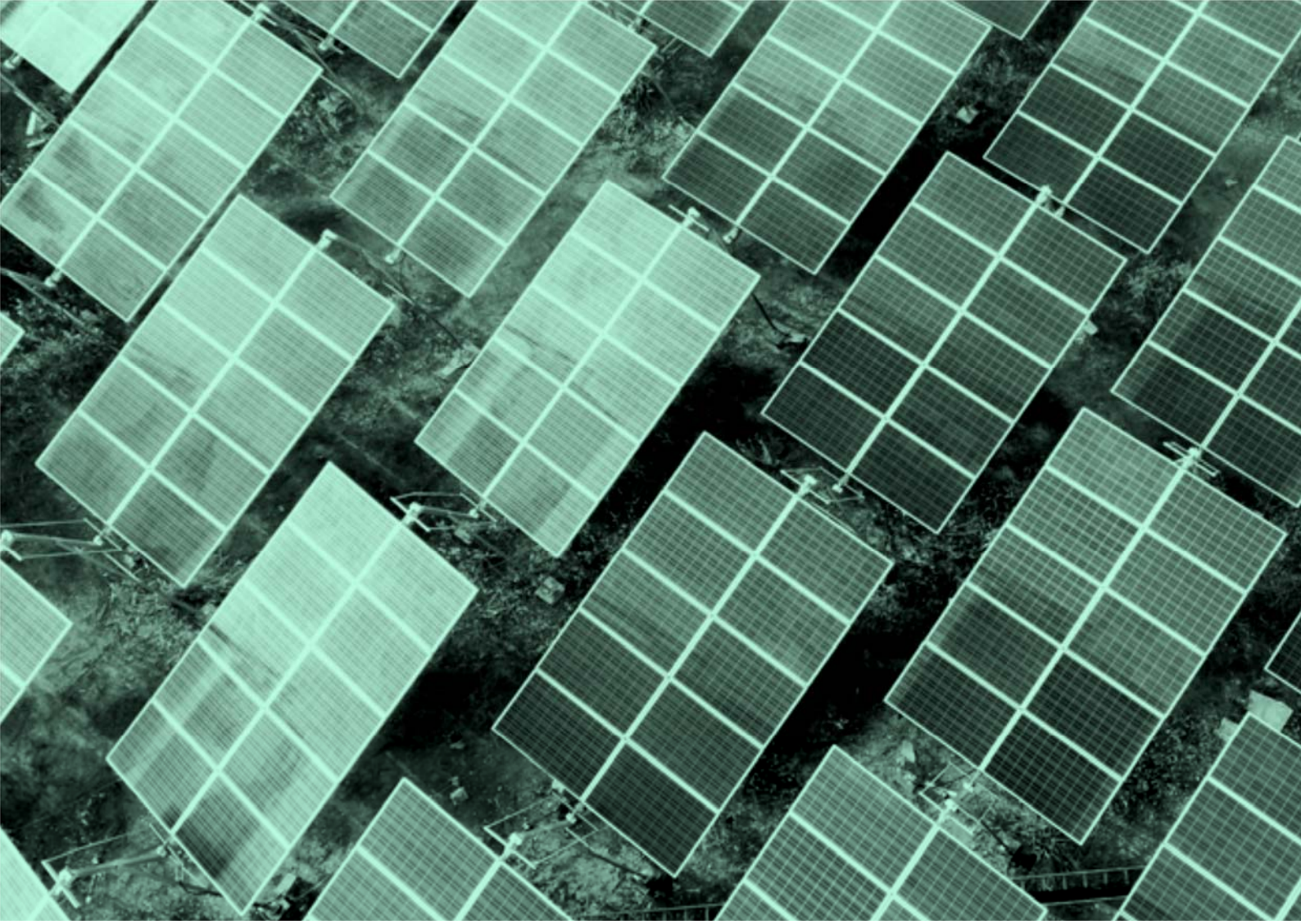

Update Report of ESIA study for 250 MW Solar Power Project

Ananthapuramu, Andhra Pradesh

Final Report

24 July 2020

Project No.: 0557252

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Ayana Renewable Power Private Limited

The business of sustainability

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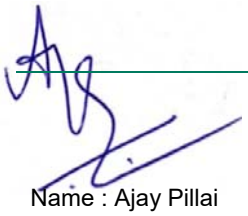

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Acronyms and Abbreviations

AASPL	Ayana Ananthapuramu Solar Power Ltd
AC	Alternating Current
APGENCO	Andhra Pradesh Power Generation Corporation Limited
APPCB	Andhra Pradesh Pollution Control Board
APSPCL	Andhra Pradesh Solar Power Corporation Pvt. Ltd
ARPPL	Ayana Renewable Power Private Limited
COVID-19	Coronavirus Disease 2019
CPCB	Central Pollution Control Board
CTE	Consent to Establish
CTO	Consent to Operate
DC	Direct Current
EFR	External factor Review
EHS	Environmental Health and Safety
EIA	Environment Impact Assessment
EPC	Engineering Procurement Construction
ESAP	Environmental and Social Action Plan
ESDD	Environmental and Social Due Diligence
ESG	Environmental and Social Governance
ESIA	Environmental and Social Impact Assessment
ESMS	Environmental and Social Management System
IMS	Integrated Management System
ISA	Implementation and Support Agreement
LARR	Land Acquisition, Rehabilitation & Resettlement
MoEFCC	Ministry of Environment Forest and Climate Change
MRO	Mandal Revenue Officer
Name	Description

NREDCAP	New and Renewable Energy Development Corporation of Andhra Pradesh Limited).
PGCIL	Power Grid Corporation of India Limited
PMC	Project Management Consultant
PPA	Power Purchase Agreements
QHSE	Quality, Health, Safety and Environment
SEIAA	State Environmental Impact Assessment Authority
SOP	Standard Operating Procedure
SPCB	State Pollution Control Board
SPV	Special Purpose Vehicle

EXECUTIVE SUMMARY

E.1 Context Setting

Ayana Renewable Power Pvt. Ltd (ARPPL) had completed the Environmental and Social Impact Assessment (ESIA) study of the proposed 250 MW Solar Power Project in Ananthapuramu, Andhra Pradesh, India, as per IFC guidelines in December 2018, through a third party consultant 'M/S Opensense Labs Private Limited' (hereinafter referred to as 'OSL').

AIIB is, at present, evaluating a potential investment opportunity into the project. In April 2020, Ayana submitted the ESIA report to AIIB for a review. AIIB completed the review and shared comments on the ESIA Report with Ayana.

Ayana engaged ERM for alignment the ESIA Study to AIIB's comments and the requirements of AIIB's E&S Framework. The work was awarded to ERM in the last week of May 2020 with a quick turnaround time for the deliverable of ten (10) days from Service Order. The assignment was completed basis desk based assessment of the data shared (no site visit included), telephonic conversation / video conferencing for discussions with Ayana's corporate and site team, other related interactions with relevant stakeholders on land securing process and compensation.

ERM undertook desk based review of available documents for the Project from 28th May to 5th June 2020.

E.2 Project and Entities Involved

Ayana Renewable Power Pvt. Ltd ('Ayana' or 'ARPPL' or 'Client') has been set up to develop renewable energy generation capacities in India and its neighbouring countries.

Ayana (ARPPL) through its special purpose vehicle (SPV) Ayana Ananthapuramu Solar Power Ltd (AASPL) is developing the 250 MW Solar Power Plant within the 1500 MW solar power park at N.P Kunta Mandal of Ananthapuramu District of Andhra Pradesh Andhra Pradesh.

The solar power park is named Ananthapuramu Ultra Mega Solar Park (1500 MW) and is managed by Andhra Pradesh Solar Power Corporation Pvt. Ltd. (APSPCL). Out of the total 1500 MW, about 1000 MW capacity solar power plants have already been commissioned within the Park by several Independent Power Producers (IPP) and are currently operating and evacuating energy. APSPCL is responsible for providing land that is free of encumbrance, on lease of 25 years for generating and distributing power along with other allied infrastructure such as developing and managing transmission line, access road, water supply through pipeline from a water reservoir constructed within the solar park.

APSPCL was incorporated in the year 2014 under Companies Act 2013 as a joint venture company between SECI (Solar Energy Corporation of India), APGENCO (Andhra Pradesh Power Generation Corporation Limited) and NREDCAP (New and Renewable Energy Development Corporation of Andhra Pradesh Limited). The objective was to plan, develop and operate solar parks in state of Andhra Pradesh under MNRE scheme for development of solar parks and Ultra Mega Solar power projects in the country, notified on 12th December 2014. In line with this, APSPCL was designated as Solar Power Park Developer (SPPD) by MNRE for facilitation and implementation of Ultra Mega Solar Park. Power Purchase Agreement was executed between AASPL and NTPC Ltd. on 17th July 2018.

E.3 Project Overview

The proposed 250 MW solar plant is located in NP Kunta and P. Kothapalli villages of NP Kunta Mandal of Ananthapur District of Andhra Pradesh. At present, the Project is under construction stage.

The proposed site is situated approximately 30 km West of Kadiri town. Bangalore is the closest airport located at road distance 180 km from the project site. The rail connectivity to the site is through the Kadiri Railway Station under south central railway zone which is at a distance of approximately 31 km from the site. The project site entrance is situated right on State Highway 34 connecting district of Anantapur and Kaddpa of Andhra Pradesh.

Tata Power Solar System Ltd. (TPSSL) has been appointed as the Construction phase contractors. The O & M contractors have not been finalised at this stage.

The power generated will be evacuated to 33/220kV Pooling Station at 33kV and further will be evacuated to 400/220kV PGCIL Substation.

Total land area of 1274 acres has been allotted on lease basis by APSPCL. Ayana will require 1250 acres of land for commissioning 250 MW solar project. 1274 Acres of land has been allotted to Ayana which includes unusable area of 24 Acres. The unusable area includes area of land covered with small hill, natural drain and unsuitable slopes for the project.

The Project aims to commission first 50 MW by September 2020, next 100 MW by October 2020, balance 100 MW by November 2020 and balance DC capacity of 125 MW by Dec'20.

E.4 Applicable Reference Framework

The following reference framework is applicable to the Project:

- Applicable environmental and social regulations and policies in India and the State of Andhra Pradesh;
- Institutional Framework for the implementation of the regulations; and
- International Standards includes the following:
  - IFC Performance Standards (2012);
  - IFC/World Bank General EHS Guidelines (2007);
  - IFC/World Bank EHS Guidelines for Electric Power Transmission and Distribution (2007); and
  - Asian Infrastructure Investment Bank (AIIB) Environmental and Social Framework (ESF).

E.4.1 Applicability to IFC Performance Standards and AIIB E & S Standards

The following IFC Performance Standards and AIIB E & S standards are applicable to the Project:

S.No.	Description of IFC PS and AIIB E & Standards	Objectives and Applicability to Project
1.	**PS-1 of IFC Performance Standards 2012** Assessment and Management of Environmental and Social Risks and Impacts. The client will establish and maintain a Social and	**Applicable** This PS and AIIB E & S standard aims to assesses the existing social and environmental management systems of Ayana and to identify the gaps with respect to their functioning, existence and implementation of an environmental and social management plan (ESMP), a defined EHS Policy, organization chart with defined roles and responsibilities, risk identification and management procedures as well as processes like stakeholder engagement and grievance management.. ARPPL team is required to have an Environmental and Social Management System (ESMS) at the Corporate level which shall be

S.No.	Description of IFC PS and AIIB E & Standards	Objectives and Applicability to Project
	Environmental Management System appropriate to the nature and scale of the project and commensurate with the level of social and environmental risks and impacts. **AIIB E&S Standards** ESS 1: Environmental and Social Assessment and Management	applicable for all its projects. The ESMS shall include (but not limited to) the following elements: ■ An Environment Health Safety and Social (EHSS) policy ■ Site Screening mechanism and site selection criteria; ■ Identification procedure of risks, impact assessment and EHS&S management procedures for all phases of its projects; ■ Framework for developing site specific E&S management programs; ■ Organizational structure for ESMS implementation ■ Training and capacity building; ■ Monitoring and review mechanism; Schedule for periodic review and update of ESMS.
2.	**PS-2 of IFC Performance Standards 2012** Labour and Working Conditions **AIIB E&S Standards** ESS-1 - Environmental and Social Assessment and Management	**Applicable** As per AIIB ESS requirements, the Project workers must have a labor management system which includes the following, consistent with relevant national law: (a) clear and understandable written terms of employment made available to Project workers in an accessible manner; (b) timely payment for Project work; (c) adequate periods of rest; (d) timely notice of termination of the working relationship (e) employment on the basis of the principle of equal opportunity, fair treatment and non-discrimination; (f) compliance with national law relating to workers' organizations and collective bargaining; (g) an accessible, understandable and transparent grievance mechanism for raising Project workplace. The project activities will involve hiring of skilled, semi-skilled and unskilled labourers during the construction phase and solar plant staff during the operation phase. The project will have to develop a human resource policy and ensure non-discrimination and equal opportunity, protection of the workforce and occupational health and safety. Therefore, PS 2 and ESS-1 is applicable to the Project.
3.	**PS-3 of IFC Performance Standards 2012** Resource Efficiency and Pollution Prevention	**Applicable** PS-3 covers the use resources and materials as inputs and wastes that could affect human health. The objective of PS-3 are: to avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities; to promote more sustainable use of resources, including energy and water, and to reduce project related GHG emissions. Key themes covered under PS-3 are: pollution prevention, resource conservation and energy efficiency, wastes, hazardous materials, emergency preparedness and response, greenhouse emissions, pesticide use and management.

S.No.	Description of IFC PS and AIIB E & Standards	Objectives and Applicability to Project
		This PS will assess how Ayana intends to minimize pollution related impacts, what management plans and systems are in place, and what measures it plans to take to conserve and use resources more efficiently. The Project construction activities will lead to increased fugitive dust emissions and loss of vegetation in the area. The project activities will also lead to increase in ambient noise level during the construction phase, which may have potential impact on the nearest settlements situated within 1 km from the project. Furthermore, the project activities will involve generation of waste and involve abstraction of water from bore wells and reservoirs. Therefore, PS 3 is applicable to the Project.
4.	**PS-4 of IFC Performance Standards 2012** Community Health, Safety and Security	**Applicable** This PS-4 requires due diligence to anticipate and avoid adverse impacts on the health and safety of the affected community during the project life from both routine and non-routine circumstances. It also requires to ensure that the safeguarding of personnel and property is carried out in accordance with relevant human rights principles and in a manner that avoids or minimizes risks to the affected Communities. Key areas of compliance screened under PS-4 includes: infrastructure/equipment safety, hazardous material safety, natural resource issues, exposure to disease, emergency preparedness and response, and security personnel requirements. The project would affect the health and safety of the communities adjacent to it during construction phase. Movement of large trailers and vehicles used during construction phase may pose risk of accident and injury to local community settlements along the route of operations as well as the labours engaged in the construction work. Therefore, PS 4 is applicable to the Project.
IFC PS5	**PS-5 of IFC Performance Standards 2012** Land Acquisition and Involuntary Resettlement **AIIB E&S Standards** ESS- 2: Involuntary Resettlement	**Not Applicable** This Performance standard and ESS-2 is not applicable for the project as there is no physical displacement understood to have happened due to project related land procurement.
IFC PS6	**PS- 6 of IFC Performance Standards 2012** Biodiversity Conservation and Sustainable Management of Living Natural Resources	**Not Applicable** Since, the solar power site is not passing through any natural habitats. There is no national ecological protected area and internationally recognized Key Biodiversity area, Important Bird Area within 10 km of the project footprint. Therefore, PS 6 is not applicable to the project.

S.No.	Description of IFC PS and AIIB E & Standards	Objectives and Applicability to Project
IFC PS7	**PS- 7 of IFC Performance Standards 2012** Indigenous Peoples **AIIB E&S Standards** ESS-3: Indigenous Peoples of AIIB Environmental & Social Standards 2016.	**Not Applicable** This PS and AIIB ESS-3 is not applicable for the project as it is not set up in a Schedule V area or has Indigenous population (referred to Scheduled Tribes (ST) in India), that is being impacted due to land procurement or other project activities.
IFC PS8	**PS- 8 of IFC Performance Standards 2012** Cultural Heritage	**Not Applicable**: For the purposes of PS-8, cultural heritage refers to (i) tangible forms of cultural heritage; (ii) unique natural features or tangible objects that embody cultural values; and (iii) certain instances of intangible forms of culture that are proposed to be used for commercial purposes. The requirements of PS-8 apply to cultural heritage regardless of whether or not it has been legally protected or previously disturbed. This PS is understood to be not applicable for the project as the Project site is not located near any cultural heritage or legally protected sites.

E.4.2 Project Categorisation and Justification

The IFC and AIIB categories are similar in nature and based on the assessment of said categories the Project has been categorised as **Category B**[1] based on the following reasoning:

- Land use related impacts are restricted to construction phase as impact are mainly in the form of clearing of vegetation from land prior to construction activities. The potential for alteration of land use of the proposed site has been assessed as moderate owing to likely alteration of water holding and erosion pattern.
- A small proportion of the waste generated during construction phase will be hazardous and will include waste fuel, grease and waste oil containing rags. Use transformer oil which is also categorised as hazardous waste will be generated from the plant. If improperly managed, solid waste could create impacts on soil quality. However, the impact magnitude has been assessed as small as such impacts are manageable through effective hazardous and other waste management measures.
- It is understood that APSPCL is not expected to provide water supply for construction purposes. Ayana is required to obtain necessary approvals/ permission from local authorities to install bore

[1] As per AIIB's Environmental and Social Framework, Category B is defined as below:
A Project is categorized B when: it has a limited number of potentially adverse environmental and social impacts; the impacts are not unprecedented; few if any of them are irreversible or cumulative; they are limited to the Project area; and can be successfully managed using good practice in an operational setting. The Bank requires the Client to conduct an initial review of the environmental and social implications of the Project. On the basis of this review, the Bank, in consultation with the Client, determines the appropriate instrument for the Client to assess the Project's environmental and social risks and impacts, on a case-by-case basis. The Bank may determine that an environmental and social assessment or another similar instrument is appropriate for the Project. The scope of the assessment may vary from Project to Project, but it is narrower than that of the Category A ESIA. As in the case of a Category A Project, the assessment examines the Project's potentially negative and positive environmental impacts and recommends any measures needed to avoid, minimize, mitigate, or compensate for adverse impacts and improve environmental performance of the Project.

well or to obtain access to water from nearest reservoir by tankers. Additionally, use of water resource is also expected during operation phase for module cleaning activities. APSPCL is responsible for supplying water to the project proponent along with other solar power project developers. This may put additional stress on water resources, therefore, the impact significance during operation phase has been assessed as moderate. It must be noted that additional mitigation measures by the project proponent such as optimizing water usage, sensitization of water use, regular inspection of water leaks, recycling/ reuse to the extent possible and opting for dry and semi dry module cleansing mechanisms (to the extent feasible) may reduce the overall impact.

- Construction activities will increase fugitive dust emissions during site clearance and other activities such as increased plying of vehicles will increase vehicular emissions. However, the construction activities are expected to span over a short period of time (~6 months), and therefore, impact significance on air quality has been assessed as small. The air emissions during operation phase of the project are expected to be limited to occasional use of DG units.
- Based on ambient noise monitoring conducted for the project (as part of ESIA Study 2018), the noise level in the project area is within CPCB permissible limit. No settlements are located within 1 km of the project site. Hence, the receptor sensitivity is assessed to be low. Impact significance over the construction period has been assessed as negligible owing to limited presence of sensitive receptors within the project vicinity and as construction activities are expected to span over a short period of time. Noise during operation phase is expected to be limited to occasional plying of vehicles to and from the site, and running of project related utilities.
- As per the primary and secondary ecological assessment undertaken as part of ESIA Study (2018), the impact magnitude on habitat, based on Habitat-Impact Assessment Criteria is assessed as negligible. Based on species sensitivity value, project construction activity is not expected to cause substantial change in the population of the species or other species dependent on it. Based on Species-Impact Assessment Criteria the impact magnitude on species was also assessed to be Negligible.
- The Project is situated on 1274 Acres of land allotted to Ayana, out of the approximately 7181 Acres of land for 1500 MW ultra -solar power park. AASPL was not involved in acquisition and procurement of land. APSPCL was responsible for providing encumbrance free land to AASPL. The land lease agreement was signed between APSPCL and AASPL on 23rd October 2018, for a period of 25 years. Based on the review of document, consultation with MRO and limited landowners, it is understood that the Project did not lead to any physical displacement. However, mitigation measures have been recommended for AASPL to ensure that compensation paid by APSPCL was paid as per legal requirement. In addition, mitigations measure are recommended for improving livelihoods of land losers through skill development activities and employment opportunities.

E.5 Baseline Conditions

E.5.1 Environmental Baseline

Anantapur district has a semi-arid climate, with hot and dry conditions for most of the year. Chitravati River is around 25 km from the project site. The project area does not fall within any sensitive receptors viz. Wild Life Sanctuaries, Biosphere Reserves, National Parks etc. There are no archaeological and historical monuments in, along or near (2.5 km) the project site.

There are few natural *nallas* (water drain) within the project boundary and will not be altered or impacted by the project activities. The Galiveedu reservoir adjacent to the project boundary will not be affected as the drainage (watershed) patterns; structures will not be disturbed and will remain as is. The land required for construction of 250 MW solar park i.e. .1250 acres will be excluding these lands

and are marked as unusable land. Total land allotted to Ayana is 1274 acres (24 acres unusable land).

The ground water in the district is in general suitable for both domestic and irrigation purposes. The Electrical Conductivity ranges from 569 to 9980 micro Siemens/cm at 250 C. Fluoride concentration in some locations of the district is more than permissible limit. In some places, it is not suitable for drinking due to the presence of Nitrates. A total of 993 Fluoride affected villages exist in the district. The proposed project falls in NP Kunta Mandal where the electrical conductivity is within the permissible limits and is suitable for both domestic and irrigation purposes.

