakur, Nellore District	28.11.2015	-do- (PPA-Bidding route)
40	M/s GRT Jewellers (India) Pvt Ltd	6.00	Basavanahalli(V), Amarapuram(M), AnanthapuramuDist	05.01.2016	-do-
41	M/s Bright Solar Energy Pvt Ltd	10.00	Basavanahalli(V), Amarapuram(M), AnanthapuramuDist	05.01.2016	-do-
42	M/s. Palnadu Solar Power Pvt Ltd	2.75	Inumella(V), Ipur (M), Guntur District	29.01.2016	Open Offer Competitive Bidding 2012 (Rs. 6.45 / unit)
43	M/s. Palnadu Solar Power Pvt Ltd	2.25	Inumella(V), Ipur (M), Guntur District	31.03.2016	Open Offer Competitive Bidding 2012 (Rs. 6.45 / unit)
44	M/s. Renew Solar Power Pvt Ltd	39.00	Chagi(V), Adoni(M), Kurnool District	07.03.2016	PPA – Bidding route (Rs. 5.98 /unit with 3% escalation for 10 years)
45	M/s. Renew Solar Power Pvt Ltd	21.00	Tarlupadu (V &M), PrakasamDist	04.03.2016	PPA – Bidding route (Rs. 5.98 /unit with 3% escalation for 10 years)
46	M/s Welspun Renewable Energy Pvt Ltd	30.00	Lomada(V), Kadapa Dist	20.03.2016	PPA – Bidding route (Rs. 5.99 /unit with 3% escalation for 10 years)
47	M/s Ushodaya Enterprises Pvt Ltd	5.00	Tadimarry(V)&(M), Ananthapuramu Dist	23.03.2016	State Policy (Open Access) (Captive use)
48	M/s. Azure Power India Pvt Ltd	50.00	Vemulapadu & Tutrallapalle (V), Yadiki(M),	28.03.2016	PPA – Bidding route (Rs. 5.90 /unit with 3% escalation for 10 years)

			Ananthapuramu Dist		
49	M/s Aarohi Solar (Acme Clean Tech Solutions Ltd	50.00	Kalipi(V), Roddam(M), Ananthapuramu Dist	31.03.2016	PPA – Bidding route (Rs. 5.63 /unit with 3% escalation for 10 years)
50	M/s Welspun Renewable Energy Pvt Ltd	70.00	Vemulapadu(V), Owk(M), Kurnool Dist	30.03.2016	PPA – Bidding route (Rs. 5.99 /unit with 3% escalation for 10 years)
51	M/s EAAMA Estates Pvt Ltd	3.00	GR Valasa, Vizianagaram Dist	30.03.2016	PPA – Bidding route (Rs. 5.94 /unit with 3% escalation for 10 years)
52	M/s New & Renewable Energy Development Corpn of AP Ltd (NREDCAP)	0.392	Gollavanitippa, Bhimavaram Rural (M), West Godavari Dist	30.03.2016	Canal Top Solar Power Project
53	M/s New Era Enviro Ventures (Mehbubnagar) Pvt Ltd	10.00	Bandapalli (V), Ramapuram (M), Kadapa District	30.03.2016	Open Offer Competitive Bidding 2012 (Rs. 6.45 / unit)
54	First Solar Power India Pvt Ltd (Hindupur Solar Park Pvt. Ltd)	40.00	Beechiganipalle and Seagipalle villages, Parigi Mandal, Ananthapuramu dist.	31.03.2016	PPA – Bidding route (Rs. 5.25 /unit with 3% escalation for 10 years)
55	ACME Clean Tech (M/s.Dayanidhi Solar Power Pvt Ltd)	40.00	Shantipuram Mandal, Chittoor district	31.03.2016	PPA – Bidding route (Rs. 5.978 /unit with 3% escalation for 10 years)
56	ACME Clean Tech (Vishwatma Solar Energy Pvt Ltd)	10.00	Kadivella Village, Yemmiganur Mandal, Kurnool district	3103.2016	PPA – Bidding route (Rs. 5.717 /unit with 3% escalation for 10 years)
57	ACME Clean Tech (Niranjana Solar Energy Pvt Ltd)	20.00	Puchakayala Madal Village, Pathikonda Mandal, Kurnool District	31.03.2016	PPA – Bidding route (Rs. 5.717 /unit with 3% escalation for 10 years)
58	SSR Agro Energy	1.00	Gajulapellore(V), BN Kandriga(M), Chittoor District	09.04.2016	State Policy – Open Access
59	ACME Clean Tech (M/s.Vishwatma Solar Energy Pvt Ltd)	20.00	Kadivella Village, Yemmiganur Mandal, Kurnool district	15.04.2016	PPA – Bidding route (Rs. 5.717 /unit with 3% escalation for 10 years)
60	NTPC	200.00	N.P.Kunta, Ananthapuramu district	15.04.2016	Under NPKunta Solar Park
61	First Solar Power India Pvt Ltd	20.00	Punganur, Chittoor district	09.05.2016	PPA – Bidding route (Rs. 5.35 /unit with 3% escalation for 10 years)
62	Acme Clean Tech (M/s. Jaisalmer Solar Power Pvt Ltd.,)	20.00	Rohukurupalli(V), Rayachoti,Ramapura m (M) Kadapa district	12.05.2016	PPA – Bidding route (Rs. 5.717 /unit with 3% escalation for 10 years)
63	Waneep Solar Pvt Ltd	25.00	Marrimakulapalli(V), Guramkonda(M), Chittoor District	19.05.2016	PPA – Bidding route (Rs. 5.769/unit with 3% escalation for 10 years)
64	First Solar Power India	20.00	Punganur,	28.06.2016	PPA – Bidding route