The site experiences semi-arid climate with extreme summer and moderate winters. Incidence of drought occurs due to inadequate and erratic distribution of rainfall in space and time. The district experiences the temperature variation between 25°C and 43°C. The year is divided in to summer season from March to May, monsoon season from June to September, post-monsoon season from October to November. The district receives an average annual rainfall of 668mm.

E.5.2 Social Baseline

The area of up to 5 km radius from the project boundary (250 MW AASPL solar plant area) has been demarcated as study area for the project by considering the extent of project impact. This includes Nambulipulikunta (N.P. Kunta) and Pedaballikothapalle (P. Kothapalle) villages falling within 5 kms from the Project boundary.

The study area has a total population of 7,657.NP Kunta village is the larger in terms of population than P. Kothapalle village. The sex ratio in the study area is 1002, which is significantly higher than the state, district and Mandal level sex ratio. The SC population in the study area is about 10.02 % and 3.02 % ST population.

There is only 1 private pre-primary school (1) in the study area. There are 8 Government-run primary schools and 7 private run primary school. There are 4 government run middle schools. There are 2 government run senior secondary schools.

As per the limited virtual consultations and 2018, ESIA report, it is understood that agriculture is the mainstay of the local economy of the study area. However, due to lack of irrigation facility and erratic rainfall, people are diversifying their sources of livelihood.

The WPR (Work Participation ratio)[2] of the study area is 52.94 %. This figure suggests the study area villages have moderate employment rate and as less than 50 % of the people are unemployed in the study area.

Approximately 40 % of the total land is under agriculture use. However, more than 90 % of the land is characterised as unirrigated land[3].

According to the ESIA report, 2018, majority of households cultivated groundnut in the year 2016, prior to giving away lands to the Project. A large proportion of the area was affected by drought and majority of the land was left uncultivated. Community reported lack of irrigation facilities and erratic rainfall in the region for the past six years that has affected agricultural practices negatively. Ground water was available at a depth of more than 400 ft below ground level. The virtual consultations also suggested that the extent of rainfall has reduced significantly over the last decade, which makes agriculture less viable in the area.

[2] Work Participation ratio (WPR) is defined as percentage of total workers including main and marginal workers, out of the total population of the study area.
[3] As per Census of India, 2011, approximately 99.89 % of agriculture land in the area was unirrigated.

At the village level, there are no Community Health Centres (CHC) in the study area. There is only 1 Primary Health Centre (PHC) in NP Kunta village. There are no Maternity and child Welfare centres or TB clinics in the study area.

E.5.3 Ecology baseline

The project area does not fall within 10 km radius of any significant sensitive receptors like Wild Life Sanctuaries, Biosphere Reserves, and National Parks etc. Removal of herbaceous vegetation from the soil and loosening of the top soil generally causes soil erosion. However, such impacts are primarily confined to the project site during initial periods of the construction phase and would be minimized through adoption of mitigation measures like paving and surface treatment and water sprinkling.

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 in the study area (10km radius) was limited to record site specific floral species (woody trees/ small tree species as well as ephemeral ground vegetation).

During the ecological survey conducted as a part of ESIA Study 2018, a few of the forest mammals eg. deer, rabbits, Antelope were sighted by the survey team during site visit. Domestic animal like cow, sheep, buffalo and goat are reported in the study area, as per 2018 ESIA. The birds like Crows, Parrots, Doves, Weaver birds and Mynas were more common among birds. In addition, none of the species (terrestrial fauna and bird fauna) are on the International Union for the Conservation of Nature's (IUCN) Red List of Threatened, Critical, or Endangered category (please refer to **Appendix G**)

E.6 Stakeholder Engagement

During the ESIA, ERM identified/profiled the various stakeholders of the project, such as the Land sellers/users of private/patta land, government land and assigned land, Contractors N.P. Kunta and P. Kothapalle Gram Panchayats (GPs, Civil Society/ Local NGOs, Regulatory Authorities such as Renewable Energy Development Corporation of Andhra Pradesh, Andhra Pradesh Power Generation Corporation, Andhra Pradesh Solar Power Corporation Pvt. Ltd;, District /Tehsil Administration, Contractual Labourer, Other Projects in the Solar Park and in nearby area areas and developed an understanding of their stakes, interests and influences on the project as per the IFC and AIIB's standards. This assists in understanding stakeholder views on the project and in identifying issues that should be taken into account in the prediction and evaluation of impacts.

As per ESIA report, 2018 by '*M/S Opensense Labs Private Limited*', following feedback was provided by local community and other stakeholders:

- Interaction with Local community of N.P Kunta village:
    - The community was aware of the Project and expected that it will contribute to the socio-economic development of the area;
    - Villagers from NP Kunta were informed that one of the family members would be given employment after the completion of proposed project.
    - The main perception and notion of the local population of the project area is "due to the installation of solar power plant there will be increase in employment opportunities, there will be an increase in their income and their standards of living will increase.
    - Few members from the community were concerned over payment of land compensation. Members of community informed that they do not have ownership of the land (no documents) however they were enjoying rights over the land and are claiming compensation for the land.

- Interaction with Other Stakeholders (social workers/NGO).
    - As per the ESIA report the NGOs and social workers were observed to be supportive to the project but were not fully aware of the same. They felt that the land being allotted for the project was not of any significant use due to the barren, undulating, rocky infertile and general lack of irrigation facilities;
    - Expectation of better engagement of local community, employment opportunities and financial benefit to local people with the upcoming project;
    - The Solar power plant would give enough recognition to the drought affected region of Ananthapur district.

E.7 ARPPL Grievance Redress Mechanism (GRM) Procedure

The formalised Grievance Redress Mechanism adopted by ARPPL shall be extended for all its SPVs, including AASPL. This GRM is developed as part of IMS manual of ARPPL and aims to understand community expectations and manage any local concerns or grievances in a systematic and transparent manner. AASPL has a special Grievance Cell comprising of all top management persons and site Managers. The cell is established for addressing the grievances of third party/ stakeholders, project staff and contracted staffs that has direct contact with project affected communities. The GRM mentions that information for filing a grievance shall be displayed at site and details of lodging complaint is provided.

E.8 Key Identified Impacts

E.8.1 Construction phase

Change in Land Use: The main impact on land use could be mainly from clearing of vegetation from land prior to construction activities. The potential for alteration of land use of the proposed site is moderate as it can alter water holding and erosion pattern.

Topography: Due to undulating topography, study area exhibit presence of micro drainage channels. Though the solar power project does not require levelling of land, construction of access road for the project purpose could potentially alter topography but the chances of that are miniscule.

Soil environment: There will be clearance of vegetation that covers the top soil, site levelling and grading during the construction phase. These activities will largely affect the top layers of the soil and loss of top soil quality is envisaged but the effects can be reversed over time.

Waste generation: General construction waste generated onsite will comprise of concrete, steel cuttings/filings, packaging paper or plastic etc. Municipal solid wastes consisting of food waste, plastic, glass and waste paper will also be generated by the construction workforce at canteen facility. A small proportion of the waste generated during construction phase will be hazardous and will include waste fuel, grease and waste oil containing rags.

Water requirement: Approximately 10 KL/Month water will be required for construction activities. It is understood that during the construction phase, Ayana is required to make its own arrangements to source water for construction activities. APSPCL is not expected to provide water supply for construction purposes. As reported, presently, the water is being procured by EPC contractor through water tankers. Approximately 2000 litres of water per day is used for domestic purpose for which packaged water is procured from nearby villages. It is also reported that Ayana has plans to install bore wells at the site for emergency purpose. According to CGWB study for Anantapur district, NP Kunta Mandal where the project site falls is categorised as “semi critical” in terms of ground water

development. Requisite permissions from CGWA will be a obtained prior to installation of any borewells.

In addition, Veligallu reservoir which shares boundary with Ananthapuramu solar power park is considered to be one of the sources of water for the project.

Air Quality: Air quality in the study area will be impacted in the form of fugitive dust emissions from construction/installation activities, vehicular emissions and exhaust emissions from DG sets. However, the construction activities are going to occur for a small period (~6 months).

Ambient Noise: Based on ambient noise monitoring conducted for the project, the noise level in the project area is within CPCB permissible limit. No settlements are located within 1 km of the project site.

Community and Occupational Health and Safety: The construction phase activities such as installation of solar PV panels, construction of transmission lines and substations and movement of material and personnel may result in impacts on the health and safety of the workers and the community. These activities will involve the use of heavy machinery and live transmission power lines. These will be consistent across project life cycle (construction, operation and decommissioning stages) and therefore the impacts would be similar in nature.

Vegetation Clearance and Construction Activity: The Project site is located in dry and arid in nature comprising dry, thorny scrubs mixed with pockets of private agriculture land. Considering the fact that the site is already in construction phase and vegetation clearance has already been done, displacement of some species (reptiles, smaller mammals etc.) could have already happened.

Reduction of Land-holding and loss of agricultural income- The Project is being developed by AASPL is situated on 1274 Acres of land allotted to Ayana, out of the approximately 7181 Acres of land for 1500 MW ultra -solar power park. The land lease agreement was signed between Andhra Pradesh Solar Power Corporation Pvt. Ltd. and AASPL on 23rd October 2018, for a period of 25 years. As per the data provided, 3.6% of land for the Solar Park is purchased from private land sellers, while the rest is Government land and Assigned Land[4]. The land procurement for the Solar Park was under the scope of APSPCL, along with assistance from the state government and District Revenue Department of Ananthapuramu, as per The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation & Resettlement Act, 2013 (No. 30 of 2013) – Andhra Pradesh. As per information collected during primary socio-economic survey and presented in 2018 ESIA report, approximately 1200 families are getting directly or indirectly affected by the overall project activities. It is understood that the Project did not result in any Physical displacement.

Impact on local economy and employment:. It is understood that the Project will generate approximately 700-800 skilled and unskilled jobs during construction phase and most of the workers will be locally sourced.

Labour Influx: During the construction phase and operation phase, it is estimated that the project will require approximately 700-800 unskilled labourers. As reported majority of them will be sourced from the local labour pool. It is understood that the labour camp will be constructed in NP Kunta village, i.e. 1.5 km from the Project boundary. If migrant labour are hired, there is a high likelihood of regular interaction between the local community and migrant labourers. If not monitored; these interactions may create interpersonal and communal conflicts due to differences in cultures, beliefs, social practices, food habits etc. moreover, these interactions can also lead to spread of transferable diseases.

[4] Govt. land given to vulnerable or landless local households for livelihood related purposes.

E.8.2 Operational phase

Soil environment: In the operation phase, soil compaction and erosion may occur due to vehicle movement, which only happens during the occasional maintenance activities.

Waste generation: The waste generated from project includes domestic solid waste at SCADA building and substation and hazardous waste like waste oil and lubricants and oil containing jutes and rags will be generated during maintenance activities.

Water Environment: Water requirement during O&M phase is primarily for module cleaning. As mentioned earlier in this report, it is estimated approximately 1.5 litre water per module will be utilised and 18 cycles per year for 11,20,000 modules will be undertaken. Therefore, 30,240 KL water will be required annually for module cleaning. For domestic purpose, approximately 1500 litre per day and 548 KL per year will be required. APSPCL will arrange and provide the necessary water supply for operation and maintenance of solar power plant from date of commissioning. APSPCL has connected natural drains and man-made canal with its reservoir to collect rain water. The APSPCL reservoir is also connected with Veligallu reservoir. As APSPCL is responsible for supplying water to other solar power project developers as well which may put stress on water resources. However, this directly falls within the scope of APSPCL and not the project proponent. At present, the use of dry cleaning and semi dry cleaning mechanisms for module cleaning are not being considered. The impact significance during operation phase has been assessed as moderate. It must be noted that additional mitigation measures, which is directly under the purview of the project developer, such as optimizing water usage, sensitization of water use, regular inspection of water leaks, recycling/ reuse to the extent possible and opting for dry and semi dry module cleansing mechanisms (to be considered based on feasibility) may reduce the overall impact.

Employment: During the operations phase, the requirement for unskilled and semi-skilled labour is expected to drastically reduce and restrict to maintenance work of the facility, 24 hour security, bush and undergrowth cleaning and housekeeping activities. Therefore, the operation phase will lead to loss of employment.

Ecology: Transmission line from the Pooling Substation to the Grid Substation is passing through a corridor scrublands, so risk of mature tree cutting is almost nil. Furthermore, baseline has already established that the study area only provides habitat for only Least Concerned Species.

E.8.3 Decommissioning phase

Soil environment: Soil in the study area will be affected due to soil compaction due to the increased vehicular and workforce movement, dismantling and storage of plant components on the adjacent land, removal of internal electric lines/ poles etc. and waste generated in form of dismantled plant components and demolition debris from plant foundations, storage yard and substation complex.

Water Environment: Water during the decommissioning phase will be consumed by labourers for drinking and domestic purposes. The source of water is not known at this stage. However, since Ayana has plans to install borewells at site, it is anticipated that groundwater may be abstracted for meeting the water requirement. According to CGWB study for Anantapur district, NP Kunta Mandal where the project site falls is categorised as “semi critical” in terms of ground water development. Also, there is a potential for contamination of groundwater and surface water resources resulting from improper management of sewage and accidental spills/leaks at the storage areas.

Air quality: Air quality in the study area will be impacted in the form of fugitive dust emissions from construction/installation activities, vehicular emissions and exhaust emissions from emergency DG sets. The biggest source of emissions in the decommissioning phase is the fugitive dust emissions from demolition activities. The demolition activities are likely to occur for a very small period of time.

Ambient noise: During decommissioning phase of the project, noise will generate from movement of vehicles carrying dismantled structure and equipment.

Economy and employment: The major social impacts associated with the decommissioning phase are linked to the loss of jobs and associated income

E.8.4 Key cumulative impacts

The project site falls under Ananthapuramu Ultra Mega Solar Park having a 1500 MW capacity. The solar park comprises of solar power developers such as Tata Power Solar (500 MW) and Softbank Power, Sprng Energy etc. however the same is yet to be finalized. All of the above highlighted impacts may have a heightened effect in the study area due to the presence of other solar power Projects. For water related impacts, as APSPCL is responsible for supplying water to other solar power project developers as well which may put stress on water resources. However, this directly falls within the scope of APSPCL and not the project proponent. At present, the use of dry cleaning and semi dry cleaning mechanisms for module cleaning are not being considered. The impact significance during operation phase has been assessed as moderate. It must be noted that additional mitigation measures, which is directly under the purview of the project developer, such as optimizing water usage, sensitization of water use, regular inspection of water leaks, recycling/ reuse to the extent possible and opting for dry and semi dry module cleansing mechanisms (to be considered based on feasibility) may reduce the overall impact directly arising from the project.

E.9 Mitigation Measures and ESMP

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

E.9.1 Organisational Structure

At the Site level, during operation phase, ARPPL will depute a Site Manager/ Plant Head. Ayana's Plant Head will be responsible for managing the environment and social performance of the Site, in compliance with the Company's IMS system and the applicable legislation and shall also be responsible for reporting the EHS compliance status to the corporate office. The Plant head will be supported by the Site Incharge/ Safety Supervisor of the O&M Contractor. During construction phase, Ayana's Site Incharge will be supported by a Project Management Contractor Safety Supervisor, who will be responsible to oversee EPC's work progress and report the overall EHS status of the site during construction phase.

E.9.2 Roles and Responsibilities

ARPPL will majorly play a role of supervisor to oversee the project performance pertaining to environment, health, safety and social issues.

E.9.3 Inspection, Monitoring and Audit

Inspection and monitoring of the environmental and social impacts of the Project activities will increase the effectiveness of ESMP. Through the process of inspection and auditing, ARPPL will ensure that the conditions stipulated under various permits are followed. The inspections and audits will be done by EPC contractor (during construction phase), ARPPL's QHSE department and by external agencies/experts. The entire process of inspections and audits should be documented as per

the reporting format and frequency agreed with the lenders. The inspection and audit findings are to be implemented by the site in-charge. Also AIIB's template for monitoring is expected to be submitted to AIIB on half-yearly basis.

E 9.3.1 Report and Documentation

ARPPL will develop and implement a programme of regular reporting through the stages of the project lifecycle. The personnel delegated EHS roles shall be required to fully comply with the monitoring programme in terms of timely submissions of reports as per acceptable level of detail. Reporting will be done in form of environmental check list, incident record register, training records, and environmental and social performance reports (weekly, monthly, quarterly, half yearly, yearly etc.).

E 9.3.1.1 External Reporting and Communication

QHSE head is responsible for ensuring that communication with regulatory agencies and stakeholders are maintained as per the requirement. All complaints and enquiries are to be appropriately dealt with and records should be maintained in a Complaint/Enquiry Register by the delegated staff of EHS.

E 9.3.1.2 Internal Reporting and Communication

According to ARPPL's Integrated Management System and QHSE Manual, EHS personnel/ PMC supervisor at site will share inspection and audit findings with their suggested measures regularly to the Site In-Charge. Site In-Charge will further share the EHS findings to the QHSE department for their consideration. The EHS audit findings are also to be communicated within the staff working on the project. To maintain an open communication between the staff and management on HSE performance the followings are being used:

- Team Briefings,
- On-site work group meetings;
- Work Specific Instructions.

Monthly compliance reports will be shared by the contractors during construction and operation period. The compliance will be verified against applicable laws, IMS and other conditions as required by the contract.

E 9.3.2 Documentation

Documentation is an important step in the implementation of the ESMP, Ayana will establish a documentation and record keeping system in keeping with their IMS, to ensure recording and updating of documents as discussed in the ESMP. Responsibilities have to be assigned to relevant personnel for ensuring that the ESMP documentation system is maintained and that document control is ensured through access by and distribution to, identified personnel in form of the following:

- Master Environment Management System document;
- Legal Register;
- Operation control procedures;
- Work instructions;
- Incident reports;
- Emergency preparedness and response procedures;
- Training records;
- Monitoring reports;

- Auditing reports; and
- Complaints register and issues attended/closed.

E 9.3.3 ESMP Review and Amendments

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

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

E.9.4 Purpose of the ESMP

The purpose of ESMP is to:

- Provide an institutional mechanism with well-defined roles and responsibilities for ensuring that measures identified in ESIA designated to mitigation potentially adverse impacts are implemented;
- List all suggested mitigation measures and control technologies, safeguards identified through the ESIA process;
- Provide Project monitoring program for effective implementation of the mitigation measures and ascertain efficacy of the environmental management and risk control systems in place; and
- Assist in ensuring compliance with all relevant legislations at local, state and national level for the Project.

E.9.5 Mitigation measures

The relevant mitigation measures to all the impacts identified during the impact assessment study have been presented in Section 6 **(**Impact Assessment) and Table 7.1 (Environmental and Social Management Plan) of the ESIA report for the Project. Key Mitigation measures for construction operation and decommissioning phases are summarized below.

- Land use:
  - Construction activities should be restricted to designated area;
  - On completion of construction activities, land used for temporary facilities such as stockyard if any should be restored to the extent possible; and
  - The land use in and around permanent project facilities should not be disturbed
- Soil:
  - Site clearance, piling, excavation and access road construction will not be carried out during the monsoon season to minimize erosion and run-off.
  - Vehicles will utilize existing roads to access the site.
  - EPC Contractor should ensure that no unauthorized dumping of used oil and other hazardous waste is undertaken at the site;
  - Designated areas should be provided for Solid Municipal Waste and daily collection and period disposal should be ensured;
  - Construction and Demolition Waste should be stored separately and be periodically collected by an authorized treatment and storage facility
  - All waste should be stored in a shed that is protected from the elements (wind, rain, storms, etc.) and away from natural drainage channels

- A log book should be maintained for quantity and type of hazardous waste generated
- In case of accidental/unintended spillage, the contaminated soil should be immediately collected and stored as hazardous waste.

- Water:
  - Authorized water tankers should be hired if water is abstracted from nearby reservoirs
  - Obtain permission from Rural Development Department, Government of Andhra Pradesh if groundwater is planned to be abstracted
  - Regularly monitor the ground water quality and maintain logbook for water consumption;
  - Prepare and implement water conservation scheme e.g., rainwater harvesting at the project site.
  - Operation Phase: Optimizing water usage, sensitization of water use, regular inspection of water leaks, recycling/ reuse to the extent possible and opting for dry and semi dry module cleansing mechanisms (to be considered based on feasibility) shall be considered as part of mitigation measures.
- Air Quality:
  - The speed limit of the heavy vehicles should be maintained.
  - All the vehicle should have valid PUC certificate.
- Occupational Health and Safety
  - All workers (regular and contracted) should be provided with training on Health and Safety management system of the EPC contractor during construction stage and company's EHS policies and procedures during the operation stage;
- Landholding and Employment:
  - Ensure, to the extent practicable, that compensation was paid as per section 26 of LAAR Act 2013 (to land owners whose land was acquired by government), payment to Private land owners for AASPL parcel is made available and the compensation was not paid below market price;
  - Explore possibilities of employment of locals, land sellers, erstwhile Assigned land users during construction phase of the project;
  - Ensure inclusion of members of land seller households for project, in the Skill Development program being conducted and other community development activities by AASPL.
- Labour Influx:
  - To the extent possible, locate the labour camp(s) within the project footprint area identified;
  - Adequately monitor the contractor's compliance to the applicable rules and regulations;
  - Development of the labour camp in keeping with the IFC Worker's Accommodation Guideline;
  - Provide adequate sanitation and waste management facilities including, such as safe drinking water, proper waste collection and disposal system, etc.;
  - Undertake health awareness among the local community,
  - Provide the local community an understanding of the project activities and the possible health and safety risks associated with the same as part of the engagement process;

- Implement on-site vector control measures;
- Access to the local community to the grievance redress mechanism for the project;
- Implement ARPPL's policy of non-discrimination and prevent unequal distribution of project benefit.

- Ecology:
  - Project related activities should be avoided during the night time.
  - General awareness regarding wildlife should be enhanced through trainings, posters etc. among the staff and labourers;
  - Strict prohibition should be implemented on trapping, hunting or injuring wildlife within the subcontractors and should bring a penalty clause under contractual agreements;
  - Camp and kitchen waste should be collected and disposed in a manner that it does not attract wild animals;
  - A minimum possible number of routes should be authorized for use during construction by the labourers and staff, speed limited of the vehicles plying in these routes should be kept 15-20 km/hr to avoid road kill;
  - Strict prohibition on use of fuel wood and shrubs from nearby areas as kitchen fuel;
  - Temporary barriers should be installed on excavated areas;
  - Stage-wise re-vegetation with local species should be undertaken immediately after completion of construction work; and
  - Minimise vegetation removal or trimming to the extent possible at Solar Farm site including internal access roads, pooling substation area, yards, and other ancillary facilities;
  - Construction noise should be minimized by usage of acoustic enclosures and lubrication of equipment's where feasible.

E.10 Conclusion

The Project is a green energy project which will generate 250 MW power through solar energy after commissioning. During the construction phase, the project and its key components such as site office building, external transmission lines, internal transmission line, etc. are likely to have minor to negligible impacts on baseline environmental parameters such as soil, noise, water, air, after suggested mitigation measures are implemented. The impact on land use (conversion from agricultural to industrial land) would have moderate impact. The E&S impacts during operation phase are likely to be minor to negligible. The social impacts from the Project are assessed to be in terms of loss of land and agricultural income and community health and safety impacts but beneficial in terms of local employment and overall local area development.

The Environmental and Social Management Plan (ESMP) describes mitigation measures for impacts specific to Project activities and also discuss implementation mechanism. To conclude, the implementation of ESMP/ Management plans will help Ayana in complying with its internal E&S requirements as well as national/state regulatory framework in addition to AIIB's ESP and ESS requirements.

1. INTRODUCTION

Ayana Renewable Power Pvt. Ltd (hereinafter referred to as 'Ayana' or 'ARPPL' or 'Client') has been set up to develop renewable energy generation capacities in India and its neighbouring countries. The Company is run by an independent Board of Directors and a Management team. As per Company's mission statement, by 2022, ARPPL plans to install 2000 MW of renewable power in India and its neighbouring countries. The company ventures into development of solar power projects (Utility scale, Roof Top and Open Access) and wind power projects. The company has its headquarters in Bengaluru, Karnataka.

M/s Andhra Pradesh Solar Power Corporation Pvt. Ltd. (APSPCL) incorporated in the year 2014 under companies Act 2013 is a joint venture company between SECI (Solar Energy Corporation of India), APGENCO (Andhra Pradesh Power Generation Corporation Limited) and NREDCAP (New and Renewable Energy Development corporation of Andhra Pradesh Limited) with an objective to plan, develop and operate solar parks in state of Andhra Pradesh under MNRE scheme for development of solar parks and Ultra Mega Solar power projects in the country, notified on 12th December 2014.

APSPCL has been designated as Solar Power Park Developer (SPPD) by MNRE for facilitation and Implementation of the Ananthapuramu Ultra Mega Solar Park (1500 MW) to be developed at N.P Kunta Mandal of Ananthapuramu District and Galiveedu Mandal of Kadapa District of Andhra Pradesh. NTPC Limited is "A Maharatna Company" is India's Largest power generating company and has proposed to establish 750 MW Capacity Solar Photo Voltaic (PV) project in phase -2 at Ananthapuramu Ultra Mega Solar Park (1500 MW) sanctioned by MNRE.

Ayana Anathapuramu Solar Power Ltd (AASPL) is the SPV of ARPPL that is developing the 250 MW Solar Power Plant in the 1500 MW Solar Plant of APSPCL.

1.1 Context

Ayana Renewable Power Pvt. Ltd had completed the Environmental and Social Impact Assessment study of the 250 MW Solar Power Project in Ananthapuramu, Andhra Pradesh, India, as per IFC guidelines in December 2018, through a third party consultant '*M/S Opensense Labs Private Limited' (hereinafter referred to as 'OSL')*.

AIIB is evaluating a potential investment opportunity into the project. In April 2020, the report was submitted to AIIB for a review. AIIB completed the review and shared comments on the ESIA Report with Ayana.

Ayana intended to update the existing ESIA Report (2018) of the project for its alignment to AIIB's comments and the requirements of AIIB's E&S Framework. For the purpose, Ayana engaged ERM for this updation work in the last week of May 2020. The updation work was to be completed in a quick turnaround time of ten (10) days from Service Order. The assignment was completed basis desk based assessment of the data shared (no site visit included), telephonic conversation / video conferencing for discussions with Ayana's corporate and site team, other related interactions with relevant stakeholders on land securing process and compensation.

The current Report aims to update and re-align the previous ESIA report with AIIB ESP and ESSs requirements, while also including elements of the previous ESIA study (based on primary surveys undertaken and information collected), comprising impact assessment and mitigations, environmental and social management plan, institutional arrangement, monitoring and reporting mechanisms, information disclosure, budget for ESMP implementation, etc. The aim is to understand the environmental and social sensitivities associated with the 250 MW solar power project as well as assess the ability of the project to comply with the requirements of the above mentioned guidelines and implement mitigation measures during the Project's lifecycle.

ERM undertook desk based review of available documents for Project from 28th May to 5th June 2020, which are presented in **Appendix A**.

1.2 Project Overview

Table 1.1 provides a snapshot of the proposed project

Table 1.1 Project description of AASPL 250 MW project

Particulars	Description
Location	■ The 250 MW solar power plant is located in NP Kunta and P. Kothapalli villages of NP Kunta Mandal of Ananthapur District of Andhra Pradesh. ■ The project is located over.1274 acres of land.
PV Modules	■ Polycrystalline / Mono PERC type; ■ Rating- 335 / 375 Wp, 72 Cells
Power Evacuation	■ The power generated will be evacuated to 33/220kV Pooling Station at 33kV and further will be evacuated to 400/220kV PGCIL Substation.
Land Requirement	■ Total land area of 1274 acres has been allotted. Ayana will require 1250 Acres of land for commissioning 250 MW solar project. ■ 1274 Acres of land has been allotted to Ayana which includes unusable area of 24 Acres. The unusable area includes area of land covered with small hill, natural drain and unsuitable slopes for the project.
Project Status	■ Construction ongoing; ■ As reported by client, the construction of the project site has started.
Contractors (construction and O&M phase)	■ Construction phase contractors: Tata Power Solar System Ltd. (TPSSL); ■ O&M Contactors:
Commissioning date	■ First 50 MW by September 2020; ■ Next 100 MW by October 2020 ■ Balance 100 MW by November 2020. ■ Balance DC capacity of 125 MW by Dec'20.

1.3 Purpose and Scope of Work

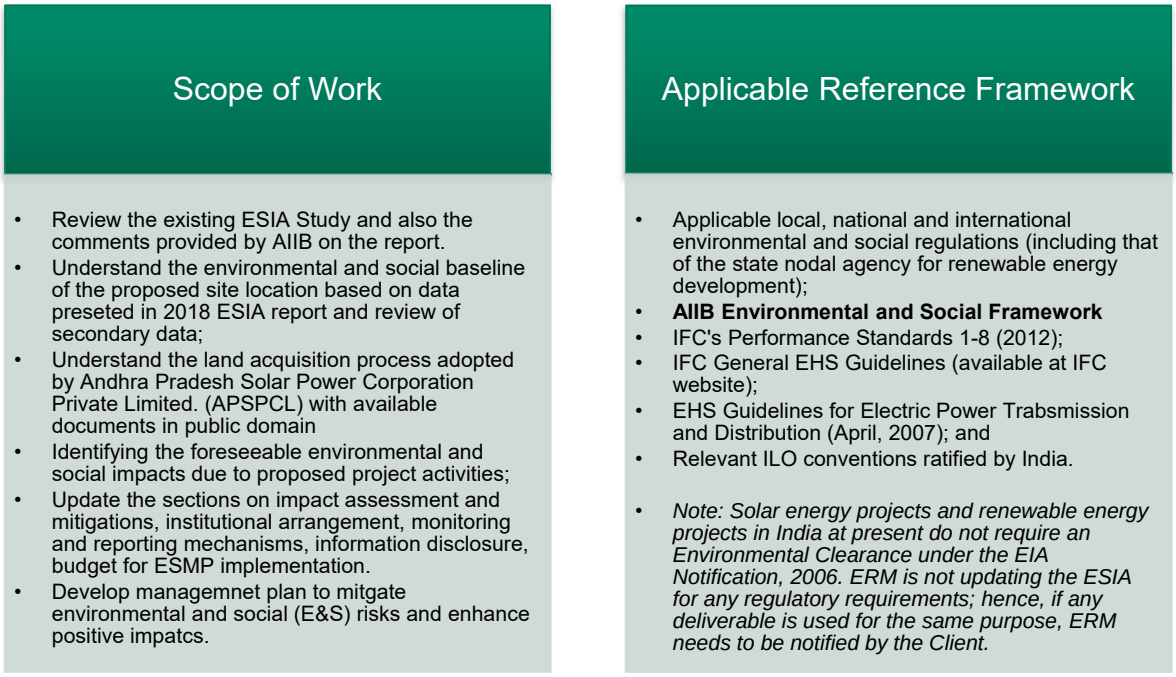
ERM understands that AIIB is evaluating an investment in the 250 MW AASPL solar power plant in Ananthapuramu, Andhra Pradesh. In this context, the project requires identifying and updating the environmental and social risks associated with the project and to implement mitigation measures to avoid adverse impacts for the remainder of the project's lifecycle.

The project has to comply with international standards, which have been presented in the applicable reference framework below, along with applicable national, state and local regulations.

This report discusses the environmental and social baseline within which the proposed solar power project is commissioned and assesses the potential adverse and beneficial impacts that the project could have, along with suitable mitigation measures and an Environmental and Social Management Plan (ESMP) for the project.

The following figure provides an understanding of the scope of work and the applicable reference framework for the project.

Figure 1.1: Scope of Work and Applicable Reference Framework



1.4 ESIA Methodology

The ESIA has been undertaken following a systematic process that predicts and evaluates the impacts the project could have on aspects of the physical, biological, socio-economic and cultural environment, and identifies measures that the project will take to avoid, minimise/reduce, mitigate, offset or compensate for adverse impacts; and to enhance positive impacts where practicable. The stages of the ESIA process are described below

1.4.1 Screening and Scoping

1.4.1.1 Screening Methodology

For the screening exercise, ERM undertook discussions with the project team and a review of the existing ESIA report and supporting documents available. The following sub sections provide an understanding of the methodology followed

1.4.1.2 Kick-off Meeting

The ERM team had a brief kick-off meeting with the Ayana team on 28th May 2020 followed by a series of discussion calls for clarity, till 5th June, 2020. A discussion was also held with regard to the expectations from this assessment in terms of scope of work, deliverables, timeline and the methodology to be followed for the same. A request for information list was shared with Ayana on 26th May 2020.

1.4.1.3 Desk based review and baseline assessment

The ERM team undertook the review of existing ESIA study and E&S data available in the public domain. Furthermore, review of secondary data on project area, administrative divisions, etc. were undertaken to strengthen the baseline information.

1.4.2 Project Description

In order to set out the scope of the Project features and activities, with particular reference to the aspects which can impact on the environment, a Project description is prepared. This is based on information as provided in the old version of the ESIA report and by the client. The Project description has been provided in ***Section 2*** of this updated ESIA report.

1.4.3 Baseline Condition

No site visits, community interactions/ public consultations, primary monitoring and surveys *have been* conducted for this report (due to COVID 19). Online discussions were conducted through video and teleconferencing with the Mandal Revenue Officer of N P Kunta Mandal and some sample consultations with Assigned land owners from which the land for AASPL parcels have been procured. The socio-economic baseline is developed using Census 2011 data, reports published by government departments, etc.

Ecological assessment presented in this Report comprises data retrieved from ESIA report dated 20.12.2018 prepared by OSL for the 250 MW solar power project in Ananthapuram, Andhra Pradesh.

1.4.4 Impact Assessment (IA) Prediction

Impact identification and assessment starts with scoping and continues through the remainder of the ESIA Process. It is an iterative process and completes only when the effects of all identified impacts arising out of the Project, including residual impacts, have been assigned a mitigation strategy. The IA comprises of four sequential steps:

- Impact Prediction;
- Impact Evaluation;
- Mitigation and Enhancement; and
- Residual Impact Evaluation.

The detailed IA is presented in **Section 8** of this ESIA report.

1.4.5 Environmental and Social Management Plan (ESMP)

The results of the ESIA study form the basis of the Project ESMP. The ESMP will incorporate measures and procedures for the short and long-term environmental and social management of the Project during its various stages. The ESMP in tabular format with defined roles and responsibilities for implementation and supervision is developed for the Project and is presented in **Section 9** of this ESIA report.

1.5 Limitations

- Ayana engaged ERM for this updation work in the last week of May 2020. The updation work was completed in a quick turnaround time of ten (10) days from Service Order. The assignment was completed basis desk based assessment of the data shared (no site visit included), telephonic conversation / video conferencing for discussions with Ayana's corporate and site team, other related interactions with relevant stakeholders on land securing process and compensation,
- Site visits or community interactions/ public consultations, primary monitoring, primary surveys (**social or ecology**) have not been conducted as a part of the ESIA update exercise. Assessment made on the basis the onsite surveys (as a part of ESIA Study 2018) and described in the Report have been reproduced as it is in this updated ESIA Report. ERM has not verified the primary data collected during environmental monitoring, ecological surveys/ social interaction in year 2018.

- The E&S impact assessment and E&S management plan is developed based on site specific data shared by Ayana, discussions with Mandal Revenue Officer, select discussions with Assigned land owners in June 2020 through video conferencing, arranged by AASPL, project team and data publically available.
- No translation work has been scoped in under this assignment. All the documents are developed and shared in English language only.
- This report uses some of the data presented in 2018 ESIA for the project; however granular aspects and details from the primary surveys (Socio-economic, Biodiversity, etc.) do not feature in this report, due to non-availability of the same. The observations and inferences made in 2018 ESIA version have been used and strengthened for the baseline sections by ERM;
- ERM was commissioned by Green Growth Equity Fund (GGEF) (acting through its investment manager, EverSource Advisors Private Limited) and National Investment and Infrastructure Fund (NIIIF) (acting through its investment manager, National Investment and Infrastructure Fund Limited)" to undertake an ESDD of Greenfield 250 MW Solar PV project – at Ananthapur (Same Project) in January 2019. ERM submitted the final ESDD report to Eversource in the year 2019. For the purpose of the present report, ERM team has drawn upon some context from this ESDD report, in terms of land related discussions with APSPCL and general agricultural and livelihoods profile of the area;
- ERM has assumed that the ESIA Study is meant to be used as Client's internal E&S risk identification, impact assessment and management tool and the Report prepared will be used for non-regulatory purposes and ERM is not responsible for submission of the reports to any regulatory agency. The solar projects do not fall under the purview of Environmental Clearance and are considered as the development projects.
- ERM is not responsible for implementation of any aspect of ESMP or in disclosure process, post approval of ESIA Report.
- With respect to transmission, line (route/ coordinates to be provided by client) and related land / ROW (land related data to be shared by client), only a preliminary assessment on environmental and social aspects is done based on secondary data review and discussions with client only.
- This report has, to a large extent, incorporated information presented in the original report prepared by M/S Opensense Labs Private Limited in December 2018. ERM, in this report, intends to address the gaps (identified by AIIB as part of their review) of the original report.
- ERM has assumed that the ESIA Study is meant to be used as Client's internal E&S risk identification, impact assessment and management tool and the Report prepared will be used for non-regulatory purposes and ERM is not responsible for submission of the reports to any regulatory agency. The solar projects do not fall under the purview of Environmental Clearance and are considered as the development projects.
- ERM is not engaged in consulting or reporting for the purpose of advertising, sales promotion, or endorsement of any client interests, including raising investment capital, recommending investment decisions, or other publicity purposes. Client acknowledges this report has been prepared for their and their clients' exclusive use and agrees that ERM reports or correspondence will not be used or reproduced in full or in part for such purposes, and may not be used or relied upon in any prospectus or offering circular. Client also agrees that none of its advertising, sales promotion, or other publicity matter containing information obtained from this assessment and report will mention or imply the name of ERM.
- Nothing contained in this report shall be construed as a warranty or affirmation by ERM that the site and property described in the report are suitable collateral for any loan or that acquisition of

such property by any lender through foreclosure proceedings or otherwise will not expose the lender to potential environmental or social liability.

1.6 Layout of the Report

The structure of the report will be as given in **Table 1.2**: and list of Annexes in **Table 1.3**: **.**

Table 1.2: Structure of the ESIA Report

Section	Title	Description
Section 1	Introduction	(*this section*) Introduction to the Project and ESIA scope and methodology adopted.
Section 2	Project Description	Technical description of the Project & related infrastructure and activities.
Section 3	Applicable Legal and Regulatory Framework	Discusses the applicable environmental and social regulatory framework and its relevance for the Project.
Section 4	Environmental, Ecology and Social Baseline	Outlines Environmental, Ecology and Social Baseline status in the study area of the Project
Section 5	Stakeholder Engagement and Grievance Redress	Provides an overview of the stakeholder engagement activities undertaken during the ESIA, stakeholder categorization and profiling Additionally, it details the provision of Grievance Redress Mechanism for the project
Section 6	Impact Assessment and Mitigation Measures	This section includes details of identified environmental impacts and associated risks due to Project activities, assessment of significance of impacts and presents mitigation measures for minimizing and /or offsetting adverse impacts identified.
Section 7	Environmental and Social Management Plan	Outline of the ESMP taking into account identified impacts and planned mitigation measures and monitoring requirements.
Section 8	Impact Summary and Conclusion	Summary of impacts identified for the Project and conclusion of the study.

Table 1.3: List of annexes

Appendix	Detail
APPENDIX A	List of Documents reviewed
APPENDIX B	Detailed groundwater sampling results (primary monitoring results – December 2018)
APPENDIX C	Detailed surface water sampling results (primary monitoring results – December 2018)
APPENDIX D	Detailed Ambient air quality sampling results (primary monitoring results – September 2018)
APPENDIX E	Detailed Ambient noise quality sampling results (primary monitoring results – December 2018)

Appendix	Detail
APPENDIX F	Applicable Environmental Standards
APPENDIX G	Ecological and Biodiversity Report
Appendix H	Details of Stakeholder Consultations undertaken for 2018 ESIA and 2020
Appendix I	ARPPL's Stakeholder Engagement Procedure
Appendix J	Details of Skill Development Program co-managed by Ayana with DFID India, CDC, etc.
Appendix K	Environmental and Social Monitoring Report Template

2. PROJECT DESCRIPTION

2.1 Introduction

This section provides a description of the Project in terms of location, facilities and associated Project infrastructure and activities during the Project lifecycle and facilitates and identification of the potential impacts on resources and receptors that could result from Project activities during the pre-construction, construction, operation and decommissioning stages.

Details of the solar plant are provided in the **Table 2.1**.

Table 2.1: Ananthapuramu Solar Plant – Project at a Glance

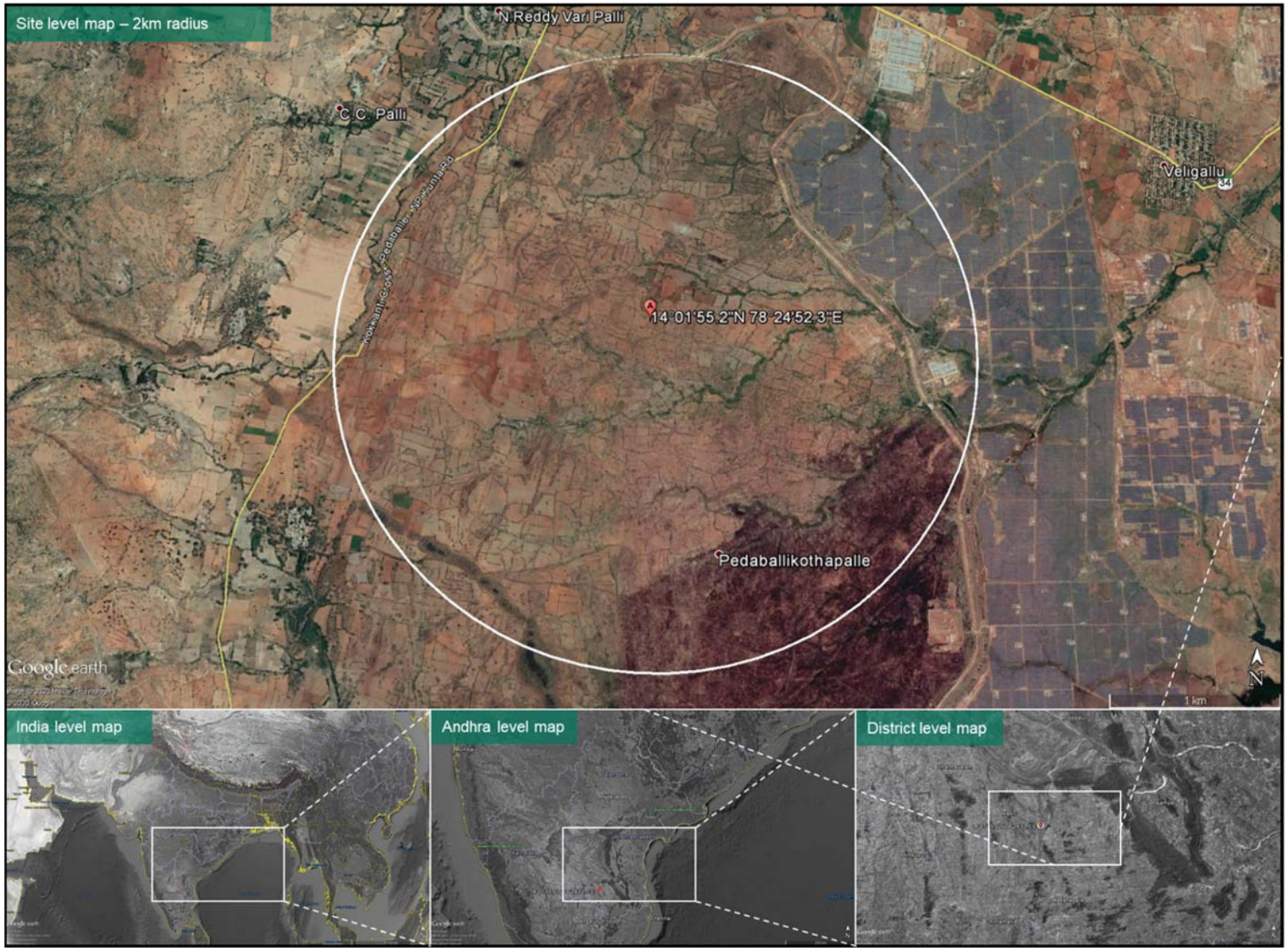
S. No.	Particulars	Description
1.	Project location	Ananthapuramu Ultra Mega Solar park- .P Kunta & P. Kothapalli villages
2.	Tehsil	N.P. Kunta Mandal
3.	District / State	Anantapur in the state of Andhra Pradesh
4.	Location Coordinates	14°1’55.20”N, 78°24’52.29”E
5.	Capacity	250 MW
6.	Power Evacuation	The power generated will be evacuated to 33/220kV Pooling Station at 33kV and further will be evacuated to 400/220kV PGCIL Substation, which is located 1 Km away from project plot. The revenue metering will be installed at the 220kV side of the 400/220kV PGCIL 1.5 GW substation. (Green Corridor)
7.	Climatic zone	Arid, Steppe and Hot type of climate
8.	Average Elevation	453 m asl
9.	Site Conditions	Barren land, undulating and rocky land with only sparsely and scattered patches of dry vegetation
10.	Road Accessibility	Through existing State highway and internal solar park roads
11.	Nearest Airport	Kempegowda International Airport, Bangalore at a distance of ~180 kms
12.	Nearest Railway station	Kadiri Railway Station at a distance of ~31 kms
13.	River/canal/nallah/ pond present in project footprint	Veligallu reservoir
14.	Protected areas (National Park/ Sanctuary)/ Forest land within 10 kms	None

S. No.	Particulars	Description
15.	Land Availability	1274 acres of land is leased to Ayana by Andhra Pradesh Solar Power Corporation Pvt. Ltd. (APSPCL) for development of the solar plant

2.2 Project Location

The proposed 250 MW solar plant is being developed at Ananthapuramu Solar Park located in N.P Kunta Mandal of Anantapur district of State of Andhra Pradesh. The proposed site is situated approximately 30 km West of Kadiri town. Bangalore is the closest airport located at road distance 180 km from the project site. The rail connectivity to the site is through the Kadiri Railway Station under south central railway zone which is at a distance of approximately 31 km from the site. The project site entrance is situated right on State Highway 34 connecting district of Anantapur and Kaddpa of Andhra Pradesh. The project site is approachable by internal roads. Site location map is presented as **Figure 2.1.**

Figure 2.1 Location Map of Anathapuramu Solar Park



2.2.1 Project site setting

The project site is primarily scrubland with sparse vegetation. The site has mixed topography of terrain. The elevation within project site, ranges from 432 to 470 m above msl and the topography is undulating with few structural hilltops.