	Pvt Ltd		Chittoor district		(Rs. 5.35 /unit with 3% escalation for 10 years)
65	Sumeru Energy Pvt Ltd	1.00	Jagadurthy (V), Dhone (M), Kurnool District	23.06.2016	Open Offer Competitive Bidding 2012 (Rs. 6.45 / unit)
66	M/s New & Renewable Energy Development Corpn of AP Ltd (NREDCAP)	0.608	Gollavanitippa, Bhimavaram Rural (M), West Godavari Dist	07.07.2016	Canal Top Solar Power Project
67	VBC Renewable Energy Pvt Ltd	3.00	Garividi SS, Vizianagaram	20.07.2016	PPA – Bidding route
68	NTPC	50.00	N.P.Kunta, Ananthapuramu district	29.07.2016	Under NPKunta Solar Park
69	M/s. Varshini Exim Pvt Ltd	1.00	Nagari Madugu-SS(V), Voyalpadu(M), Chittoor District	04.08.2016	State Policy – Open Access
70	Visakhapatnam Port Trust	6.25	Visakhapatnam	18.08.2016	State Policy – Open Access
71	Sree Jaya Jyothi Cements Pvt Ltd.,	1.00	Yanakandla Village, Banaganapalli(M),Kurnool District	24.08.2016	State Policy – Open Access
72	Sprouts Solar Energy Pvt Ltd	2.00	Pamulapadu, Kurnool Dist	08.09.2016	Open Offer Competitive Bidding 2012 (Rs. 6.45 / unit)
73	Ushodaya Enterprises Pvt Ltd	5.00	Tadimarry(V)&(M), Ananthapuramu Dist	22.09.2016	State Policy (Open Access) (Captive use)
74	Sumeru Energy Pvt Ltd	4.00	Jagadurthy, Kurnool Dist	22.09.2016	Open Offer Competitive Bidding 2012 (Rs. 6.45 / unit)
75	Narasimha Swamy Solar Generations Pvt Ltd	5.00	Peravali, Singanamala(M), Ananthapuramu District	26.09.2016	State Policy (Open Access) (Third Party Sale)
76	M/s Yaswanth Solar Energy (Pvt) Ltd	1.00	Kottapally(V), Muddanur(M), Kadapa District	01.10.2016	State Policy (Open Access) (Third Party Sale)
77	APGENCO	5.426	Polavaram Right Main Canal, Gollgudem(V), Unguturu(M), West Godavari dist	19.11.2016	Canal bund project under MNRE Pilot demonstration scheme.
78	Repal Renewables Pvt. Limited	4.90	Thanakallu (V&M) Ananthapuramu district	19.11.2016	State Policy (Open Access) (Third Party Sale)
	Total	**975.376**			

NREDCAP-HYDERABAD

LIST OF SMALL HYDEL PROJECTS COMMISSIONED – ANDHRA PRADESH

SL. NO.	NAME OF THE DEVELOPER	SCHEME LOCATION	CAPACITY in MW	Date of commission	REMARKS
01.	M/s. Deccan Cement Limited, 6-3-366/B, Deccan chambers Somajiguda, Hyderabad Ph 23310168/23310552	Guntur Branch Canal at '0' M. Guntur district	3.75	28.2.96	Canal NSRC Not IREDA
02.	M/s.Dhanalakshmi Cotton & Rice Mills Limited, Ganapavaram, Chilakaluripet Guntur Dist. Ph 522619	MHES on Addanki Branch canal at 4th to 6th Mileage Guntur Dist.	2.00	24.11.97	Canal NSRC Not IREDA
03.	M/s.Sagar Power Limited, 8-2-472/B 12, Road No.1 Banjara Hills, Hyderabad 28. Ph.23351571	MHES on Guntur Branch Canal III. Guntur district	4.30	27.11.97	Canal NSRC IREDA
04.	M/s.KCP Limited, Vuyyur, Krishna District. 521 165	MHES on Guntur Branch canal at M 2-3-199 to 2-6-190,Guntur district	1.50	14.3.98	Canal NSRC Not IREDA
05.	M/s. Rayalaseema Power Projects Limited, 8-2-629/1/A, Vishal Bhavan, Road No.12, Banjara Hills, Hyderabad 28 Ph 27644305	On Guntur Branch Canal at 13th & 14th Miles. Guntur district	3.00	21.11.98	Canal NSRC IREDA
06.	M/s. SKJ Power Limited, 8-3-214/29, 1st Floor, Bhaskara Nilayam, Srinivasa Colony (W), S.R.Nagar,Hyderabad – 500 038 (M) 9848511821	On Ongole Branch canal at M 2-3-199 to 2-6-190 Prakasam dist	1.50	27.1.99	Canal NSRC IREDA
07.	M/s.Sagar Power Limited, 8-2-472/B 12, Road No.1 Banjara Hills, Hyderabad 28. Ph.23351571	Lock-in-sula on K C Canal Kurnool dist	4.00	7.9.98	Canal KCC IREDA
08.	M/s.Trident Power Corporation, Lakshmi Nivas, Flat No.103, House NO.6-3-862 Ameerpet, Hyderabad – 16 Ph.26610489	On Addanki Branch canal at 10th, 13th Miles Guntur district Sch I- 2.00 MW Sch II-2.00 MW	2.00 2.00	13.10.99 26.8.99	Canal NSRC IREDA
09.	M/s.Trident Power Corporation, Lakshmi Nivas, Flat No.103, House NO.6-3-862 Ameerpet, Hyderabad - 16 Ph.No.26610489	On Addanki Branch canal at 28TH Mile Prakasam dist	3.00	28.2.2001	Canal NSRC IREDA
10.	M/s.Dhanalakshmi Cotton & Rice Mills Limited, Ganapavaram, Chilakaluripet Guntur Dist. Ph 522619	MHES on Addanki Branch Canal at 4TH & 6TH Miles, Guntur Dist	1.588 2.610	23.12.97 23.7.97	Canal NSRC Not IREDA
11.	M/s.KCP Limited, Vuyyur, Krishna District. 521 165	MHES on Guntur branch canal Guntur district	2.25 1.50 1.50	6.9.99 20.11.98 18.9.98	Canal NSRC Not IREDA

			1.50	2.4.99	
12.	M/s.Bhavani Hydro Power Projects, D.No.1-307/1, 9th lane, Pandaripuram, Chilakaluripet Guntur dist Ph.NO.23354404	M 5-2-550 on Bellamkonda Branch canal. Guntur district Scheme II	0.55	28.8.99	Canal NSRC IREDA
13.	M/s.Active Power (P) Limited 8-2-269/19/S/B, Sri Residency, Road No.2, Banjara Hills, Hyderabad 500 034	On Budameru diversion channel utilizing V T P S Back waters, Krishna District.	1.40	28.4.2000	Canal Budameru IREDA
14.	M/s.Thirumala Hydro Power (P) Limited, 26-161Subbaiah Thota, Chilakaluripet, 522 619 Guntur dist Ph 254631	On Guntur Branch canal at M 20-5-330,21-5-550, 22-2-220 Guntur district	0.80 0.80 0.80	1.7.2000 2.2.2000 6.11.2000	Canal NSRC IREDA
15.	M/s. Espar Pak Limited, D.No.1-307/1, 9th lane, Pandaripuram, Chilakaluripet Ph.NO.23354404	Scheme 1: M 0-0-000, 0-0-550 & 0-3-550, on Bellamkonda branch canal ,Scheme 2: Bellamkonda Branch Canal Sl.no.12 Guntur dist	1.30	8.4.2000	Canal NSRC IREDA
16.	M/s. Shivani Power Spinners D.No.1-307/1, 9th lane, Pandaripuram, Chilakaluripet Ph.NO.23354404	On Bellamkonda Branch Canal between M 0-0-000 to M 1-3-000 at Julakallu village, Guntur District.	0.750	11.3.2000	Canal NSRC IREDA
17	Sri Jayalakshmi Power Corporation Ltd. ,Tobacco Colony, P.B.no. 6 Guntur – 522 001	MHS on Addanki Branch Canal at M 17-0-0 & M 18-0-00 Guntur district	4.00	19.01.2000 27.02.2000	Canal NSRC IREDA
18.	M/s.NCL Energy Limited. Raghavaratna Towers, 7th floor, Chiragali Lane, Hyderabad 500 001 Ph no 040 23202548	On Pothireddypadu H/R Kurnool Dist	2.50 2.50 2.50	28.9.2000 17.11.00 9.2.2001	Canal Srisailam IREDA
19.	M/S.Manihamsa Power Projects (P) Limited, 8-226, Canal Road, Ravulapalem 533 238, EG Dist (M) 9395533366	Yeleru Reservoir Project Gap 2, Yeleswaram, East Godavari.	3.00	17.1.00	Reservoir Yeleswaram IREDA
20.	M/s.Akshay Profiles 1-320, 9th lane, Pandaripuram, Chilakaluripet, Guntur dist Ph 98481 34534	Chilakaluripet Major Block 10 at M 0-4-312 & N 1-7-000 Guntur district	0.50 0.50	13.7.2000 11.9.2000	Canal NSRC IREDA
21.	M/s PMC Power Pvt. Ltd., Sai Enclave, 10-3-152/B 2&3 East Marredpally, Secunderabad 500 026 Ph.No040 27732239	MHS on Pedanandipadu branch canal at M 0-0-440 Guntur district	0.650	17.5.2001	Canal NSRC IREDA
22.	M/s. KM (P)Limited, 6-3-883/3, RK Plaza, Panjagutta Hyderabad 87. Ph.23414711	On Nippulavagu at Guntakandala, Kurnool District KM 7.95 to 10.995	4.00	6.2.2002	Canal KC Canal IREDA
23.	M/s.KM Power (P)Limited, 6-3-883/3, RK Plaza, Panjagutta, Hyderabad 87.Ph.23414711	On Nippulavagu at Velpaur, Kurnool dist KM 10.995 to 14.303	3.30	7.11.2002	Canal KC Canal IREDA
24.	M/s.KM Power (P)Limited, 6-3-883/3, RK Plaza, Panjagutta, Hyderabad 87. Ph.23414711	On Nippulavagu at Madhavaram(v), Kurnool dist KM 14.303 to 18.227	2.00 2.00	21.11.2003 25.12.2003	Canal KC Canal IREDA