The project area does not fall within any sensitive receptors viz. Wild Life Sanctuaries, Biosphere Reserves, National Parks etc. There are no archaeological and historical monuments in, along or near (2.5 km) the project site. Structures of religious importance will not be affected by the project. There are few natural Nalas (water drain) within the project boundary and will not be touched or effected by the project Activities. The Galiveedu reservoir is located at adjacent to the project boundary

2.3 Description of Project Facilities, Components and Activities

The proposed 250 MW solar plant will include the following:

- Project Components:
- Solar panels;
- Switchyard;
- Inverters;
- Transformers;
- Main Control Room;
- Associated Facilities:
- Internal Access Roads; and
- Additional project infrastructure such as scrap yard, storage area

2.3.1 Project Components

According to previously conducted ESIA study by OSL, key components envisaged for this project are:

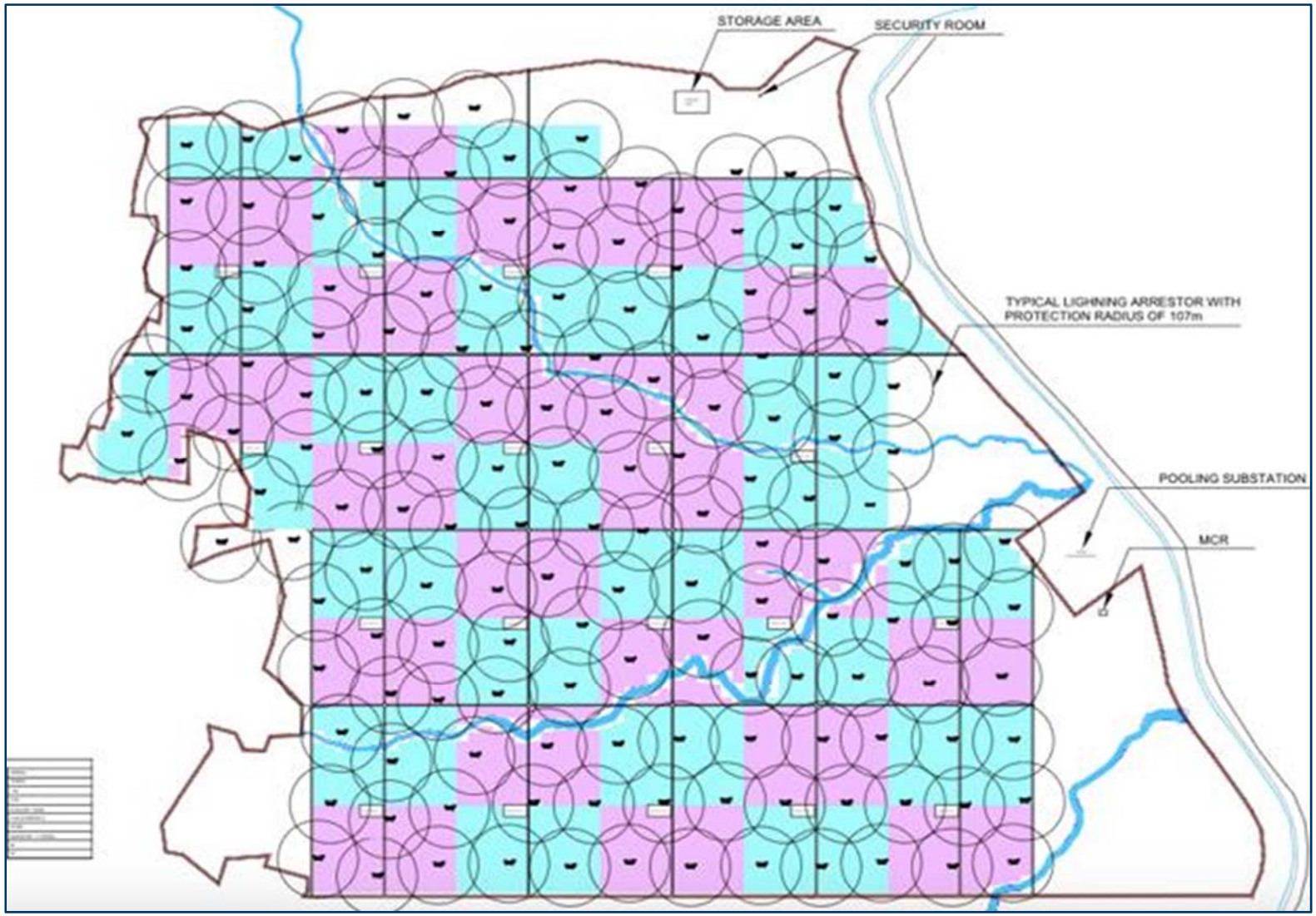
- Solar PV Modules
- Mounting Structure (HDG and Galvalume) –Fixed Tilt
- Power Conditioning Unit / Inverter
- Array and String Junction Boxes
- Monitoring System
- Power Evacuation Infrastructure ie Transformers, Switch Gears, etc.
- Cables & Connectors
- Illumination System
- Plant Communication
- Telephone System
- CC TV.

As reported in the OSL ESIA report, the proposed plant will be a ground mount fixed tilt (10 Degree) type solar PV plant of capacity 250 MW AC and 375 MWp DC. The proposed solar power plant is expected to generate about 615 million units of renewable energy per annum at a fixed tariff of INR 2.73/Kwh for 25 years. Power Purchase agreement has been signed with NTPC. The primary component of a photovoltaic system is the solar cell. This is the element that converts solar radiation into electricity. A photovoltaic module or photovoltaic panel is a packaged interconnected assembly of photovoltaic cells. Module Technology /type shall be either Polycrystalline or Mono PERC. There shall be 73 cells, 330.335 Wp for polycrystalline or 370.375 Wp for the Mono PERC modules. Ayana will be using tire 1 module.

The Power Conditioning Unit will comprise of MPPT (Maximum Power Point Tracker) controller, inverter and associated control and protection devices etc. It is the critical equipment in a grid connected SPV Power plants system. This equipment converts DC power generated by SPV array, into 3 phase voltage AC to be connected to Grid and acts as an interface between the PV array and the Grid. Central inverter technology will be used for the project. The Inverters will be outdoor containerized type with rating between 3.125 MW Sunglow.

The MPPT is an electronic system present in the inverter that operates the Photovoltaic (PV) modules in a manner that allows the modules to produce all the power they are capable of. The modern inverters have inbuilt maximum power point circuits that allow them to tune the load conditions to maximize the power output based on the DC output of the arrays. Typical conversion efficiencies for the inverters today are >96% for a range of DC outputs. In addition, the inverter will also act as a protective device of the system for situations like over current both at input and output, short circuit, over temperature, lightning and surge voltage induced at output due to external source. It will trip out if the voltage, current or frequency goes outside acceptable ranges. The power generated at the solar power plant will be combined at the 220/33kV pooling substation located within the solar plant premises through 33 kV cables. The power will be evacuated from pooling substation to the 400/220 kV PGCIL grid substation through 220 kV double circuit external transmission line.

Figure 2.2: Proposed 250 MW Site Layout



Source: OSL ESIA

2.3.2 Associated Facilities and Other Plant Infrastructure

The development of associated facilities such as external transmission line connecting the solar plant to the PGCIL grid substation and external approach road will be under the scope of Andhra Pradesh Solar Power Corporation Private Limited (APSPCL).The transmission poles have been already erected by APSPCL and will be connected to the solar plant during construction phase. The external access roads of 7m width are already developed by APSPCL for the solar park which will be used for accessing the proposed 250 MW solar power project as well.

The project will include scrap yard to be developed by ARPPL within the site. The scrap yard will consist of discarded panels and other hardware components such as wood/steel, oil barrels, wires/cables and domestic components. Ayana will also develop internal roads within the plant premises for accessing project components.

As reported in the OSL ESIA report, other plant infrastructures to be provided by APSPCL to the proposed 250 MW solar plant includes the following:

- Transmission/ utility corridor of 50m width running along the plot boundaries
- Water supply through park-wide pipeline network providing one water tapper project plot; and
- Trapezoidal cement concrete storm water drainage network on either side of the internal roads, utility corridors. The drainage network will connect to the nearest natural stream/ canal.

Existing infrastructures within the solar power park is presented in ***Figure 2.3.***

Figure 2.3: Existing Infrastructure within Solar Park

PGCIL Substation

PGCIL Substation

Water Reservoir for water supply

Internal Road (Solar Park)

Source: OSL ESIA report

2.3.3 Project Phases and Activities

The project plant is currently at initial stages of construction. The activities for the project can be divided into the following phases/stages.

- Planning phase;
- Construction phase;
- Operation and maintenance phase; and
- Decommissioning phase.

The key activities for the above are as showcased in ***Table 2.2***: **.**

Table 2.2: Project Phase and Key Activities

S. No	Project phase	Key activities
1.	Planning	Site surveys as topographic, geo-technical investigations, solar radiation and yield study, electrical grid studies, etc.; ■ Obtaining all necessary approvals/clearances; and ■ Design and finalization of contractors.
2.	***Construction (Current Phase)***	■ Civil work involving batching plant. ■ Land Clearance ■ Land Levelling. ■ Excavation for foundation (Pits of 1.3 meters depth and 250 mm dia). Transportation, Handling and storage of material. ■ Fence work. ■ Excavation for underground cable laying, ■ Fixing of mounting structures and installation of solar PV modules. ■ Installation if Inverters and Transformers. ■ Cable laying/ stringing. ■ Transformer installation. ■ Security. ■ Travel. ■ Work at height. ■ Cutting, welding (Hot Work). ■ Electrical work. ■ Use of motor bike as mode of transportation within the solar farm.
3.	Operation and Maintenance	■ Monthly cleaning of PV modules; ■ Control of vegetation viz. shrubs, bushes etc. within the site and those immediately surrounding it; ■ Routine inspection of all PV modules and associated structures viz. cables, transformers, inverters, mounting structures etc.; ■ Operation and maintenance of ancillary facilities such as pooling substation; ■ Inspection and maintenance of internal pathways.
4.	Decommissioning	■ The average life span of the solar modules is 25 years; ■ At the end of this life cycle, the solar modules will either be revamped or replaced, or disposed as per the then applicable legislation;

S. No	Project phase	Key activities
		■ If decommissioned, all components including foundations and internal roads of the project will be removed and the site will be restored to its pre-construction state; ■ The concrete pedestals of the ground mounted structure foundations will be demolished and removed from the sub-surface.

2.4 Resource Requirement

2.4.1 Workforce Requirement

It is understood that 32 Contractors will be required for the construction period. Around 700-800 skilled and unskilled workers will be required during the peak construction and operation period. There is a mix of local and migrant workforce engaged for the construction of the 250 MW AASPL plant. The engagement of workforce during Operations phase would reduce significantly in numbers and would comprise of Engineers, technicians and housekeeping workers.

2.4.2 Water Requirement and Source

2.4.2.1 Construction Phase

Approximately 10 KL/Month water will be required for construction activities. It is understood that during the construction phase, Ayana is required to make its own arrangements to source water for construction activities. APSPCL is not expected to provide water supply for construction purposes. As reported, presently, the water is being procured by EPC contractor through water tankers. Approximately 2000 litres of water per day is used for domestic purpose for which packaged water is procured from nearby villages. It is also reported that Ayana has plans to install bore wells at the site for emergency purpose. According to CGWB study for Anantapur district, NP Kunta Mandal where the project site falls is categorised as “semi critical” in terms of ground water development. Requisite permissions from CGWA will be obtained prior to installation of any borewells.

2.4.2.2 Operation Phase

Water requirement during operation phase will be primarily for module cleaning. It is estimated that approximately 1.5 litre of water will be required per module wash and 18 wash cycles per year will be undertaken for 11,20,000 PV modules. Therefore, approximately 30,240 KL of water will be required annually for module cleaning. For domestic purpose, water requirement is estimated to be 1500 litre per day and approximately 548 KL per year.

Reportedly, APSPCL will be responsible for providing water at the plant during operation phase. Water supply obligation of APSPCL is 16 KL/MW/month. Considering, 250 MW capacity of the ARPPL solar plant, total water to be supplied by APSPCL will be 4000 KL/ month and 48000 KL per year. In addition, 17212 KL of water is estimated to be surplus from demand and supply requirement.

An Implementation and Support Agreement (ISA) has been signed between APSPCL (SPPD) and Ayana Ananthapuramu solar Private Limited (SPD) dated 12th October 2018. The ISA includes following clauses:

- APSPCL will arrange and provide the necessary water supply for operation and maintenance of solar power plant from date of commissioning.
- It is proposed to supply 16KL/MW/Month so as to complete one cycle every fortnight, however supply of water is not restricted.
- SPD shall be charged for water supply by SPPD at the rate of Rs. 10/KL which is fixed for the agreement period.

- APSPCL will provide water at a single source through a meter for each plot, SPD shall collect the water supplied by APSPCL in a ground level water tanks and water from the tank shall be used by SPD by making its own arrangements as required.
- However, APSPCL will not provide water supply during construction. SPD has to obtain necessary approvals/ permission from local authorities to dig bore well or to get water from nearest reservoir by tankers and APSPCL will extend necessary support in arranging such approvals/ permission if required.
- APSPCL has provisioned for a reservoir extending in 25 acres of land within Ultra Mega Solar Park for storage of water for requirement during operation phase of PV plants. APSPCL has connected natural drains and man-made canal with its reservoir to collect rain water. The APSPCL reservoir is also connected with Veligallu reservoir located approximately 4 km from the ARPPL plant towards east direction.

2.4.3 Raw Material Requirement

2.4.3.1 Construction Phase

The major raw materials required for the construction phase are fencing material, construction materials like cement, sand, aggregate that will be sourced from local areas.

The Solar Module manufacturer have not been finalized by Ayana, however manufacturers like JA Solar, Jinko Solar, Longi Solar, Canadian Solar, Trina Solar or equivalent Tire -1 manufacturer are being considered for supply of PV modules.

2.4.3.2 Operation Phase

There will not be major requirement of raw materials during operation except for maintenance purpose viz. consumable spares.

2.4.4 Power Requirement

Power requirement during the construction phase will be met through Diesel Generators (DG). Details on the exact no. of DG sets and quantity of fuel required was not shared with ERM.

During operation phase power requirement will be met through auxiliary generation.

2.4.5 Fire Safety and Security

2.4.5.1 Construction Phase

Appropriate firefighting system and equipment shall be provided throughout the construction period. The fire extinguishers will be placed at all strategic locations such as site office, storage yard, near construction area, welding area, etc. Besides this, emergency contact numbers shall also be displayed onsite.

2.4.5.2 Operation Phase

It is understood that suitable fire protection and fighting systems viz. portable fire extinguishers, fire buckets and automatic fire detection system will be made available at the entire PV array area, inverter stations, main control room and switchyard. The aforesaid systems and equipment's will conform to National Fire Protection Authority (NFPA) fire safety standards and local fire authority requirements. Firefighting arrangements for electrical utilities like transformers etc. will be in accordance to tariff advisory committee, Central Board of Irrigation and Power (CBIP), Indian Standard (IS) 10028 i.e. Code of practice for selection, installation and maintenance of transformers, National Fire Protection Association (NFPA) 70 and 15 requirements.

2.5 Pollution Streams during Construction Phase

2.5.1 Solid Waste Generation

2.5.1.1 Construction Phase

The key solid wastes that are expected to be generated during construction phase are as follows:

- Domestic waste from temporary site office; hazardous waste such as waste oil, lubricants, oil contaminated rags; electronic waste like broken PV module etc.;
- As a means of best practice, it is expected that, hazardous wastes will be stored onsite at separate designated covered area provided with impervious flooring and secondary containment. The storage containers/ bins/ drum will be clearly marked and identified for their hazards. Before completion of 90 days, hazardous waste materials will be sent to APPCB/CPCB authorised vendor for eventual disposal at the Common Hazardous Waste Treatment, Storage and Disposal Facility (CHWTSDF).
- The broken solar panels, batteries (dry type or wet type), electronics if any, is expected to be sent back to the vendor as part of buyback arrangement;
- Domestic solid waste is expected to be disposed with the help of authorised vendor at authorised disposal ground;
- The transformer oil drums is expected to be disposed through an authorized hazardous waste recycler; and
- All non-recyclables waste is expected to be collected and disposed of by the contractor at designated landfill sites.

2.5.1.2 Operation Phase

During operation phase waste generated from the project will include domestic waste at site office, scrap materials like scrap tools, damaged PPEs etc.; hazardous waste like waste oil, lubricants, used transformer oil; damaged batteries; damaged PV modules etc. Following measure will be adopted for disposal of solid waste:

- The hazardous wastes will be stored temporarily onsite at separate designated covered area provided with impervious flooring and secondary containment and will be disposed in accordance with Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016;
- The broken solar panels, batteries (dry type or wet type), electronics if any, will be sent back to the vendor as part of buyback arrangement; and
- Domestic solid waste generated form the site office will be disposed at disposal site of local municipality.

2.5.2 Air Emissions

2.5.2.1 Construction Phase

There will be impact on air quality due to onsite construction activities. The likely emissions from construction activities would include the following:

- Fugitive emissions from site clearing, material handling, transportation, piling, use of construction machinery, etc.;
- Fugitive dust emissions from unpaved roads;

- Vehicular emissions from increased traffic volume from vehicles used for transport of construction material; transportation of PV modules and accessories; and
- Exhaust emissions from operation of diesel generators.
- To control air emission during construction phase from operation of D.G. sets, adequate stack height as per CPCB norms is expected to be provided to ascertain regulatory compliance. Fugitive dust emission arising from various activities such as piling, transportation of material (loading and unloading), vehicular movement (on unpaved roads) is expected to be minimized through sprinkling of water and maintaining vehicular speed to 10-15 km/hr. Vehicular emission is expected to be controlled through proper maintenance of vehicles and vehicles with proper PUC will be operated at project site

2.5.2.2 Operation Phase

Under normal operating conditions there would be no gaseous emissions from the operating areas. However, there is a likelihood of gaseous and fugitive dust emissions, albeit in smaller concentrations, owing to the operating of maintenance vehicles. As a means of best practice and adherence to country regulations, well maintained vehicles with proper PUC is expected to be used for operation and maintenance purposes.

2.5.3 Waste Generation

2.5.3.1 Construction Phase

Liquid effluents generated during the construction phase will include domestic sewage from temporary site office. As part of the site preparation stage, a drainage and sewerage system will be constructed for the site office. The sewerage system will consist of soak pits for the collection of wastewater from the kitchen and washing areas and Office facility. Sewage from the toilets will go into lined septic tanks. Sewage disposal trucks will be used to periodically remove the sludge/sewage from the site

2.5.3.2 Operation Phase

The operational phase will have negligible wastewater generation at site office. Septic tank and soak pits will be provided at the site office for disposal of sewage.

2.5.4 Noise Emissions

2.5.4.1 Construction Phase

During the construction phase noise will be generated primarily during the day time. Noise will be generated from pilling, moving vehicles as well as construction equipment and machineries, including the DG sets utilized for power.

As a control measure it will be ensured that noise emission from the vehicles and equipment's shall not exceed 91 dB(A) (for Passenger or commercial vehicles with gross vehicle weight above 12000 kg as specified in Central Motor Vehicles Rules, 1989). DG sets will be provided with acoustic enclosures and workers near noise generating machines will be provided with earplugs as safeguard against high noise hazards.

2.5.4.2 Operation Phase

Under normal operations, none of the activities of solar power plant will generate noise. Any activities generating from maintenance work will be restricted to daytime only

2.6 Analysis of Alternatives and Project Justification[5]

The section gives analysis of alternatives with respect project for 3 scenarios:

- Current or No project Scenario
- Alternate Location for Project Site
- Alternative Methods Of Power Generation

2.6.1 Current or No Project Scenario

2.6.1.1 Power Scenario in India

India became the world's third largest producer of electricity in the year 2013 with 4.8% global share in electricity generation surpassing Japan and Russia. The utility electricity sector in India had an installed capacity of 343.898.722 GW as of end March 2015. Renewable Power plants constituted 33.27% (including large Hydro i.e 13%) of total installed capacity and Non-Renewable Power Plants constituted the remaining 66.73%.

Table below provides information on year to year growth in energy generation and share of renewable energy among that.

Table 2.3: Year Wise Renewable Energy Generation (GWh)

Source	2014-15	2015-16	2016-17	2017-18
Large Hydro	129,244	121,377	122,313	126,134
Small Hydro	8,060	8,355	7,673	5,056
Solar	4,600	7,450	12,086	25,871
Wind	28,214	28,604	46,011	52,666
Biomass	14,944	16,681	14,159	15,252
Other	414	269	213	358
Total	1,91,025	1,87,158	2,04,182	2,27,973
Total Utility Power	1,105,446	1,168,359	1,236,392	1,302,904
% Renewable Power	17.28%	16.02%	16.52%	17.50%

Source: OSL

The total potential for renewable power generation in the country as on 31.03.14 is estimated at 147615 MW. This includes wind power potential of 102772 MW (69.6%), SHP (small-hydro power) potential of 19749 MW (13.38%), Biomass power potential of 17,538 MW (11.88%) and 5000 MW (3.39%) from bagasse-based cogeneration in sugar mills. With many bilateral nuclear agreements in place, India is expected to become a major hub for manufacturing and associated components. Foreign participation in the development and financing of generation and transmission assets, engineering services, equipment supply and technology collaboration in nuclear and clean coal technologies is also expected to increase.

During 11th Five Year Plan nearly 55,000 MW of new energy generation capacity was created, yet there continued to be overall energy deficit of 8.7% and peak shortage of 9.0%. Thus to cater to increasing demand of power, renewable energy projects are favoured and various states are coming forward with schemes promoting renewable energy.

[5] This section except for ***sub section 2.6.4*** is written based on data retrieved from ESIA report prepared by OSL dated 20.12.2018.

The 2022 electrical power targets include achieving 227GW (earlier 175 GW) of energy from renewable sources - nearly 113 GW through solar power, 66 GW from wind power, 10 GW from biomass power, 5GW from small hydro and 31GW from floating solar and offshore wind power. The bidding process for the further additional 115 GW or thereabouts to meet these targets of installed capacity from January 2018 levels will be completed by the end of 2019-2020. The government has announced that no new coal-based capacity addition is required beyond the 50 GW under different stages of construction likely to come online between 2017 and 2022.

2.6.2 Power Scenario in Andhra Pradesh

Power sector of Andhra Pradesh is divided into four categories, namely Regulation, Generation, Transmission and Distribution as shown in the below figure. Andhra Pradesh Electricity Regulatory Commission (APERCO) deals with the electricity production and maintenance, proposes new projects, and upgrades to the existing ones as well. The APGENCO also set up a Special Purpose Vehicle (SPV), named Andhra Pradesh Power Development Company Limited (APPDCL), a joint venture company of APGENCO (with 50% equity) and IL AND FS (50% equity).

- APTRANSCO is set up for transmission of power. The erstwhile Andhra Pradesh State Electricity Board (APSEB) was unbundled into six entities to focus on the core operation of:
- Power Generation (APGENCO)
- Power Transmission (APTRANSCO)
- Distribution (APDISCOMS).

2.6.3 Present Power Supply Position

Power is being supplied to domestic, commercial and industrial consumers along with agricultural consumers in rural areas through mixed feeders. There are 706 dedicated/express industrial feeders. Seven hours three phase power supply is being given to agricultural consumers mostly in single/two spells and supply timings are rotated every 7 days. Rural areas are given single phase domestic lighting from 6 PM to 6 AM. Three phase supply to rural areas for domestic, commercial and industrial consumers is along with agricultural supply only. As a result, most of the consumers, other than agricultural, in rural areas on mixed feeders get between 12 to16 hours of supply every day, depending on agricultural supply spell timings. Agricultural feeders have been separated from domestic feeders in fourteen mandals on a pilot basis during 2011.

In these mandals, domestic consumers are being extended three phase supply depending upon availability of power. However, there is a system in Andhra Pradesh, which enables single phase supply to be extended to all domestic consumers through suitable control mechanism at the substations. Depending upon availability of power, 24 hrs single phase power supply has been extended to domestic, commercial consumers & industrial consumers in rural areas. The segregation of agricultural feeders would enable extension of 24x7, reliable three phase supply to all domestic, commercial and industrial consumers.

Various sources of power in AP region are as follows: ·

- Thermal power
- Gas fuel-based plants
- Hydroelectric power plants ·
- Solar Power Plant
- Wind Power Plants
- Other Utility Power Plants

2.6.3.1 Promotion of Renewable Energy in Andhra Pradesh

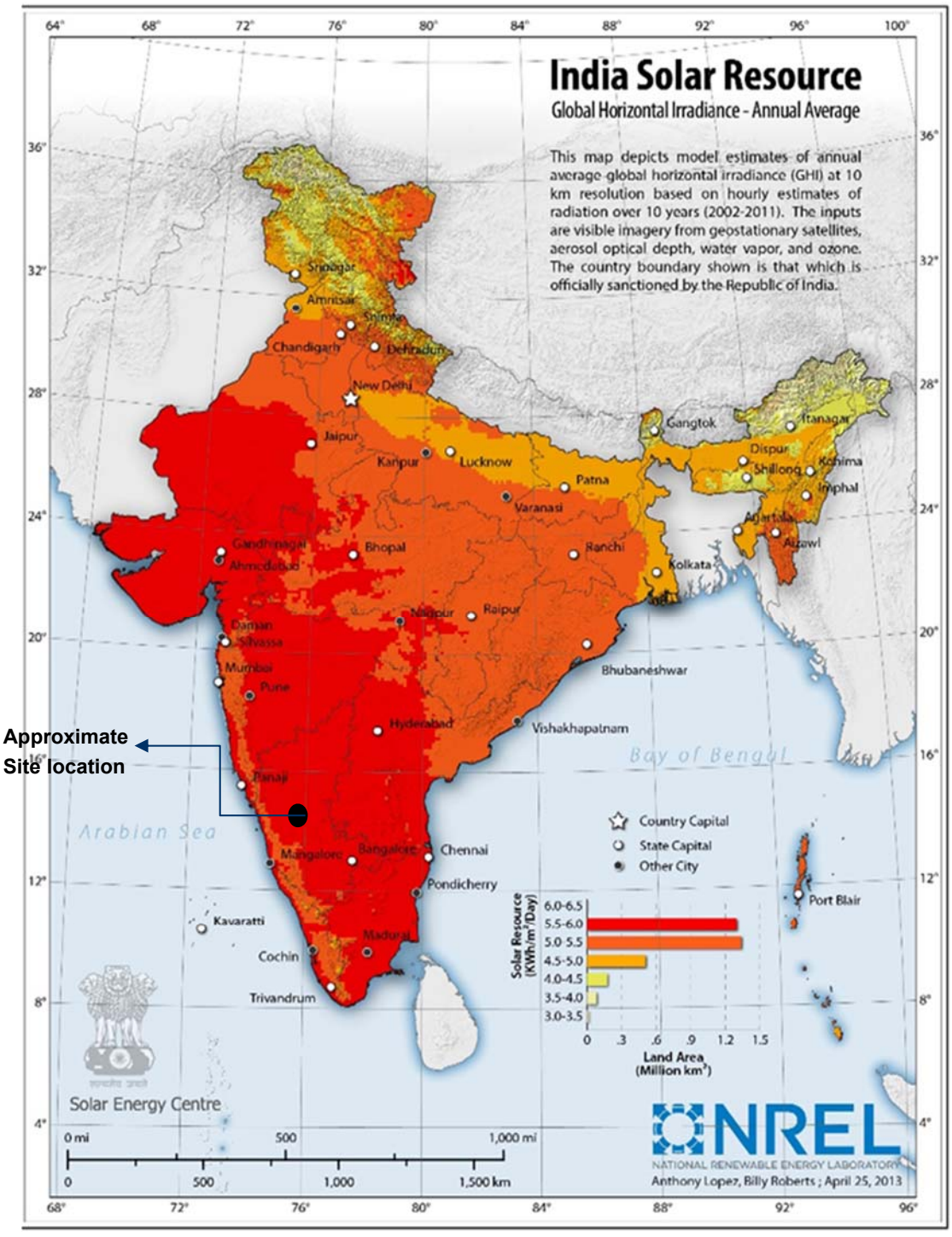
- Andhra Pradesh is poised for rapid industrial growth driven by infrastructure investments and has also been selected by Ministry of Power as one of the pilot states for implementation of the 24X7 – Power for All (PFA) scheme. Solar energy can become an important source in meeting the growing power requirements of the State. AP has large agriculture consumption constituting around 24% of the total energy consumption of the State. With the increasing consumption of solar energy in India, the state government of Andhra Pradesh has also decided to avoid the power crisis by utilizing solar power in the state Solar power can also help shift the agriculture load and meet the power demand during the day time.
- 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 State Government has released the detailed list of qualified bidders for 500 MW solar projects, 63 bids qualified the selection criteria, totalling up to 1291 MW. To boost the solar energy sector, the government plans to facilitate installation of about 5,000 MW of solar power generation by 2019. Andhra Pradesh State has announced a new solar power policy. It is intended to encourage PV developers to set up projects in the state for sale through a Renewable Energy Certificate (REC) mechanism. Andhra Pradesh by establishing the REC mechanism aims at attracting investments in solar power plants as well as in the setup of manufacturing facilities. Another target is to promote off-grid solar applications to meet the power needs on a stand-alone basis. The potential of Andhra Pradesh in solar energy and facilitating role of the Government of AP is now being acknowledged. Encouraged by new initiatives and Support Mechanism for Encouraging Solar Plant such as single window clearance, Allotment of Govt. Land, Exemption from Electricity Duty, Open Access for Third Party Sale, etc., solar power producers have registered with Policy. With the support of the Central Government is keen to transform AP as a solar power generation hub, providing all necessary support through this new solar policy.

2.6.4 Alternate Location for Project Site

Solar projects are less polluting energy generation projects which are site specific and dependent on the availability of solar irradiance resource. Solar irradiance mapping done by Solar Energy Corporation of India (SECI) through National Renewable Energy Laboratory (NREL), based on which potential areas are notified by SECI. The current site selected is a high solar power potential site with irradiation of 5.5-6.0 kWh/m^2/day and availability of 300 sunny days. The final selection of the project site depends upon availability of a contiguous patch of land that is willingly sold by land owners. The proposed 250 MW solar power project was won by Ayana through an auction conducted by the National Thermal Corporation of India (NTPC) in May 2018 for developing 750 MW of solar projects in Ananthapuramu Ultra Mega Solar Park. Since the project will be developed within the Ananthapuramu Ultra Mega Solar Park and land for the project has been leased out by APSPCL to Ayana, therefore, the option for choosing an alternative area is not available to the project developer.

As stated above, since the land for the development of the 250 MW solar power project has been leased out by APSPCL to Ayana and scope for obtaining land from land owners does not directly include Ayana's involvement. Hence, assessment on physical and economic displacement associated with involuntary resettlement (if any) and impacts on Indigenous People due to the development of the project is not under the scope of Ayana.

Figure 2.4: Horizontal Solar Resource Map of India



Source: Mapping done by SECI through National Renewable Energy Laboratory (NREL), Government of India

2.6.5 Alternate Method of Power Generation

India has an installed capacity of 225.793GW as of 31st July, 2013. In terms of fuel, coal-fired plants account for 59% of India's installed electricity capacity followed by hydro power which accounts for approximately 18%, renewable energy for 12% and natural gas for about 9%. The source wise installed capacity in India is presented below.

Environmental advantage and disadvantages of various electricity generating options.

Table 2.4: Alternate methods of power generation – Advantages and disadvantages

Mode	Disadvantage	Advantage
Thermal Power Plant(Coal based)	Consumption of large quantities of fossil fuel Large quantities of water requirement for cooling High volume of emissions from operation Accumulation of fly ash (for coal powered) Upstream impact from mining and oil exploration GHG emission estimated as 888 tonnes CO2 /GWh	Large scale production potential Moderate period of commissioning Relatively inexpensive Wider distribution potential
Hydropower Plant	■ Site specific, dependent on Reservoir/river etc. ■ Downstream impact on flow ■ Long gestation period ■ Social and Ecological impacts ■	Inexhaustible fuel source · Limited environmental impact Relatively useful levels of energy production Can be reproduced on small scale GHG emission estimated as low as 26 tonnes CO2 /GWh for
Solar Power	■ Land requirement ■ Site specific to solar insolation ■ Expensive installation	Pollution levels are insignificant Inexpensive power generation Inexhaustible source GHG emissions as low as 85 tonnes CO2 /GWh for the Production Chain
Wind Power	■ Site specific (associated to wind pattern) ■ Expensive installation	Pollution levels are insignificant Inexpensive power generation Inexhaustible source GHG emissions as low as 26 tonnes CO2 /GWh for the Production Chain
Nuclear Power	■ Availability of fuel source ■ Hazards associated with radioactive material ■ High cost of project ■ Long start-up period	Cheaper power generation GHG emissions as low as 29 tonnes CO2 /GWh

Source: International Atomic Energy Agency (IAEA), Comparison of Lifecycle Greenhouse Gas Emissions of Various Electricity Generation Sources (World Nuclear Association)

Every mode of electricity generation offers various advantages and disadvantages with respect to operational cost, environmental impact and other factors. In relation to GHG emissions, each generation method produces GHGs in varying quantities through construction, operation (including fuel supply activities) and decommissioning. Coal fired power plants release the majority of GHGs during operation. Others, such as wind power and nuclear power, release the majority of emissions during construction and decommissioning phases.

Further to the above mentioned reasons, it would be significant to conclude that:

- The Project is environment friendly with minimal greenhouse gas emissions;
- It is the most feasible choice of power generation in the state; and
- It will contribute towards the state of Andhra Pradesh attaining self-sufficiency in power supply

2.6.6 Conclusion

- Considering various factors and after going through all the alternative options of energy generation viz non-renewable sources advantage of area selected for solar power park and demand of energy, it is understood that construction and operation of the project is one of the best option than having no project option or any other option.
- Power generation with solar energy is a clean power with no GHG emissions and resources available within the proposed project area in terms of waste land and solar radiation, high number of sunny days the proposed project area is learnt to be one of the best option for construction and operation of solar power plant.
- The project will have overall positive impact on local communities with increase in employment opportunities and other sources of income generation.

3. LAND REQUIREMENT AND PROCUREMENT PROCESS

3.1 Land Requirement and Procurement Process

3.1.1 Land Requirement for 1500MW Solar Park

The 1500 MW Ananthapuram Ultra Mega Solar Park is being developed by Andhra Pradesh Solar Power Corporation Pvt. Ltd. (APSPCL) in the N.P. Kunta Mandal of Ananthapuramu district and Galiveedu Mandal of Kadapa District of Andhra Pradesh. The land for 1500 MW Solar Park is procured from the villages of Kothapalli (5128.31 acres) and N P Kunta (2052.7 acres).

The land lease agreement has been signed between Andhra Pradesh Solar Power Corporation Pvt. Ltd. (Lessor) and AASPL (Lesse) on 23rd October 2018, for a period of 25 years. As per the Land lease agreement, APSPCL is responsible for development of common infrastructure in the Solar Park, comprising Internal Transmission System, Water Supply, Road Connectivity, Drainage systems, Weather stations and Street Lightings. The table below presents the breakup of land procured for Solar Park.

Table 3.1: Land Break up for Solar Park (in acres)

Village	Government Land	Assigned Land	Patta (Private) Land	Total
Kothapalli	3713.41	1262.28	152.62	**5128.31**
N. P Kunta	873.23	1070.93	108.54	**2052.7**
Total	**4586.64**	**2333.21**	**261.6**	**7181.01**

Source: 2018 ESIA report for the Project, provided by AASPL

The various categories of land being procured for the Solar Park are explained below.

Box 3.1: Definitions of various land types in the project

Assigned Land*-Assigned land is that land which was originally government land but was later assigned to people for agricultural/ residential use. Consultations with villagers and review of Andhra Pradesh Assigned Lands (Prohibition of Transfer) Act, 1977 indicated that this allotment granted villagers the right of use on the land. It is also understood that at those who were assigned lands prior to 1954 (G.O.Ms. Number 1142 dated 18th June 1954, wherein for the first time prohibition on transfer of assigned lands situated in Andhra Area was prescribed) can sell away their land and others who were assigned lands after 1954 could use the land but cannot sell it. Also, a condition (as reported during consultations) was added in the patta document stating that the government can withdraw the allotment for any developmental activity. As the assigned lands were granted pattas or documents stating user right on a particular parcel, the whole exercise of withdrawing the allotted patta gives these lands a local name of 'Depatta' land.*

Patta or Private Land*- Patta or Private land is self-explanatory meaning that these plots are privately owned and ownership of these plots is maintained by the local patwari or land revenue officer.*
Government Land *– The land, for which legal ownership lies with the Government.*

SJ- stands for Sivai Jamedar *which means tiller. "Sivai jamedar" is one who has been in occupation of the land at the time of consideration for its assignment provided he had been in continuous occupation of the land from the fasli (fasli year means a period of crop cycle starting from July to June) immediately preceding the one in which the assignment is considered.*

As per the data provided, 3.6% of land for the Solar Park is purchased from private land sellers, while the rest is Government land and Assigned Land. As per information collected during primary socio-economic survey (and mentioned in 2018 ESIA report), approximately 1200 families are getting directly or indirectly affected by the overall activities of the 1500 MW Solar Park.

3.1.1.1 Land Requirement for 250 MW AASPL project

The 250 MW power project being developed by AASPL is situated on 1274 Acres of land allotted to Ayana (with 24 acres of unusable land), out of the approximately 7181 Acres of land for 1500 MW ultra -solar power park. The breakup of the land procured is presented in table below.

Table 3.2: Land ownership breakup of 250 MW AASPL power plant

Government Land Acquired in Acres	Assigned Land Acquired in Acres	Patta Land Acquired in Acres	Total Land Allotted to Ayana in Acres
610.59	582.38	81.04	1274.00

Source: Land Lease Agreement between APSPCL and AASPL

Based on review of Land Lease Agreement and understanding developed basis discussion with AASPL team, there were approx. 235 Assigned Land parcels and approx. 14 Private land parcels have been identified to be procured for 250 MW AASPL project.

3.1.2 Land Procurement Process

- The land procurement for the Solar Park was under the scope of APSPCL, along with assistance from the state government and District Revenue Department of Ananthapuramu. APSPCL is contractually responsible for delivering vacant possession of land to AASPL, for the development.
- The District Revenue Department has conducted the process of procurement of Assigned Land (as per LARR Act, 2013) and has handed over Government Land and Assigned Land identified for the project to New and Renewable Energy Development Corporation of Andhra Pradesh (NREDCAP), which in turn has handed over the possession of land to APSPCL. The purchase of private land parcel has been undertaken through direct discussions and negotiations with respective land sellers.
- It has been reported during consultations with APSPCL that government has focussed on procuring land parcels that are not viable for cultivation and are left unused, for Solar Park.
- It has been mentioned at various forums (discussion with AASPL team and APSPCL team) that there have been community agitations and issues due to non-payment or delayed payment of compensation to the encroachers, who were claiming use of Government land for agriculture, especially in absence of correct legal documentation possessed by the claimants and various illicit claims. The consultation with APSPCL officials and AASPL team have highlighted that the compensation claims have been closed by payment of INR 1 lac per Households, for valid encroachment claims. As per a local newspaper article in 2018, Revenue officials & Joint collector visited NP Kunta Mandal and discussions were held with the farmers who were cultivating on Government land and payment of INR 1 lac was finalised as compensation amount. At present the land procurement is understood to be completed for entire Solar Park and all compensation claims are settled, as confirmed by Mandal Revenue Officer, NP Kunta. The land parcels are handed over to companies for construction of solar plant and the AASPL plot is also fenced.

3.1.2.1 Compensation Details

The private land owners (approx. 13 land owners), contributing to 6.3% of total land for 250 MW power plant, are reportedly paid a compensation of INR 3.25 lac per Acre. ERM reviewed two sample sale deeds for approximately 4 acres of land, that confirm the same. The sale deeds were signed between APSPCL and landowners (from NP Kunta village) on 25th March 2015. It is understood that amount paid to the Private landowners is more than government circle rate (for the year 2018-19), which is in the range of INR 1,00,000 to 1,32,000 per acre in NP Kunta and P. Kothapalle

village[6]. On the other hand, the Assigned land owners are reportedly paid compensation at the rate of INR 2 lacs per acre. A preliminary notification certificate[7] (Form VI under section 11(1) of the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation & Resettlement Act, 2013 (No. 30 of 2013) – Andhra Pradesh (hereinafter called as 'LARR act, 2013') was shared with ERM[8]. Further, Advance land possession certificate and details of compensation (2015) for Assigned landowners was shared by AASPL, this document was duly signed by Revenue Divisional Officer, Kadiri.