25.	M/s Bhavani Hydro Power Projects Pvt Ltd, 1-307/1, 9th Lane, Pandaripuram, Chilakaluripet, Guntur Dist. Ph.23354404	On Bellamkonda branch canal at M3-1-550 to 3-7-580, Guntur Dist.	0.550	17.11.2004	Canal NSRC IREDA
26.	M/s Balaji energy Pvt.Ltd., 1-2-234/13/37&38,2nd Floor, Aravind Nagar Colony, Domalaguda, Hyderabad – 500082 Ph.no.27606449/56501776	MHS on Left Flank of Somasila Reservoir in Nellore district.	10.00	Nov. & Dec.05	Reservoir IREDA
27	M/s Balaji energy Pvt Ltd., 1-2-234/13/37&38,2nd Floor, Aravind Nagar Colony, Domalaguda, Hyderabad – 500 082.Ph.no.27606449/56501776	MHS on Left Flank of Somasila Reservoir in Nellore district.	2.00	Oct 2008	Reservoir IREDA
28	M/s Sardar Power Ltd. 104, Swarganivas Enclave, East Srinivasa Nagar, Ameerpet, Hyderabad 500 016, (M) 9441901270	MHS on Nagavali River near Naguru Village, Garugubilli Mandal, Vizianagaram district.	2.00	2008	River Bank
29	M/s. Manihamsa Power Projects (P) Limited, 8-226, Canal Road, Ravulapalem 533 238 (20/101)	Yeleru Reservoir Project Gap 2, Yeleswaram, East Godavari Dist	1.5	06.04.2011	Reservoir Yeleswaram
30	M/s A.P.Tribal Power Com Ltd.4th floor, D.S.S.Bhavan, Masab Tank, Hyd	MHS on Yeleru River (Pedda Vagu) near Vetamamidi (V) Addathigala (M), East Godavari (D)	1.20	15.04.2011	River
		Total	**89.098**		

N.R.E.D.C.A.P.LTD. HYDERABAD

BIOMASS BASED POWER PROJECTS COMMISSIONED IN ANDHRA PRADESH STATE

Sl.No.	Name & address of the Developer	Name of the location	Name of the Dist.	Installed capacity	Date of Commissioning
1	Rithwik Energy Systems Ltd, 8-2-684/2/A, Poly No. 1to 4 , 4th floor, NSL ICON, Opp. ICICI Bank, Road No.2, Banjara Hills, Hyderabad. 500 034.ph.040-23327919/39/49,fax.0866-6641747. mail agplvjw@gmail.com	Rachagunneru (v) Srikalahasti (m) Chittoor	Chittoor	6.00	28.8.2002
2	OM Shakthi Reenergies Ltd, D-6/A, IDA Uppal, Hyderabad. 500 039 ph 040-27205263	Pannur (v) Vijayapuram (m) Chittoor dist	Chittoor	6.00	24.1.2004
3	Greenko Energies Pvt Ltd, (Chennur unit) Plot No. 1071, Road No. 44, Jubilee Hills, Hyderabad. 500 033, ph.040-23552263	Chennur (v M) Cuddapah dist	Cuddapah	6.00	14.4.2004
4	Vamshi Industries Ltd. R.O. 2-215/10, Sreenagar, Anneparthy, East Godavari dist. 500 342. ph.no. 08857-229962	Vemulapalli (v) Mandapeta (m) East Godavari dist	East Godavari	4.00	20.4.2001
5	Sudha Agro Oil & Chemicals Industries Ltd, PB No. 9, Samalkot. 533 440, East Godavari dist. Ph.0884-2327240/2327379, fax.0884-2327223.mail.sudhaagro@sify.com	Samalkot (v &m) East Godavari dist	East Godavari	4.00	27.12.2001
6	Shree Papers Ltd, 76-1-17, A3 & A4 Akhil Apartments, Danvaipet, Rajamundry. 533 103 ph.0883-2476999/39/49	G.Rangampet(v) Peddapuram (M) East Godavari dist	East Godavari	4.00	23.2.2003
7	Jocil Limited, PB No. 216, Arundalpet, Guntur. 522 002.ph.no.0863-2290191/92	Dokiparru (v) Medikudur(M) Guntur dist	Guntur	6.00	23.3.2001
8	Matix Power (p) Ltd, 8-2-227/12, No. 296, Road No.3, UBI colony, Banjara Hills, Hyderabad 500 034. ph. 040-23546776	Karempudi (v&M), Guntur dist	Guntur	4.50	08.8.2001
9	Greenko Energies Pvt Ltd, (Sattenapally Unit) Plot No. 1071, Road No. 44, Jubilee Hills, Hyderabad. 500 033, ph.040-23552263	Vandavalli (v) Sattenpally (m) Guntur dist	Guntur	6.00	19.7.2002
10	Satyamaharshi Power Corpn Ltd, Krosu Road, Muthaiahpalem (v) Amaravathi (m) Guntur dist. 522 020 ph08645-255355	Muttayapalem (v) Guntur dist	Guntur	6.00	13.7.2004

11	Velagapudi Power Generation Ltd, 74-2-12A, Ashoknagar, Vijayawada.520 007 Ph.0866-2554801	Nadimpalem (v) Prathipadu (m) Guntur dist	Guntur	4.00	13.11.2006
12	HCL Agro Power Ltd, Suite, 508, 5th floor, Model House Panjagutta, Hyderabad. 500 033, ph.no. 040-66153235	Vedadri (V) Jaggaiahpet (M) Krishna dist	Krishna	6.00	24.10.2000
13	Roshni Power Tech Ltd, 1071, Road No.44, Jubilee Hills, Hyderabad. 500 033, Ph.040-32915858	Ayyanki (V)Movva(M) Krishna dist	Krishna	6.00	30.8.2001
14	Satyakala Power Projects (P) Ltd, Ganguru (v) Penamaluru (M) Krishna dist	Ganruru (v) Penamaluru (M) Krishna dist	Krishna	4.00	02.11.2001
15	Vijaya Agro Products (p) Ltd, Enikepadu, Vijayawada, Krishna dist. Ph.0866-2842451/2842452, fax.0866-2842678, mail. vijayaag@hotmail.com	Enikepadu, Vijayawada, Krishna dist	Krishna	4.00	24.12.2001
16	Veeraiah Non-Conventional Power Projects Ltd., Kuramaddali. 521 301, Pammaru Mandal, Krishna dist. Ph. 08674-242260/242769	Kuramaddali (v) Pamarru (m) Krishna dist	Krishna	4.00	26.10.2002
17	Balaji Agro Oils Ltd, D.No. 74-2-19, Old Check Post Centre (near) Krishnagar, Vijayawada, 520 007 ph.0866-2554393/2554326	Davuluru (v) Kankipadu (m) Krishna dist	Krishna	4.5	01.06.2003
18	Rayalaseema Green Energy Ltd, 1-10-19, Street No.3, Ashok Nagar, Hyderabad. 500 020, ph.no.040-27611058	Pandupadu (V) Kalluru (M) Kurnool dist	Kurnool	5.50	14.2.2001
19	Suchand Power Gen.(p) Ltd, 309 IDA, Bachupally, Miyapur, Bollaram Road, Hyderabad. 500 072.ph.040-23042552/23040436/23043017.fax 040-2343974	Udumulapuram (v) Nandyal (m), Kurnool dist	Kurnool	6.00	28.11.2002
20	SLS Power Ltd, 3/336, Laxmipuram, Nellore dist. Ph.0861-2313596/2314922	Navalok Garden, Nellore rural	Nellore	6.00	30.8.2001
21	Bollineni Castings & Steels Ltd, Progressive Towers, 5th floor, 6-2-913/914, Khairthabad, Hyderabad. 500 004, ph040-23307704/23307031	Suryapalem (v) Podalkur (m) Nellore dist	Nellore	6.00	07.10.2003
*22	Jyothi Bio Energy Ltd, Mayank Tower, 6-3-1090/B, 1&2,4 Floor, Rajbhavan Road, Hyderabad. 500 082	Gundlapally (V) Maddipadu (M) Prakasham dist	Prakasham	4.50	17.11.2000