The table below presents the rates reported to be paid for different categories of land.

Table 3.3: Land procurement rates

S. No	Land Ownership/ Claim	Number of Land parcels	Compensation amount (in INR)
1.	Private land (owners with valid Patta/ Old Patta), having selling rights	14 land parcels	3.25 lac per acre
2.	Assigned Land (Depatta land or DKT land)	235 land parcels	2 lac per acre
3.	Encroachers (cultivating of government vested land for generations within the site location) – referred to *Sivai Jamedar* by the Land Revenue Department	■ 1150 – Initial claims from land users (**for entire 1500 MW Solar Park**)* ■ 934 – Reduced number of valid claims after verification of documents (**for entire 1500 MW Solar Park**)	1 lac per head

Source: Discussion with APSPCL and Land Lease Agreement

**Break up for encroachers on 250 MW AASPL project not available*

The procurement process followed for each land type is detailed in the sections below.

[6] http://registration.ap.gov.in/UnitRateMV.do

[7] As per section 11 (1) Whenever, it appears to the appropriate Government that land in any area is required or likely to be required for any public purpose, a notification (hereinafter referred to as preliminary notification) to that effect along with details of the land to be acquired in rural and urban areas shall be published in the following manner, namely:—
(a) in the Official Gazette;
(b) in two daily newspapers circulating in the locality of such area of which one shall be in the regional language;
(c) in the local language in the Panchayat, Municipality or Municipal Corporation, as the case may be and in the offices of the District Collector, the Sub-divisional Magistrate and the Tehsil;
(d) uploaded on the website of the appropriate Government;
(e) in the affected areas, in such manner as may be prescribed.
(2) Immediately after issuance of the notification under sub-section (1), the concerned Gram Sabha or Sabhas at the village level, municipalities in case of municipal areas and the Autonomous Councils in case of the areas referred to in the Sixth Schedule to the Constitution, shall be informed of the contents of the notification issued under the said sub-section in all cases of land acquisition at a meeting called especially for this purpose.
(3) The notification issued under sub-section (1) shall also contain a statement on the nature of the public purpose involved, reasons necessitating the displacement of affected persons, summary of the Social Impact Assessment Report and particulars of the Administrator appointed for the purposes of rehabilitation and resettlement under section 43.
(4) No person shall make any transaction or cause any transaction of land specified in the preliminary notification or create any encumbrances on such land from the date of publication of such notification till such time as the proceedings under this Chapter are completed:
Provided that the Collector may, on the application made by the owner of the land so notified, exempt in special circumstances to be recorded in writing, such owner from the operation of this subsection:
Provided further that any loss or injury suffered by any person due to his wilful violation of this provision shall not be made up by the Collector.
(5) After issuance of notice under sub-section (1), the Collector shall, before the issue of a declaration under section 19, undertake and complete the exercise of updating of land records as prescribed within a period of two months.

[8]

3.1.2.2 Patta or Private Land

The Private Land identified for the project comprises 14 private land parcels (as per Land Lease agreement) that are understood to be purchased through willing buyer willing seller principle. The owners of identified land parcels were approached directly by NREDCAP officials for discussion and negotiation for sale of land for the Solar Park.

3.1.2.3 Government Land

As per Land Lease agreement (LLA), about 194 Government land parcels have been transferred for the development of Solar Park. The list of identified land parcels has been shared with District Revenue department and the land has been leased from Revenue department to NREDCAP for a period of 99 years. NREDCAP has further handed over the land parcel to APSPCL for use in the 1500 MW Solar Park.

Encroachment

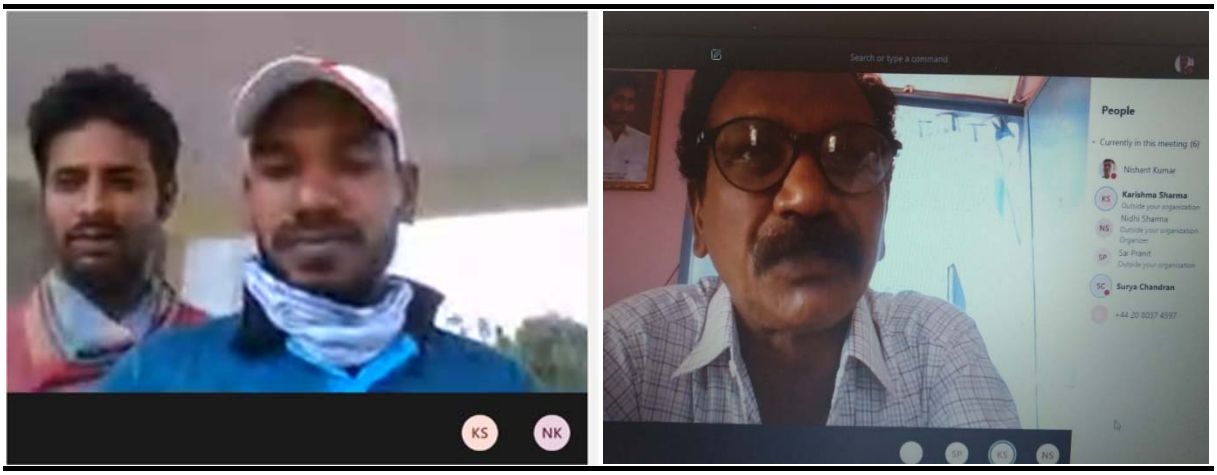
There have been some encroachment activities prevalent in the area by *Sivai Jamedar* (Encroachers), and the above mentioned agitations by community on land use compensation claims have been regarding the non-title use of vacant/unused Government land, for opportunistic cultivation by the local community. As discussed above, the compensation claims have been closed by payment of INR 1 lac per Households, for valid encroachment claims. At present the land procurement is understood to be completed for entire Solar Park and all compensation claims are settled, as per consultations with MRO, NP Kunta. A drone survey was conducted by AASPL in the year 2018, before taking possession of land from APSPCL and no settlement/encroachment or structures were identified. The land had only a few patches of agriculture land which is now confirmed to be clear (by AASPL), the plot is fenced and construction activities are ongoing for AASPL.

3.1.2.4 Assigned Land

There are approx. 235 land parcels understood to be procured for 250 MW AASPL Plant of Solar Park (as per LLA). As per the provisions of the LARR, act 2013, a Social Impact Assessment needs to be undertaken for the procurement of land for the projects. The consultations with APSPCL officials stated that a Social Impact Assessment has been undertaken in the year 2015-16. As discussed above a preliminary notification as per section 11(1) of the said act was shared with ERM for review. however the SIA report has not been made available to AASPL or ERM, by APSPCL. The consultations with Assigned land owners also confirmed that SIA linked consultations were undertaken in 2015, followed by a Public Hearing, in 2015-16. The types of grievances raised comprised of delayed payments of compensation or insufficient compensation. It is understood from the discussion with MRO and limited consultation with Assigned landowners that currently there are no claims of pending compensation.

Reportedly, the negotiations with the Assigned land owners were conducted by the *Tehsildar* and Mandal Revenue Officer (MRO), based on review of Land Passbook records possessed by Assigned land owner that states ownership. After review of documents and negotiation process, the land was procured by Revenue department, compensation was paid to the Assigned land owners and land was transferred to NREDCAP for further use by APSPCL.

Figure 3.1 Online consultations with Assigned Land Sellers (left) and MRO (right)



Dated: June 2020

3.1.3 Project Related Land Procurement and Specific Issues

3.1.3.1 Schedule V Area[9] (Designated Tribal Inhabited Area)

The project is not being set up in a Schedule V area, as Ananthapuramu district does not have notified Schedule V areas, as per Ministry of Tribal Affairs list.

3.1.3.2 Tribal (Schedule Tribe) Land

As per Census of India, 2011 there is approx. 3.2 percent of ST population in the study area. However, the land procurement for the project did not result in physical displacement of Tribal households. There can be some livelihood related impacts due to encroachment of Government land by the local population; however the extent of Tribal households being impacted due to procurement of land due to project is not known till the compilation of this report.

3.1.3.3 Landlessness

The land identified for the project comprises mostly of Government land and Assigned land, with very small proportion of private land (6.3% for AASPL and 3.6% for the 1500 MW Solar Park). The Assigned land owners belong to vulnerable groups, who were assigned land parcels for livelihood related use. The extent of land procured from Assigned land owners and their remaining land holdings post project related land procurement is not presently known by ERM.

There were sample consultations undertaken with Assigned Land Owners, where it was understood that some Assigned land holders may have been rendered landless post procurement of land for solar project; however the consulted Assigned Land owners reported that they opportunistically cultivate Government land parcels at locations (outside Solar Park), which were more viable for agriculture, due to better water availability.

9 In the Constitution of India, the expression “Scheduled Areas” means such areas as the President may by order declare to be Scheduled Areas. The criteria followed for declaring an area as Scheduled Area are preponderance of tribal population; compactness and reasonable size of the area; under-developed nature of the area; and marked disparity in economic standard of the people. These criteria are not spelt out in the Constitution of India but have become well established. (Source: Official website of the Ministry of Tribal Affairs (MoTA), Government of India (GoI). URL: http://tribal.nic.in/Content/DefinitionofScheduledAreasProfiles.aspx. Accessed on 27.08.2016.

3.1.3.4 Common Property Resources

The Government land identified for the project was being used for cattle grazing by the residents of the nearby villages.

3.1.3.5 Cultural Heritage

There are small mosques and temples located near the identified land parcels outside solar park boundary; however no sites of religious and/ or cultural importance have been identified to fall within the identified land parcels for the project.

3.1.3.6 Land Use Change

The private land parcels required for the project are understood to be purchased at the prevailing market rates from the owners, following willing buyer willing seller principles, followed by the Non Agricultural (NA) conversion of land use for industrial purpose.

4. APPLICABLE AND REGULATORY FRAMEWORK

4.1 Introduction

This section highlights the environmental and social regulations applicable to the Project. At the outset, it should be emphasized that this administrative framework focuses on the following:

- Applicable environmental and social regulations and policies in India and the State of Andhra Pradesh;
- Asian Infrastructure Investment Bank's (AIIB) Environmental and Social Framework (ESF).
- IFC Sustainability Framework
- World Bank General EHS Guidelines (2007);
- IFC/World Bank EHS Guidelines for Electric Power Transmission and Distribution (2007);

4.2 Permitting Status of Project

As per the EIA Notification (2006) and its amendments, the Solar Power project does not require any environmental clearance from the Ministry of Environment Forest and Climate Change (MoEFCC) or the State Environmental Impact Assessment Authority (SEIAA). In addition to this, as per latest notification from the CPCB, dated 07/03/2016 (Ref No: B-29012/ ESS (CPA)/2015-2016, "Solar power generation through solar photovoltaic cell, wind power and mini hydel power (less than 25 MW)" have been classified to "white category" from "green category" and therefore "there shall be no necessity in obtaining 'Consent to Operate" for white category of industries and an intimation to the concerned SPCB and PCC office".

4.3 Solar Policies and Regulation Specific to the Government of Andhra Pradesh

4.3.1 Andhra Pradesh Solar Power Policy, 2018 by New & Renewable Energy Development Corporation of Andhra Pradesh Ltd

In order to promote Solar Power Projects, and meeting the energy requirements of the State and India, the Government of Andhra Pradesh have Andhra Pradesh Solar Power Policy, 2018[10]. The policy aims to promote widespread usage of solar power and to meet the following objectives:

- 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.
- To develop solar park(s) with the necessary utility infrastructure facilities to encourage developers to set up solar power projects in the State.
- To promote distributed generation that can help in avoiding upstream network cost and contribute towards loss reduction.
- To deploy solar powered agricultural pumpsets and meet power requirements of farmers during day time.
- To promote local manufacturing facilities which will generate employment in the State.

[10] https://nredcap.in/PDFs/Pages/AP_Solar_Power_Policy_2018.pdf as amended https://nredcap.in/PDFs/Pages/Amendment_order_GO_Ms_NO_35_dt_18_11_2019.pdf Accessed on 03 June 2020

- 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.
- As per the policy, 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 Government of A.P will develop initially 4000 MW capacity Solar Parks. 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.

4.4 National Administrative Requirements

A brief description of the relevant enforcement agencies with respect to the institutional framework is described in **Table 4.1.**

Table 4.1: Enforcement Agencies relevant to the Project

Agency	Functions
Central Level	
Central Pollution Control Board	■ The Central Pollution Control Board (CPCB) has been constituted for the control of water, air and noise pollution, land degradation and hazardous material and waste management. The specific functions of CPCB are as follows: ■ Prevent pollution of streams and wells; ■ Advise the Central Government on matters concerning prevention, control and abatement of water and air pollution; ■ Co-ordinate the activities of SPCB's and provide them with technical and research assistance; ■ Establish and keep under review quality standards for surface and groundwater and for air quality; ■ Planning and execution of national programme for the prevention, control and abatement of pollution through the Water and Air Acts.
Ministry of New and Renewable Energy (MNRE)	■ The Ministry of New and Renewable Energy (MNRE) is the nodal Ministry of the Government of India for all matters relating to new and renewable energy. The broad aim of the Ministry is to develop and deploy new and renewable energy for supplementing the energy requirements of the country. ■ The Ministry facilitate research, design, development, manufacture and deployment of new and renewable energy systems/devices for transportation, portable and stationary applications in rural, urban, industrial and commercial sectors.

Agency	Functions
Central Electricity Authority (CEA)	■ The Central Electricity Authority (CEA) is a statutory organization constituted under Section 3 of the repealed Electricity (Supply) Act, 1948, here in after replaced by the Electricity Act, 2003. Some of the functions performed by CEA include the following: ■ Advise the Central Government on the matters relating to the national electricity policy, formulate short-term and perspective plans for development of the electricity system and coordinate activities of the planning agencies for the optimal utilization of resources to sub-serve the interests of the national economy and to provide reliable and affordable electricity to all consumers; ■ Specify the technical standards for construction of electrical plants, electric lines and connectivity to the grid; ■ Specify the safety requirements for construction, operation and maintenance of electrical plants and electric lines; ■ Promote and assist in the timely completion of schemes and projects for improving and augmenting the electricity system; ■ Collect and record the data concerning the generation, transmission, trading, distribution and utilization of electricity and carry out studies relating to cost, efficiency, competitiveness and such like matters; ■ Make public from time to time the information secured under this Act, and provide for the publication of reports and investigations; ■ Advise any State Government, licensees or the generating companies on such matters which shall enable them to operate and maintain the electricity system under their ownership or control in an improved manner and where necessary, in coordination with any other Government, licensee or the generating company owning or having the control of another electricity system; etc.
Central Ground Water Authority	■ The Central Ground Water Authority (CGWA) was constituted in 1997 to regulate, control and manage groundwater development in the country, under the EP Act 1986. One of the main functions of CGWA is to regulate indiscriminate boring and withdrawal of groundwater and to issue necessary regulatory directions with a view to preserve and protect the groundwater. ■ CGWA has declared certain areas of India as “notified areas” from the point of over-development of resource, or from groundwater quality point of view, or for registration of groundwater abstraction structures. In these so "notified areas” further extraction is regulated in order to prevent the depletion of groundwater levels and deterioration of its quality.
State Level	
New & Renewable Energy Development Corporation of Andhra Pradesh Ltd (NREDCAP)	■ New & Renewable Energy Development Corporation of AP Ltd (NREDCAP) is the State Nodal Agency for implementation of all Renewable energy programmes in Andhra Pradesh sponsored by both the State and Central Governments with the following objectives. ■ Generate electricity through renewable sources like wind and solar on decentralized manner ■ Conserve energy in rural areas ■ Import & adopt viable technology & machinery in the areas of Non-Conventional Energy Sources & ensures post installation service ■ Impart training and to promote research and development in the field of Non-conventional energy sources
Andhra Pradesh Solar Power Corporation private Limited	■ In order to set up solar parks in the State of Andhra Pradesh, a Joint venture 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.) has been formed for development of Solar Park in Andhra Pradesh. The JV Company is known as Andhra Pradesh Solar Power Corporation Private Limited (APSPCL). ■ The objectives of the APSPCL are: ■ Development of solar park and solar power project ■ Transmitting, manufacturing, supplying , selling of power ■ Lease of land and finance ■ Business management consultant

Agency	Functions
Department of Environment, Andhra Pradesh	■ The Environment Department is the apex body in the States for implementation of all the environment related matters including Environment (Protection) Act, 1986, which is an umbrella Act on environment in the country. The main mandate of the Department is to achieve the sustainable development in the State and introducing the sound environmental management practices. ■ Activities like pollution Control & Monitoring of Water, Air, Noise and other related areas, Conservation of Natural resources, Environment Monitoring, Environment Education etc. are co-ordinated by this department.
Andhra Pradesh Pollution Control Board (APPCB)	■ APPCB is responsible for implementing various environmental legislations in the state, mainly including Water (Prevention and Control of Pollution) Act, 1974, Air (Prevention and Control of Pollution) Act, 1981, and some of the provisions under Environmental (Protection) Act, 1986 and the rules framed there under like, Biomedical Waste (M&H) Rules, 1998; Hazardous Waste (M&H) Rules, 2008; Municipal Solid Waste Rules, 2000 etc. SPCBs functions under the administrative control of Environment Department of the State.
Labour Department, Government of Andhra Pradesh	■ The Department of Labour is responsible for formulation, implementation, and enforcement of the labour laws in the Andhra Pradesh. It also undertakes prevention and settlement of industrial disputes, Industrial safety, Health and promotes welfare of workers in the undertakings falling within the sphere of the State.
Gram Panchayats	■ The local Panchayats are empowered with management of local resources like forests, groundwater, common land and infrastructure like roads, buildings etc.
Directorate Industrial Safety and Health Department (DISH)	■ The Directorate Industrial Safety and Health Department enforces the provisions of Factories Act 1948 and State Factories Rules and the rules made there under to ensure the safety health and welfare of the workers. It also plays a significant role in regularizing working hours, and working conditions and reducing the accident and dangerous occurrences in the factories, redress of the grievances of the workers in respect of Safety Health and Welfare through a set of policies and programs developed by both the Central and State Government. Some of the functions of DISH are ■ Eliminating inequality and discrimination in the work place; ■ Enhancing occupational health and safety awareness and compliance in the workplace; ■ Workforce and community participation, to employers, employees, workplaces, communities, businesses and unions; and ■ Providing policy advice and analysis to government on labour and employment related matters.

4.5 Applicable Regulatory/Policy Framework

The table below summarizes the key regulations that are relevant to the project across its lifecycle. This table should be used to update/develop a comprehensive legal register for the project which can be regularly monitored for compliance as well as updated to reflect changes/non-applicability of regulations, policies and standards.

Table 4.2: Applicability of Key Legislations in India & Reference Framework during the Project life cycle

Topic and Reference	Pre-construction	Construction	Operations	Decommissioning	Agency Responsible	Remarks
Indian laws, regulations and policies						
The Electricity Act 2003	√	√	√	√	Central Electricity Authority	■ Generating company deemed to obtain a license under this Act and also to comply with all safety requirement as per rule 29 to 46 under chapter 6.
Andhra Pradesh Solar Policy 2015	√	√	√	√	Government of Andhra Pradesh	■ Refer to section **3.3.1**.
Environment Protection						
Environment Protection Act, 1986 and as amended; The Air (Prevention And Control Of Pollution) Act, 1981; The Water (Prevention And Control Of Pollution) Act 1974	√	√	√	√	APPCB MoEFCC CPCB	■ Permissible limits for ambient air quality, water quality, noise limits has been laid down by CPCB under EP Act, 1986 which requires to be complied with.
The Noise (Regulation & Control) Rules, 2000 and as amended up to 2010 Ambient Noise Standards	√ X	√ √	√ √	√ X	APPCB APPCB MoEFCC	■ Per the Act, ambient noise levels are to be maintained as stipulated in the rules for different categories of areas such as residential, commercial, and industrial and silence zones. Considering the context of the Project, *Ayana* and their contractors will need to abide by the limits prescribed for residential zones. ■ As the project is in rural/residential set up, noise standards for residential area will be applicable for the project.
Solid Waste Management Rules 2016	X	√	√	√	APPCB /local municipal bodies	■ All bio-degradable, non-biodegradable and domestic hazardous wastes generated from the project will be managed by Ayana (the waste generator) in accordance to the relevant provision of this Rule.
Manufacture, Storage and Import of Hazardous Chemicals (MSIHC) Rules, 1989 and as amended	X	√	√	X	APPCB	■ Rules will be applicable during construction and operation phases if chemicals stored at site satisfy the criteria laid down in the Rules.
The Batteries (Management and Handling) Rules 2001 as amended later	X	√	√	X	APSPCB	■ Rules will be applicable during construction and operation phases as the project will use Batteries for power back up. ■ Filing of Half Yearly return by bulk consumers and auctioneers of batteries to State Pollution Control Board as per Form 8 and 9 under Rules10 (2) (ii) and 11 (ii) respectively
E-waste (Management) Rules, 2016	X	X	√	√	APPCB	■ Rules will be applicable as electrical and electronics as listed in the Schedule I of the aforesaid rules will be used and will require replacement within the lifecycle of the whole project as well during decommissioning.
Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016	X	√	√	√	APPCB	■ Generation of waste oil and transformer oil at site attracts the provisions of Hazardous and Other Wastes Rules, 2016. The hazardous wastes have to dispose through approved recyclers only.
The Factories Act, 1948 and Andhra Pradesh Factories Rules, 1980	X	X	√	X	Deputy Chief Inspector of Factories	■ *Ayana* will need to comply with all requirement of factories rules and participate in periodic inspection during the Operations Phase.
Building and Other Construction Workers Act, 1996; Inter-state Migrant Workers Act, 1979; Contract Labour Act, 1970	X	√	X	√	Labour Department, Government of Andhra Pradesh	■ *Ayana* will need to comply with the requirements of the regulations.
The Child Labour (Prohibition and Regulation) Act, 1986; Bonded Labour (Abolition) Act 1976; Minimum Wages Act, 1948;	X	√	√	√	Labour Department, Government of Andhra Pradesh	■ *Ayana* and their contractors will need to comply with the requirements of these regulations.