23	Agri Gold Projects Ltd, 40-1-21/3, Surya Towers, 1st Floor, MG Road, Catholic Complex, MG Road, Vijayawada, 520 010, Krishna dist. Ph.0866-6667471	Dupadu (v) Tripurantkam (M) Prakasham dist	Prakasham	6.00	19.6.2003
24	Jyothi Bio Energy Ltd, Mayank Tower, 6-3-1090/B, 1&2,4 Floor, Rajbhavan Road, Hyderabad. 500 082 ph 040-30603399	Gundlapally (V) Maddipadu (M) Prakasham dist	Prakasham	6.00	14.11.2003
25	Clarion Power Corp.Ltd, 8-2-684/2/A, Plot No.1 to 4, 4th floor, NSL Icon Opp. ICICI Bank, Road No.2, Banjara Hills, Hyderabad. 500 034 ph.040-23327919/39/49	Tangutur (vM) Prakasham dist	Prakasham	12.00	23.1.2004
26	Singaraya Hills Green Power Genco (p) Ltd. 40-1-21/3, First Floor, Surya Towers, MG Road, Vijayawada, Krishna dist. 520 010 ph0866-6667471,fax 0866-6641747 mail. agriacc@yahoo.com	Hasnapur (v) Tripurantakam (m) Prakasham dist	Prakasham	8.00	13.7.2008
27	Varam Power Projects (P) Ltd, D.No. 8-4-120/3, Raja complex, GT Road, Srikakulam. 532 001 ph 08942-228444	Chilakapalem(v) Regadiamadalavalasa (m) Srikakulam	Srikakulam	6.00	01.12.2001
28	Perpetual Energy Systems Ltd.,8-2-684/2/A, Plot No.1 to 4, 4th floor, NSL ICON, Opp. ICICI Bank, Road No.2, Banjara Hills, Hyderabad.500 003	Appayyapet (v) Sitanagaram (m) Vizinagaram dist	Vizinagaram	6.00	23.03.2003
29	Vishnu Vidyuth India Ltd (Formerly Circar Power Ind ltd) Plot No. 18, street No.1, Sagar society, Road No.2, Banjarahills, Hyderabad. 500 034, ph.23540195, fax,23554498	Narasingabilli (V) Kasimkota (m) Visakhapatnam dist	Visakhapatnam	7.50	11.1.2013
30	Gowthami Solvent Oil Ltd, PB No. 1, Pydiparru, Tanuku. 534211, West Godavari. Ph. 08819-224992	Tanuku (V&M), West Godavari	West Godavari	2.75	31.3.1996
31	Sri Kalyani Agro Products & Industries Limited, Prathipadu (v) Pentapadu (M), West Godavari dist. 534 146,ph.no. 08818-222655/223599, 9848122655(Narayana Rao)	Prathipudi (v &M) Pentapadu (M) West Godavari dist	West Godavari	4.00	03.12.2002
	Total			**171.25**	

LIST OF BAGASSE BASED CO GENERATION POWER PROJECTS IN ANDHRA PRADESH STATE

Sl.No.	Name & address of the Developer	Name of the location	Name of the Dist.	Installed capacity	Date of Commissioning
1	Shree Vani Sugars & Industries Ltd, Mudipapanapalli (V) Sugalimitta(post) Punganur, Chittoor dist	Mudipapanapalli (V) Sugalimitta Post, Chittoor dist	Chittoor	9.00	08.08.2003
2*	Sudulagunta Sugars Ltd, 209, TP area, Tirupathi.517501. Chittoor dist.	BN Kandriga (V) Srikalahasti (M) Chittoor dist	Chittoor	8.00	09.06.1999
3	Nava Bharat Ventures Ltd., Nava Baharath Chambers, 63-1109/1, 2nd floor, Raj Bhavan Road, Hyderabad. 500 082	Samalkot, East Godavari dist	East Godavari	9.00	23.11.2005
4	Sri Sarvaraya Sugars Ltd, Cehlluru, East Godavari	Chelluru, East Godavari	East Godavari	19.65	25.12.2008
5	KCP Sugar Industries & Corp.Ltd, Laxmipuram, Challapalli (M) Krishna dist	Vuyyuru, Krishna dist	Krishna	12.00	26.12.2005
6	KCP Sugar Industries & Corp.Ltd, Laxmipuram, Challapalli (M) Krishna dist	Laxmipuram, Krishna dist	Krishna	5.00	26.12.2005
7	Saritha Sugars Ltd, Prabhagiripatnam (V) Padalkur (M) Nellore Dist	Prabhagiripatnam (v) Padalkur(M) Nellore dist.	Nellore	6.00	00.04.2001
8	Empee Power company (I) Ltd "Empee Towers" 59, Harris Road, Pudupet, Chennai. 600 015, ph.no. 044-28522510 fax.044-28555163. mail.empee@satyam.net.in	Ayyappareddipalem (v) Naidupet (M) Nellore dist	Nellore	20.00	02.12.2009

9	GMR Industries Ltd. 6-3-866/868, Green lands, Begumpet, Hyderabad.500 016, Phone no. 23412191/94	Sankili (v) Regadi Amadalavalasa (M) Srikakulam dist	Srikakulam	16.00	15.8.2001
10	Chodavaram Co-op. Sugars Ltd, Govada V.Chodavaram (M), Viskhapatnam dist.	Govada (V), Chodavaram (M) Visakhapatnam dist.	Viskhapatnam	14.00	06.04.2003
11	The Etikoppaka Co.op Agrl. & Industrial Society Ltd., Etikoppaka. 531 082, Viskhapatnam dist. Ph.08931-40317	Dariapudi (V) S. Rayavaram (M) Viskhapatnam	Viskhapatnam	4.50	01.03.2001
12	NCS Sugars ltd., 405 & 406, Minar Apartments, Deccan Towers, Basheerabagh, Hyderabad. 500 001, Ph.No. 040-66666331/34/35	Sithanagaram (v) Vizinagaram	Vizinagaram	20.00	15.6.2007
13	Andhra Sugars Ltd., Venkatrayapuram, Tanuku. 5323415, West Godavari.dist. Phone no. 08819-24911 to 15	Tadvai, Jangareddygudem(M), West Godavari dist.	West Godavari	7.00	21.01.1999
14	Krishnaveni Sugars Ltd, D.No.3-5-821, Doshi Square, Hyderabad	Ramakrishnapuram, West Godavari	West Godavari	28.00	19.10.2003
15	Jeypore Sugars Company Ltd (Unit II), Pothavaram, West Godavari dist. 534 176, Fax. 08818.274955. 274788, mail.vrksugars@rediffmail.com	Pothavaram (V&MM) West Godavari	West Godavari	16.80	19.10.2003
16	Jeypore Sugars Company Ltd, Chagallu. 534342, West Godavari dist	Chagallu (V&M), West Godavari	West Godavari	12.00	19.10.2003
	Total			**206.95**	

N.R.E.D.C.A.P.LTD. HYDERABAD
LIST OF BIOMASS CO GENERATION (NON-BAGASSE) POWER PROJECTS IN ANDHRA PRADESH STATE

Sl.No.	Name & address of the Developer	Name of the location	Name of the Dist.	Installed capacity	Date of Commissioning

1	Lalitha Enterprises	East Godavari dist	East Godavari	0.50	15.85.2003
2	Sri Murali Mohana Para Boiled Rice Mill	East Godavari dist	East Godavari	0.65	26.8.2003
3	Sri Ramadas Paper Boards (P) Ltd	East Godavari dist	East Godavari	4.00	27.6.2006
4	Surya Chandra Paper Mills Ltd	East Godavari dist	East Godavari	3.00	27.11.2007
5	Sri Satyanarayana Raw & Boiled Rice (P) Ltd	West Godavari dist	West Godavari	0.75	31.3.2008
6	Delta Paper Mills Ltd	West Godavari dist	West Godavari	9.90	1.12.2007
7	Sree Godavari Kraft Paper (p) ltd	West Godavari dist	West Godavari	3.00	15.11.2008
8	Sri Gowthami Rice Industries Ltd	East Godavari dist	East Godavari	0.75	25.3.2009
9	Sirius Overseas Pvt. Ltd	East Godavari dist	East Godavari	9.00	4.1.2009
10	Seven Hills Papers (P) Ltd	East Godavari dist	East Godavari	1.20	25.2.2009
11	Sri Lalitha Enterprises Industries Ltd (Unit II	East Godavari dist	East Godavari	4.70	25.2.2009
12	Pallavi Enterprises, D.No.6-22, Enikepadu, Vijayawada, Rural, Krishna Dist	Enikepadu, Vijayawada, Rural	Krishna	2.50	10.2.2010
13	MGRRice Industries, Polamuru,533 342, Anaparthi Mandal, East Godavari dist	Polamuru	East Godavari	0.89	1.7.2013
15	Adilaxmi Industries, Vetapalem. Rly.Station, East Godavari dist	Vetapalem	East Godavari	0.41	1.4.2014
16	Naga Hanuman Solvent Oils Pvt Ltd, D.No. 7B-15-45, Maruthinagar, Vippuvari Veedhi, Eastern Street, Eluru, West Godavari dist	Gundugolanu	West Godavari	1.20	1.12.2013
17	Nava Bharat Agro Products Limited, 8-2-235, Road No.3, Banjara Hills, Hyderabad	Uppalameta	West Godavari	0.95	12.9.2014