Topic and Reference	Pre-construction	Construction	Operations	Decommissioning	Agency Responsible	Remarks
Equal Remuneration Act 1976; Workmen's Compensation Act, 1923; Maternity Benefit Act, 1961.						
Companies Act, 2013	X	X	√	X	Ministry of Corporate Affairs	■ According to Schedule 135 sub-section 1, the companies meeting the threshold criteria 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 requirements as stated in the law.
International treaties and conventions						
Conventions on the Conservation of Migratory species of wild animals and migratory species	√	√	√	√	State Forest Department	■ Migratory bird in the project area bears protection from killing under Convention of Migratory Species (CMS) to which India is a signatory
Kyoto Protocol: The 3rd Conference of the Parties to the Framework Convention on Climate Change (FCCC) in Kyoto in December 1997 introduced the Clean Development Mechanism (CDM) as a new concept for voluntary greenhouse-gas emission reduction agreements.	√	√	√	√	MoEFCC, Government of India	-
Basel Protocol on Liability and Compensation for Damage Resulting from Transboundary Movements of Hazardous Wastes and their Disposal Basel, 10 December 1999.	√	√	√	√	State pollution control board	--
International Standards and Guidelines						
IFC Performance Standards, 2012	√	√	√	√	Project Proponent and Lenders	■ The methodology of the ESIA has been developed on the basis of the IFC Performance Standards. ■ During the construction, operation and eventual decommissioning of the site, the following guidelines will need to be followed.
IFC General EHS Guidelines, 2007	X	√	√	√		
IFC EHS Guidelines for Power Transmission and Distribution, 2007	X	√	√	√		
IFC/WB Air Emissions and Ambient Air Quality Standards	X	√	X	√		
IFC/WB Guidelines for treated sanitary sewage discharges	X	√	√	√		
IFC/WB Noise Standards	X	√	√	√		
AIIB ESF and ESS 1, 2 and 3	√	√	√	√		
Asian Infrastructure Investment Bank (AIIB) Policy on the Project-affected People's Mechanism	√	√	√	√		

4.6 National Environmental Standards

The Central Pollution Control Board (CPCB) has stipulated different environmental standards w.r.t. ambient air quality, noise quality, water and waste water for the country as a whole under EP Act, 1986. Following standards are applicable to the project and need to be complied with during the project life cycle.

- National Ambient Air Quality Standards (NAAQ Standards), as prescribed by MoEFCC vide, Gazette Notification dated 16th November, 2009;
- Drinking water quality- Indian Drinking Water Standard (IS 10500: 2012);
- General standards for discharge as prescribed under the Environment Protection Rules, 1986 and amendments (G.S.R 422 (E) dated 19.05.1993 and G.S.R 801 (E) dated 31.12.1993 issued under the provisions of E (P) Act 1986);
- Noise standards specified by the MoEFCC vide Gazette notification dated 14th February, 2000 (Noise Pollution (Regulation and control) Rules, 2000); and
- Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.

4.7 International Safeguard Requirements

4.7.1 Applicability of International Standards

Applicability of international standards for the Project has been provided in table below. Further explanation on their applicability is provided in subsequent sections.

Table 4.3 Applicability of International Standards

S. No.	International Standard & Requirements	Applicability
1.	**PS-1 of IFC Performance Standards 2012** Assessment and Management of Environmental and Social Risks and Impacts. The client will establish and maintain a Social and Environmental Management System appropriate to the nature and scale of the project and commensurate with the level of social and environmental risks and impacts. **AIIB E&S Standards** ESS 1: Environmental and Social Assessment and Management	Yes
2.	**PS-2 of IFC Performance Standards 2012** Labour and Working Conditions **AIIB E&S Standards** ESS-1 - Environmental and Social Assessment and Management	Yes
3.	**PS-3 of IFC Performance Standards 2012** Resource Efficiency and Pollution Prevention	Yes
4.	**PS-4 of IFC Performance Standards 2012** Community Health, Safety and Security	Yes
5.	**PS-5 of IFC Performance Standards 2012** Land Acquisition and Involuntary Resettlement **AIIB E&S Standards** ESS- 2: Involuntary Resettlement	No
6.	**PS- 6 of IFC Performance Standards 2012** Biodiversity Conservation and Sustainable Management of Living Natural Resources	No

S. No.	International Standard & Requirements	Applicability
7.	**PS- 7 of IFC Performance Standards 2012** Indigenous Peoples **AIIB E&S Standards** ESS-3: Indigenous Peoples of AIIB Environmental & Social Standards 2016.	No
8.	**PS- 8 of IFC Performance Standards 2012** Cultural Heritage	No

4.7.2 IFC Requirements and Applicability

IFC applies the Performance Standards to manage social and environmental risks and impacts and to enhance development opportunities in its private sector financing in its member countries eligible for financing. The Performance Standards may also be applied by other financial institutions choosing to support them in the proposed project. These performance standards and guidelines provide ways and means to identify impacts and affected stakeholders and lay down processes for management and mitigation of adverse impacts. Together, the Client is required to meet the stipulations of all the eight Performance Standards throughout the life of an investment in the case such an investment is being sought either form IFC or any other institution which follows IFC standards.

Table 4.4 IFC Performance Standards and their Applicability

IFC PS	Description	Objectives and Applicability to Project
IFC PS1	Assessment and Management of Environmental and Social Risks and Impacts	**Applicable** This PS aims to assesses the existing social and environmental management systems of Ayana and to identify the gaps with respect to their functioning, existence and implementation of an environmental and social management plan (ESMP), a defined EHS Policy, organization chart with defined roles and responsibilities, risk identification and management procedures as well as processes like stakeholder engagement and grievance management.. According to IFC PS 1, ARPPL team is required to have an Environmental and Social Management System (ESMS) at the Corporate level which shall be applicable for all its projects. The ESMS shall include (but not limited to) the following elements: ■ An EHSS policy ■ Site Screening mechanism and site selection criteria; ■ Identification procedure of risks, impact assessment and EHS&S management procedures for all phases of its projects; ■ Framework for developing site specific E&S management programs; ■ Organizational structure for ESMS implementation ■ Training and capacity building; ■ Monitoring and review mechanism; ■ Schedule for periodic review and update of ESMS. Additionally this PS requires provisions of external GRM and Stakeholder Engagement, covered as part of existing IMS of ARPPL, which provide management system level guidance on dealing with grievances of procurement of private and Assigned land parcels
IFC PS2	Labour and Working Conditions	**Applicable** This PS is guided by a number of international conventions and instruments on labour and workers' rights. It recognises that the pursuit of economic growth through employment creation and income generation

IFC PS	Description	Objectives and Applicability to Project
		should be accompanied by protection of fundamental rights of workers. The PS covers following themes: human resource policy and management, workers' organization, non-discrimination and equal opportunity, retrenchment, protecting the workforce and occupational health and safety. This PS helps to assess the status of the employees and workers of Ayana as well as any contractors. The project activities will involve hiring of skilled, semi-skilled and unskilled labourers during the construction phase and solar plant staff during the operation phase. The project will have to develop a human resource policy and ensure non-discrimination and equal opportunity, protection of the workforce and occupational health and safety. Therefore, PS 2 is applicable to the Project. This Performance Standard is applicable for the project during the entire project lifecycle, as it governs the working conditions of staff and workers engaged for project related activities.
IFC PS3	Resource Efficiency and Pollution Prevention	**Applicable** PS-3 covers the use resources and materials as inputs and wastes that could affect human health. The objective of PS-3 are: to avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities; to promote more sustainable use of resources, including energy and water, and to reduce project related GHG emissions. Key themes covered under PS-3 are: pollution prevention, resource conservation and energy efficiency, wastes, hazardous materials, emergency preparedness and response, greenhouse emissions, pesticide use and management. This PS will assess how Ayana intends to minimize pollution related impacts, what management plans and systems are in place, and what measures it plans to take to conserve and use resources more efficiently. The Project construction activities will lead to increased fugitive dust emissions and loss of vegetation in the area. The project activities will also lead to increase in ambient noise level during the construction phase, which may have potential impact on the nearest settlements situated within 1 km from the project. Furthermore, the project activities will involve generation of waste and involve abstraction of water from bore wells and reservoirs. Therefore, PS 3 is applicable to the Project.
IFC PS4	Community Health, Safety and Security	**Applicable** This PS-4 requires due diligence to anticipate and avoid adverse impacts on the health and safety of the affected community during the project life from both routine and non-routine circumstances. It also requires to ensure that the safeguarding of personnel and property is carried out in accordance with relevant human rights principles and in a manner that avoids or minimizes risks to the affected Communities. Key areas of compliance screened under PS-4 includes: infrastructure/equipment safety, hazardous material safety, natural resource issues, exposure to disease, emergency preparedness and response, and security personnel requirements. The project would affect the health and safety of the communities adjacent to it during construction phase.

IFC PS	Description	Objectives and Applicability to Project
		Movement of large trailers and vehicles used during construction phase may pose risk of accident and injury to local community settlements along the route of operations as well as the labours engaged in the construction work. Therefore, PS 4 is applicable to the Project.
IFC PS5	Land Acquisition and Involuntary Resettlement	**Not Applicable** PS-5 requires project proponents to anticipate and avoid, or where avoidance is not possible, minimize adverse social and economic impacts from land acquisition or restrictions on land use. The key themes covered under this are: compensation and benefits for displaced persons, consultation and grievance mechanism, resettlement planning and implementation, physical displacement, economic displacement. The PS-5 also prescribes private sector responsibility to supplement government actions and bridge the gap between governments assigned entitlements and procedures and the requirements of PS-5. This Performance standard is not applicable for the project as there is no physical displacement understood to have happened due to project related land procurement.
IFC PS6	Biodiversity Conservation and Sustainable Management of Living Natural Resources	**Not Applicable** The requirements of this Performance Standard are applied to projects (i) located in modified, natural, and critical habitats; (ii) that potentially impact on or are dependent on ecosystem services over which the client has direct management control or significant influence; or (iii) that include the production of living natural resources (e.g., agriculture, animal husbandry, fisheries, forestry). PS-6 screens relevant threats to biodiversity and ecosystem services, especially focusing on habitat loss, degradation and fragmentation, invasive alien species, overexploitation, hydrological changes, nutrient loading, and pollution. The key themes covered under PS-6 are: natural habitat, critical habitat, legally protected areas, international introduction of alien species, and living natural resources (natural and plantation forest, aquatic resources etc.) are sustainably managed. Since, the solar power site is not passing through any natural habitats. There is no national ecological protected area and internationally recognized Key Biodiversity area, Important Bird Area within 10 km of the project footprint. Therefore, PS 6 is not applicable to the project.
IFC PS7	Indigenous Peoples	**Not Applicable** This Performance Standard applies to communities or groups of Indigenous Peoples who maintain a collective attachment, i.e., whose identity as a group or community is linked, to distinct habitats or ancestral territories and the natural resources therein. PS-7 endeavour to ensure that the development process fosters full respect for the human rights, dignity, aspirations, culture, and natural resource-based livelihoods of Indigenous Peoples. Key themes covered under PS-7 are: avoidance of adverse impacts, consultation and informed participation, impacts on traditional or customary lands under use, relocation of IPs from traditional or customary lands, and cultural resources. This PS is not applicable for the project as it is not set up in a Schedule V area or has Indigenous population (referred to Scheduled Tribes (ST) in

IFC PS	Description	Objectives and Applicability to Project
		India), that is being impacted due to land procurement or other project activities.
IFC PS8	Cultural Heritage	**Not Applicable**: For the purposes of PS-8, cultural heritage refers to (i) tangible forms of cultural heritage; (ii) unique natural features or tangible objects that embody cultural values; and (iii) certain instances of intangible forms of culture that are proposed to be used for commercial purposes. The requirements of PS-8 apply to cultural heritage regardless of whether or not it has been legally protected or previously disturbed. This PS is understood to be not applicable for the project as the Project site is not located near any cultural heritage or legally protected sites.

4.7.3 AIIB Environmental and Social Policy and Standards and their Applicability

AIIB environmental and social policy and standards are as described below.

4.7.3.1 Overarching Policy

The Bank recognizes that environmental and social sustainability is a fundamental aspect of achieving outcomes consistent with its mandate to support infrastructure development and enhance interconnectivity in Asia. The objective of this policy is to facilitate achievement of these development outcomes, through a system that integrates sound environmental and social management into Projects. Refer **IFC PS 1** in ***Table 4.4*** for applicability to the 250 MW solar power project.

4.7.3.2 Environmental and Social Policy Including Environmental and Social Standards

This overarching policy comprises of:

- Environmental and Social Policy. An environmental and social policy (ESP), which sets forth mandatory environmental and social requirements for each Project;
- Environmental and Social Standards. The following three associated environmental and social standards (ESSs), which set out more detailed mandatory environmental and social requirements relating to the following:
- ESS 1: Environmental and Social Assessment and Management (ESS 1): To ensure the environmental and social soundness and sustainability of Projects and to support the integration of environmental and social considerations into the Project decision-making process and implementation. Refer **IFC PS 1** in ***Table 4.4*** for applicability to the 250 MW solar power project;
- ESS 2: Involuntary Resettlement (ESS 2): To avoid Involuntary Resettlement wherever possible; to minimize Involuntary Resettlement by exploring Project alternatives; where avoidance of Involuntary Resettlement is not feasible, to enhance, or at least restore, the livelihoods of all displaced persons in real terms relative to pre-Project levels; to improve the overall socioeconomic status of the displaced poor and other vulnerable groups; and to conceive and implement resettlement activities as sustainable development programs, providing sufficient resources to enable the persons displaced by the Project to share in Project benefits. Refer **IFC PS 5** in ***Table 4.4*** for applicability to the 250 MW solar power project

- ESS 3: Indigenous Peoples (ESS 3): To design and implement Projects in a way that fosters full respect for Indigenous Peoples' identity, dignity, human rights, economies and cultures, as defined by the Indigenous Peoples themselves, so that they: (a) receive culturally appropriate social and economic benefits; (b) do not suffer adverse impacts as a result of Projects; and (c) can participate actively in Projects that affect them. Refer **IFC PS 7** in ***Table 4.4*** for applicability to the 250 MW solar power project.

4.7.3.3 An Approach for Environmental and Social Management

Together, the ESP and the ESSs comprise an environmental and social management approach designed to:

- Support decision-making by the Bank;
- Provide a robust structure for managing operational and reputational risks of the Bank and its shareholders in relation to environmental and social risks and impacts in Projects;
- Provide for environmental and social screening and categorization of Projects;
- Analyze potential environmental and social risks and impacts of Projects;
- Identify actions to avoid, minimize, mitigate, offset or compensate for environmental and social impacts of Projects;
- Support integration of environmental and social management measures into Projects;
- Specify environmental and social management provisions to be included in agreements governing Projects;
- Provide a mechanism for public consultation and disclosure of information on environmental and social risks and impacts of Projects;
- Provide for monitoring and supervision of environmental and social management measures under Projects;
- Facilitate development and dissemination of lessons learned from Projects to improve environmental and social management practices.

4.7.3.4 Support for Clients

The ESP (including the associated ESSs) sets out the requirements for Clients relating to identification and assessment of environmental and social risks and impacts associated with Projects supported by the Bank. The Bank believes that the application of the ESP and ESSs, by focusing on the identification and management of environmental and social risks and impacts, will support Clients in achieving good international practice relating to environmental and social sustainability; assist Clients in fulfilling their national and international obligations relating to environmental and social risks and impacts; enhance non-discrimination, transparency, participation, accountability and governance; and enhance sustainable development outcomes of Projects through ongoing stakeholder engagement.

4.7.4 AIIB's Information Disclosure Requirement

As per AIIB's information disclosure requirement, Client shall ensure that relevant information about environmental and social risks and impacts of the Project is made available in the Project area in a timely and accessible manner, and in a form and language(s) understandable to the Project-affected people, other stakeholders and the general public, so they can provide meaningful inputs into the design and implementation of the Project. This documentation includes, as applicable, the following:

- Environmental and social assessment reports, project specific ESMP, and other approved forms of documentation such as AIIB monitoring report template;

NOTE: It must be noted that the project does not require legally relevant public disclosure as the project is exempt from obtaining an Environmental Clearance from MOEF&CC.

4.8 Project Categorisation

4.8.1 IFC and AIIB Project Categorisation

IFC's Environmental and Social Review Procedure Manual (11) and AIIB Environmental and Social Framework have provided a provisional categorization tool for projects. The tool assigns an E&S category based on risk inherent to the particular sector, as well as on the likelihood of a development taking place and on what can be reasonably ascertained about the environmental and social characterization of the Project's likely geographical setting. The categories are defined as follows:

- **Category A:** Projects with potential significant adverse environmental or social risks and/or impacts that is diverse, irreversible or unprecedented.
- **Category B:** Projects with potential limited adverse environmental or social risks and/or impacts that is few in number, generally site-specific, largely irreversible and readily addressed through mitigation measures.
- **Category C:** Projects with minimal or no adverse environmental or social risks and/or impacts.

The proposed Project has been categorized as falling under **Category B** as per the guidelines.

4.8.2 Category Justification

Selection of **Category B** is based on similar reasoning:

i. The IFC and AIIB categories are similar in nature and based on the assessment of said categories the Project has been categorised as Category B based on the following reasoning:

ii. Land use related impacts are restricted to construction phase as impact are mainly from clearing of vegetation from land prior to construction activities. The potential for alteration of land use of the proposed site has been assessed as moderate owing to likely alteration of water holding and erosion pattern.

iii. A small proportion of the waste generated during construction phase will be hazardous and will include waste fuel, grease and waste oil containing rags. Use transformer oil which is also categorised as hazardous waste will be generated from the plant. If improperly managed, solid waste could create impacts on soil quality. However, the impact magnitude has been assessed as small as such impacts are manageable through effective hazardous and other waste management measures.

iv. It is understood that during the construction phase, Ayana is required to make its own arrangements to source water for construction activities. APSPCL is not expected to provide water supply for construction purposes. As reported, presently, the water is being procured by EPC contractor through water tankers. Approximately 2000 litres of water per day is used for domestic purpose for which packaged water is procured from nearby villages.

v. Additionally, use of water resource is also expected during operation phase for module cleaning activities. APSPCL is responsible for supplying water to the project proponent along with other solar power project developers. This may put additional stress on water resources, therefore, the impact significance during operation phase has been assessed as moderate. It

(11) Environmental and Social Review Procedures Manual: Environment, Social and Governance Department (2012): http://www.ifc.org/wps/wcm/connect/190d25804886582fb47ef66a6515bb18/ESRP%2BManual.pdf?MOD=AJPERES. Accessed on 06.09.2016.

must be noted that additional mitigation measures by the project proponent such as optimizing water usage, sensitization of water use, regular inspection of water leaks, recycling/ reuse to the extent possible, and opting for dry and semi dry module cleansing mechanisms may reduce the overall impact.

vi. Construction activities will increase fugitive dust emissions during site clearance and other activities such as increased plying of vehicles will increase vehicular emissions. However, the construction activities are expected to span over a short period of time (~6 months), and therefore, impact significance on air quality has been assessed as small. The air emissions during operation phase of the project are expected to be limited to occasional use of DG units.

vii. Based on ambient noise monitoring conducted for the project, the noise level in the project area is within CPCB permissible limit. No settlements are located within 1 km of the project site. Hence, the receptor sensitivity is assessed to be low. Impact significance over the construction period has been assessed as negligible owing to limited presence of sensitive receptors within the project vicinity and as construction activities are expected to span over a short period of time. Noise during operation phase is expected to be limited to occasional plying of vehicles to and from the site, and running of project related utilities.

viii. Based on ambient noise monitoring conducted for the project, the noise level in the project area is within CPCB permissible limit. No settlements are located within 1 km of the project site. Hence, the receptor sensitivity is assessed to be low. Impact significance over the construction period has been assessed as negligible owing to limited presence of sensitive receptors within the project vicinity and as construction activities are expected to span over a short period of time. Noise during operation phase is expected to be limited to occasional plying of vehicles to and from the site, and running of project related utilities;

ix. As per the primary and secondary ecological assessment undertaken as part of ESIA Study (2018), the impact magnitude on habitat, based on Habitat-Impact Assessment Criteria has been assessed as negligible. Based on species sensitivity value, project construction activity is not expected to cause substantial change in the population of the species or other species dependent on it. Based on Species-Impact Assessment Criteria the impact magnitude on species was also assessed to be Negligible.

x. The Project is situated on 1274 Acres of land allotted to Ayana, out of the approximately 7181 Acres of land for 1500 MW ultra -solar power park. AASPL was not involved in acquisition and procurement of land. APSPCL was responsible for providing encumbrance free land to AASPL. The land lease agreement was signed between APSPCL and AASPL on 23rd October 2018, for a period of 25 years. Based on the review of document, consultation with MRO and limited landowners, it is understood that the Project did not lead to any physical displacement. However, mitigation measures have been recommended for AASPL to ensure that compensation paid by APSPCL was paid as per legal requirement. In addition, mitigations measure are recommended for improving livelihoods of land losers through skill development activities and employment opportunities.

5. BASELINE SETTINGS - ENVIRONMENT, ECOLOGY AND SOCIAL

This section presents environment, ecological and socio economic baseline of the study area for the proposed 250 MW solar power project in Ananthapur District of Andhra Pradesh, in order to provide a context within which the impacts of the 250 MW solar power project are to be assessed.

It is to be noted that major part of the data on environment, social and ecology (and all of primary data) has been referenced from the original ESIA Report, prepared by OpenSense Lab in 2018.

The project is situated on land from two villages, namely Nambulipulikunta (NP Kunta) and Pedaballikothapalle (P. Kothapalle) villages of NP Kunta Mandal. The data provided in the section is based on secondary information and desk based review of documents.

Baseline refers to the physical, biological, cultural and human conditions that will prevail in the absence of the project, including interactions amongst them. Establishing baseline helps in understanding the prevailing environmental, ecological and socio-economic status of the study area. It provides requisite information of the biophysical and social environment for decision makers to take appropriate measures regarding the project.