18	M/s Ananda Enterprises (India) Pvt Ltd, 27-8-21/3, Shivaraopet, Bheemavaram, West Godavari dist	Kothapusalamarru	West Godavari	2.00	1.4.2014
19	M/s Shree Gowthamee Rice Industries (P) Limited, Chelluru, Rayavaram Mandal, East Godavari dist	Cehlluru	East Godavari	0.58	1.2.2014
20	M/s Aroma Biotech Pvt Ltd, St. No. 237/1, Avapadu village, Nallajerla Mandal, West Godavari dist	Avapadu	West Godavari	2.20	12.5.2012
21	M/s. Vijaynagar Bio- Tech Ltd	Kotha Koperla (V), Pusapatiregu (M)	Vizianagaram	1.20	20.02.2013
22	M/s. Nava Bharat Agro Products Ltd, 8-2-235, Road No.3, Banjara Hills, Hyderabad	Uppalametta (V), Jangareddygudem (M)	West Godavari	1.00	15.03.2015
23	M/s Veda Bio Fuel Pvt Ltd, Nadipalli(V), Pusapatirega(M) Vizianagaram Dt.	Nadipalli(V), Pusapatirega(M) Vizianagaram Dt.	Vizianagaram	3.00	15.03.2016
24	M/s Shree Gowthami Rice Industries (P) Ltd Chelleru(V), Rayavaram (M), E.G.Dist.	Chelleru(V), Rayavaram (M)	East Godavari	0.88	01.06.2016
25	M/s Balaji Boiled & Raw Rice Mill, Ramavaram (V), Jaggampet, E.G.Dist.	Ramavaram (V) Jaggampet,	East Godavari	0.89	01.06.2016
	Total			**55.14**	

MUNICIPAL SOLID WASTE POWER PROJECTS COMMISIONED IN ANDHRA PRADESH STATE

Sl.No.	Name & address of the Developer	Name of the location	Name of the Dist.	Installed capacity	Date of Commissioning
1	M/s.Sri Ram Energy System Ltd	Vijayawada	Vijayawada	6.00	04.12.2003

2	Vijayawada Municipal Corpn. Biomethanation Plant	Vijayawada	Vijayawada	0.15	11.11.2004
				6.15	

INDUSTRIAL WASTE POWER PROJECTS COMMISIONED IN ANDHRA PRADESH STATE

Sl.No.	Name & address of the Developer	Name of the location	Name of the Dist.	Installed capacity	Date of Commissioning
1	M/s. Ruchi Soya Industries (formerly Palm Tech India ltd), IDA , ADB Road, Peddapuram - 533 437, EGDt Ph: 08852 242480	Peddapuram IDA, E.G Dist.	East Godavari	0.50	30.8.1999
2	M/s. Blue Ocean Biotech Ltd(Previously Vensa Biotek Ltd), Flat No: 506, Keerthi Apartments, E Block, YellareddygGuda, Ameerpet, Hyderabad 500 073	Samalkota, E.G Dist.	East Godavari	5.00	8.11.2003
3	M/S.Devi Corn Products Ltd., Biccavolu- 533 343 East Godavari Dist. Ph: 08857-37007,36767.	Biccavolu, East Godavari Dist	East Godavari	1.5	01.03.2004
4	M/s.Sri Sarvaraya Sugars Ltd., Chelluru, Rayavaram (M), East Godavari Dist	Chelluru, Rayavaram (M), East Godavari	East Godavari	1.00	25.06.2006
5	M/s. Sai Renewable power Pvt. Ltd., Kamavarapukota, West Godavari Dist	Kamavarapukota, West Godavari Dist	East Godavari	4.50	12.04.2004
6	M/s Foods Fats & Fertilizers Ltd., Tadepalligudem, West Godavari Dist.	Tadepalligudem, West Godavari Dist.	East Godavari	6.00	01.11.2006

7	M/s Jeypore Sugar Company Ltd., Chagallu, West Godavari Dist.	Chagallu, West Godavari Dist.	East Godavari	1.00	27.06.2007
8	M/s KCP Sugar & Industries Corp., Ltd, Vuyyuru, Krishna Dist.	Vuyyuru, Krishna Dist	East Godavari	1.00	07.02.2006
9	M/s. Tern Distilleries (P) Ltd Tallapalem, Kasimkota (M), Viskhapatam Dist.	Tallapalem, Kasimkota (M), Viskhapatam Dist.	East Godavari	0.75	07.12.2006
10	M/s. Raus Power PVT. Ltd., Duppalapudi (V), Anaparthy (M) East Godavari Dist.	Duppalapudi (V), Anaparthy (M) East Godavari Dist	East Godavari	3.66	07.02.2009
11	M/s Godrej oil palm Ltd., Ch.Pothepally (V), Dwaraka Tirumala (M), West Godavari Dist.	Ch.Pothepally (V), Dwaraka Tirumala (M), West Godavari Dist	East Godavari	1.60	01.12.2010
12	M/s Redan Infrastructure Pvt Ltd, at Ganagavaram (M), Chittoor District.	Ganagavaram (M), Chittoor District.	Chittoor	7.50	06.04.2015
13	M/s Richmond Power Private Ltd at Koduru (V), Garividi (M), Vizianagaram District	Koduru (V), Garividi (M), Vizianagaram District	Vizianagaram	6.00	01.03.2016
	Total			**40.01**	

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