Establishing baseline provides the background environmental and social conditions for prediction of the future environmental characteristics of the area before setting up of the project. It also helps in environmental and social management planning and provides a basis to finalize a strategy for minimizing any potential impact due on surrounding environment due to setting up of the project.

5.1 Area of Influence

For the purpose of the baseline establishment and impact assessment, an Area of Influence (AoI) has been identified. This sub section provides an understanding of the terms used in the section, comprising of Project footprint, Project AoI and Study area identified and the basis for this classification.

5.1.1 Project Footprint Area

The Project Footprint is the area that may reasonably be expected to be physically touched by Project activities, across all phases. The Project Footprint for 250 MW AASPL project includes land used for the setting up the Solar PV's, transformer rooms, storage of materials, site office, access roads, and internal and external transmission lines.

5.1.2 Project Area of Influence

- The effects of the Project and Project activities on a particular resource or receptor will have spatial (distance) and temporal (time) dimensions, the scale of which is dependent on a number of factors. These factors are incorporated in the definition of the Project's Area of Influence (AoI).
- The Project AoI considered for the existing Project with respect to the environmental and social resources was based on the following reach of impacts:
- Environmental parameters: Project site boundary, immediate vicinity, Access road and surroundings, i.e. a study area of approximately 5km (hereafter referred to as the AoI) distance from project line has been used to depict these parameters;
    - Air Quality: Dust emissions, fugitive dust- typically up to 500 m from a construction area and 100 m from operations and maintenance area;
    - Noise: Noise impact area (defined as the area over which an increase in environmental noise levels due to the Project can be detected) –typically 1 km from operations;

- Land environment: The impacts on soil and land- typically up to 100 m from project foot print area;

- **Ecological Environment (Terrestrial and Aquatic):** This includes: (a) the direct footprint of the project comprising the solar plant; (b) The areas immediately adjacent to the project footprint within which a zone of ecological disturbance is created through increased dust, human presence and project related activities (e.g., trampling, transportation activities);
- **Social and Cultural:** The AoI for the project is identified as the area within a 5 km radius from the project footprint area and/or area identified beyond 5 km that is directly impacted by project activities.

5.1.3 Study Area

The area of up to 5 km radius from the project boundary (ARPPL solar plant area) has been demarcated as study area for the project by considering the extent of project impact in terms of noise, water resources, human settlement, cultural heritage sites, location of labour sites, location of the access roads besides considering the actual land area which has been procured for the project and its utilities footprints. The study area includes two villages namely NP Kunta and P. Kothapalle villages of NP Kunta Mandal. The study area has been considered a 100% overlap with the AoI defined above and has been subdivided into a core and buffer zone as follows:

5.1.3.1 Core and Buffer Zone

This Study area is in turn, divided into a core and buffer zone. This division of the Study area into two zones is based on the understanding that the majority of the impacts from the project (during the project lifecycle) would be contained within a 1 km radius (core zone) from the Project Footprint in terms of spread and intensity, with the buffer zone (5 km radius) appearing to have limited interactions with the project.

The Buffer Zone is the area which does not have direct impacts on land or environment, however it is demarcated in case the impact on core zone are sometimes extended to near-by areas. Usually the impacts on buffer zone are more inclined towards, noise, air and water pollution. In cases it also has impact over labour, land ownership, migration and accessibility to any natural resources.

For the purpose of socio economic baseline assessment, core (1 km from project boundary) and buffer zones (beyond 1 km and within 5 km of project boundary) have been considered. There are 2 villages namely N.P. Kunta and P. Kothapalle village within the buffer zone and no villages are present within the core zone ie. 1 km from AASPL project boundary.

5.2 Environment Baseline[12]

Ananthapur district has a semi-arid climate, with hot and dry conditions for most of the year. The environmental setting is arrived based on secondary data, all available data has been used for the purpose of Environmental understanding. Chitravati River is around 25 km from the project site. The project area does not fall within any sensitive receptors viz. Wild Life Sanctuaries, Biosphere Reserves, National Parks etc. There are no archaeological and historical monuments in, along or near (2.5 km) the project site.

Structures of religious importance will not be affected by the project. There are few natural Nalas (water drain) within the project boundary and will not be touched or effected by the project Activities. The Galiveedu reservoir adjacent to the project boundary will not be affected as the drainage (watershed) patterns; structures will not be disturbed and will remain as is. The land required for

[12] This section comprise of data retrieved from ESIA report dated 20.12.2018 prepared by OSL for the 250 MW solar power project for ARPPL.

construction of 250 MW solar park i.e. .1250 acres will be excluding these lands and are marked as unusable land. Total land allotted to Ayana is 1274 acres (24 acres unusable land).

5.2.1 Land Use

The land utilization pattern as available in the district during the year 2011-2012 include net area sown as 10.48 Lakh hectare, which forms 54.78% of the total area. The total cropped area is 11.14 Lakh hectare. Area sown more than once is 0.66 Lakh hectare. The cultivated area of the District is 11.14 Lakh hectare out of which 9.82 Lakh hectare is under Kharif and 1.32 Lakh hectare, is under Rabi Season during the year 2011-12. The district occupies the lowest position in respect of irrigation facilities with only 15.43% of the gross cropped area during 2011-2012. Out of the gross irrigated area of 1.72 Lakh hectare during 2011-2012 canals accounted for 13.64%, tanks 0.54%, Tube wells 80.59%, wells 3.98% and other sources 1.25%. All the principal sources except canals are non-precarious.

As reported in the ESIA report prepared by OSL, agriculture and horticulture practices are carried out in very small patch of approximately 3-4 acres of land within the project area. As reported by Ayana, the project area was previously covered with bushes, however, all the bushes have been cleared and the site is currently clean and free of bushes.

5.2.2 Topography

Anantapur district lies between 13° -40 and 15° -15' Northern Latitude and 76° -50' and 78° -30' Eastern Longitude physically. The district may be divided into 3 natural divisions.

Northern Mandal of Rayadurg, Kanekal, Beluguppa, Gooty, Guntakal, Vajrakarur, Uravakonda, Vidapanakal, Yadiki, Tadipatri, Putlur and Yellanur containing larger areas of black cotton soils;

Kalyandurg, Kambadur, Settur, Brahmasamudram, Ramagiri, Kanaganapalli, C.K.Palli, Dharmavaram, Bathalapalli, Tadimarri, Mudigubba, Anantapur, Kudair, Pamidi and Peddavadugur in the center which are mainly made up of arid treeless, expense of poor red soils;

High level land of Penukonda, Roddam, Somandepalli, Hindupur, Lepakshi, Chilamathur, Madakasira, Rolla, Gudibanda and Agali which connects with Mysore plateau at higher elevation of the rest of the district. This part has average sandy red soils of normal productivity.

The elevation within project site, ranges from 430 to 470 m above msl and the topography is majorly undulating with few structural hilltops.

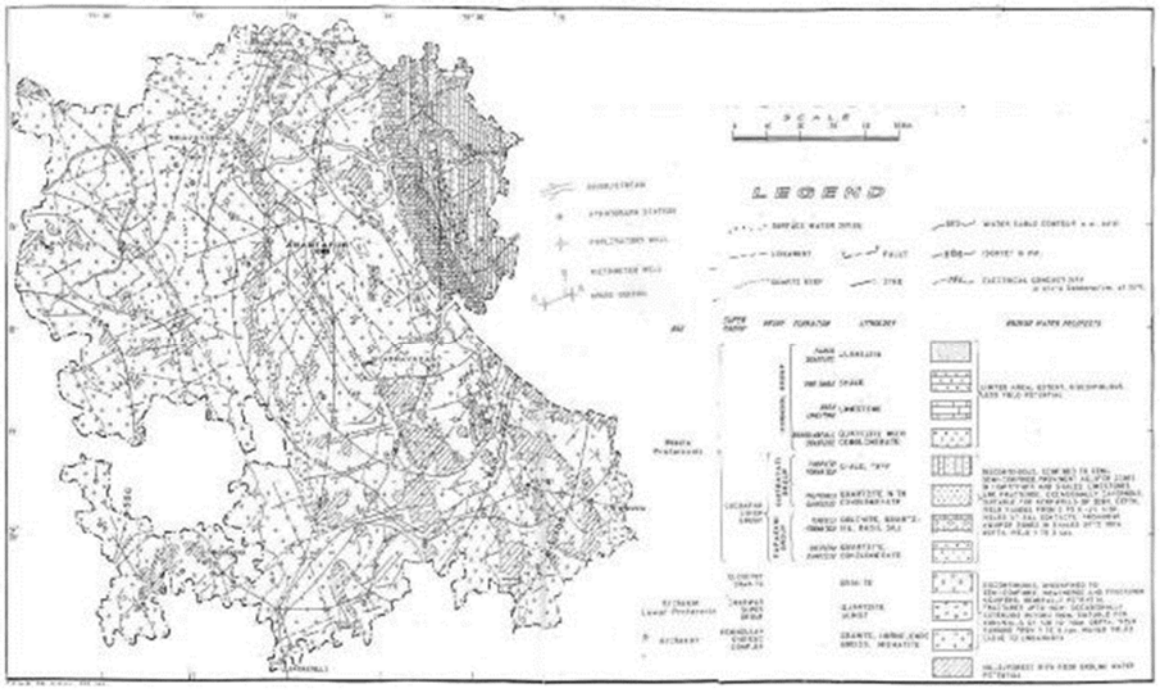
5.2.3 Geology

The geological formations in Anantapur district can broadly be categorized into two distinct groups (i) an older group of archaean rocks and (ii) a younger one of sedimentary rocks equivalent in age relation to Kadapa and Kurnool Systems of Kadapa Basin. Rocks belonging to the later formations are pre-cambrian in age and covers the area of Yadiki, Peddapappapuru, Tadipatri, Putlur, Yellanur mandals and the eastern parts of Peddavadugur, Gooty, Pamidi, Guntakal, Vajrakarur, Vidapanakal, Narpala, Singanamala, Garladinne, and Kuderu mandals. The remaining parts of the district comprise the older arch can group of rocks which include schists, gneisses and granites.

5.2.4 Hydrology and Drainage

The district is underlain by granite gneisses and schists of Archaean age and formation of Cuddapah Super Group belonging to upper Precambrian to lower Paleozoic Age. River alluvium occurs along the major river courses and to some extent along minor stream courses. The hydrogeological map of the district is presented in the below figure.

Figure 5.1: Hydrogeological Map of Anantapur District



Source: CGWB

Six rivers flow within the district: Penna, Chithravathi, Vedavathi, Papagni, Swarnamukhi, and Thadakaleru. Chitravati river is around 30 km from the project site.

A hydrology study was commissioned for the project for proper drainage planning for the site. The dendritic drains from the structural hills are connecting to the main drainage, which is running from south west to east & north east direction within the site. The main drainage is only the seasonal and the water flow will be observed during the rainy season and is connecting to the Papagni River at downstream. Veligallu reservoir is located approximately 4 km (aerial distance) towards east of the project site. No water bodies exist within the project sit. however, a number of water gully plugs, rubble check dams and concrete check dams are located at multiple locations along the drains to enhance the groundwater recharge and support the water needs of plants and animals.

Penna (also known as Pennar, Penner, Penneru or North Pinākinī) is a river of southern India. The Penna rises in Nandi Hills in Chikaballapur district of Karnataka state, and runs north and east through the states of Karnataka and Andhra Pradesh to empty into the Bay of Bengal. It is 597 kilometres (371 mi) long, with a drainage basin covering 55,213 km2; 6,937 km2 in Karnataka and 48,276 km2in Andhra Pradesh. The river basin lies in the rain shadow region of Eastern Ghats and receives 500 mm average rainfall annually.

Papagni River is a non-perennial, inter-state river in southern India that flows through the states of Karnataka and Andhra Pradesh. It is a right bank tributary of the Pennar river.

Veligallu Project is constructed across Papagni river near Veligallu village in Galiveedu Mandal of Kadapa District. The contemplated ayacut under the Project is 24,000 acres (2,000 acres in Rabi and 24,000 acres in khariff) in Galiveedu, Lakkireddi palli and Ramapuram Mandals. The project is also contemplated to provide drinking water facility to Rayachoty town by sparing 0.30 TMC. The full capacity of the project is 4.64 TMC

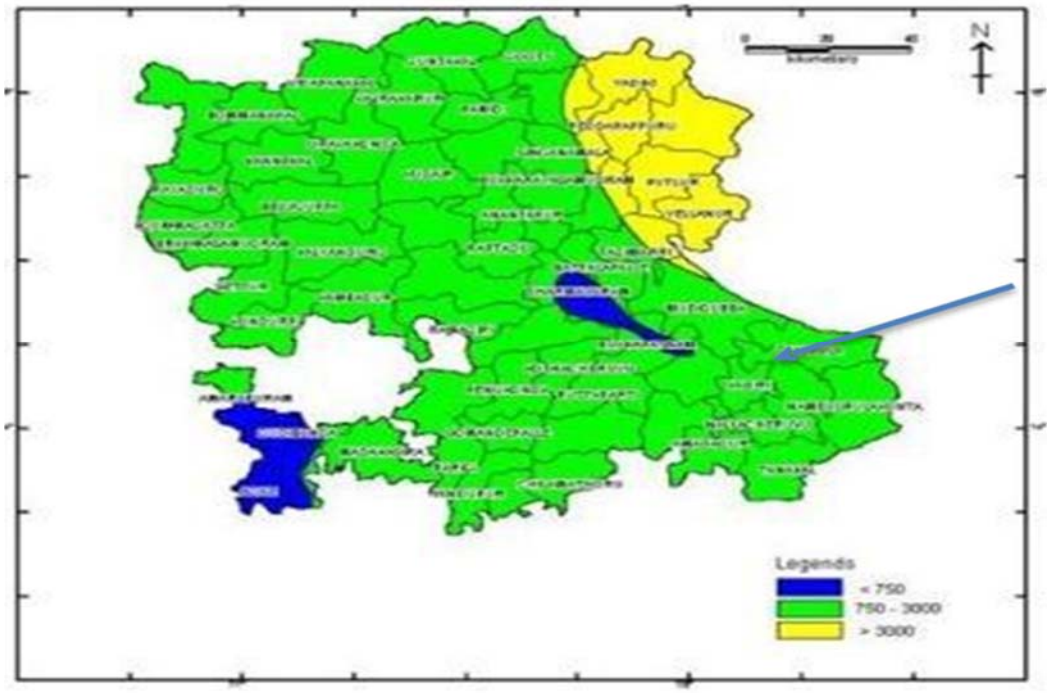
The site is a part of Papagni river tributary watershed, the nala (drain) does not possess uniform depth/slope across & results in to temporary water log at each stage of the nala (drain), and the water flow occurs only when there is a heavy rainfall.

As per hydrology study, the runoff water would follow the natural flow paths. The natural streams/drains should be cleared for any obstruction, sump or bunding for easy runoff flow. The natural drain way out points to be kept unchanged as per pre-development stage and no major modifications are required. The same shall be suitable for providing outfall to storm water.

5.2.5 Ground Water Development

The ground water in the district is in general suitable for both domestic and irrigation purposes. The Electrical Conductivity ranges from 569 to 9980 micro Siemens/cm at 250 C. Fluoride concentration in some locations of the district is more than permissible limit. In some places, it is not suitable for drinking due to the presence of Nitrates. A total of 993 Fluoride affected villages exist in the district. The proposed project falls in NP Kunta Mandal where the electrical conductivity is within the permissible limits and is suitable for both domestic and irrigation purposes.

Figure 5.2: Electrical Conductivity Map of Anantapur District



Source: CGWB

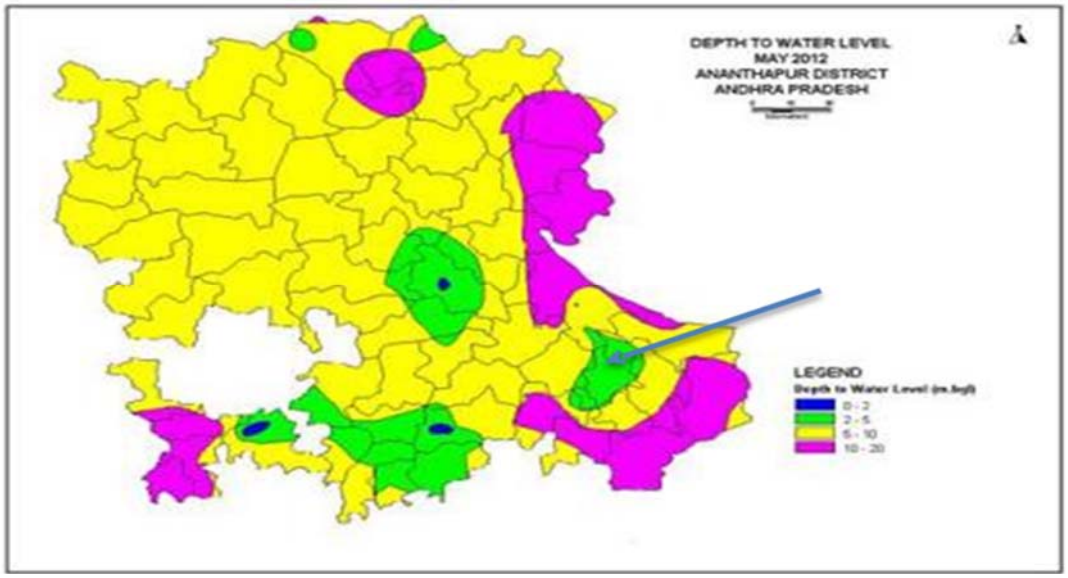
5.2.5.1 Depth to Water Level

Ground water levels are monitored from a network of 36 observation wells four times in a year by the state ground water department. These observation wells, tapping the phreatic aquifer, include dug wells and shallow bore wells. The State Ground Water Department has also established 144 observation wells and 70 piezometers.

5.2.5.2 Pre- Monsoon Water Levels

The depth to water level in the district during pre-monsoon (2012) ranges from 0.65-11.97mbgl. The shallow water levels of 2m is observed in southern part of the area at three locations. The depth to water levels between 5-10 m is observed in majority of the area. Deeper water levels of >10 m bgl are observed in the North Eastern and South Eastern parts of the area.

Figure 5.3: Depth to Water Level- Pre-monsoon 2012

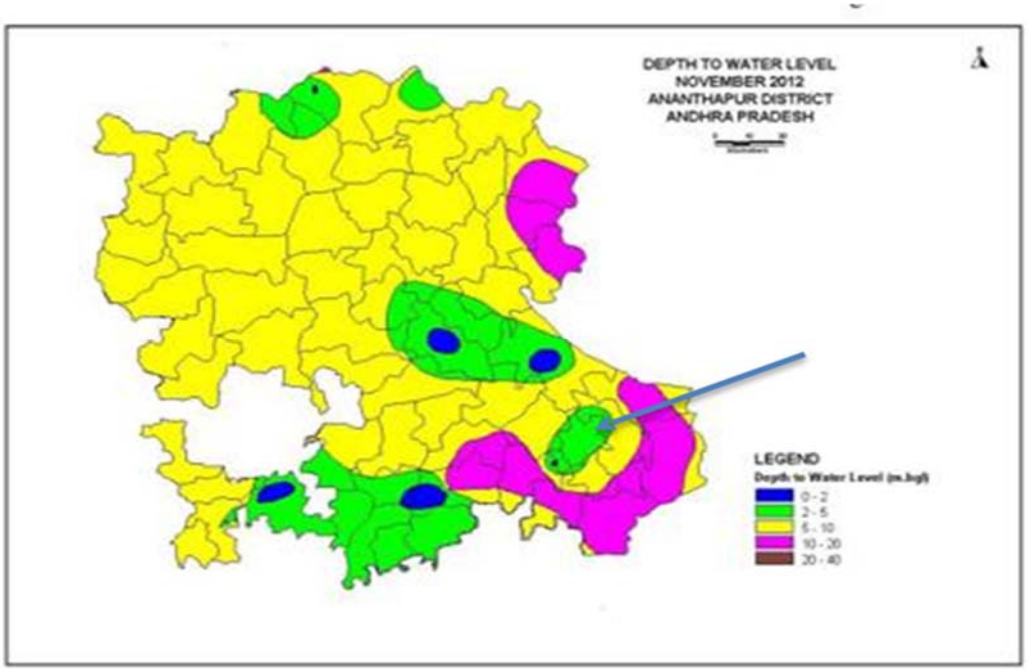


Source: CGWB

5.2.5.3 Post-Monsoon Water Levels

The depth to Water level ranges from 0.37 to 15.26mbgl during the post monsoon period (2012). The areas having water levels of <5 m during pre-monsoon have come upto 2-5 m bgl with minimum recharge and the area having water level of more than 10 m bgl have come upto 5-10 m bgl in south western and northern eastern part of the district.

Figure 5.4: Depth to Water Level- Post-monsoon 2012



Source: CGWB

5.2.5.4 Ground Water Development in the Project Area

The depth of ground water in the region is 200-300 ft below ground level. Chitravati river is around 45 km from the project site. The proposed project area comes under N.P Kunta mandal and in this

location ground water level is in “Semi Critical” category according to the ground water brochures of central ground water board. Municipality water is the source of the water supply at the project site. Currently same water is using for site construction activities and drinking water purpose.

5.2.6 Water Quality

The water quality assessment was done to understand the baseline surface water and groundwater quality of the study area. The samples were analysed for physicochemical and bacteriological parameters and results compared with IS: 10500 drinking water standards to identify and interpret any deviation in the statutory limits set for parameters in the standard.

5.2.6.1 Ground Water Quality

Groundwater samples were collected from two (2) bore wells located near select villages in the study area.The details of groundwater sampling locations are presented in **Table 5.1** and results of sampling are presented in **Table 5.2**.

Table 5.1: Groundwater Sampling Location

S.No.	Sample Code	Sample Location	Number of Samples
1	GW-1	NP Kunta Village	1
2	GW-2	Velligallu Village[13]	1

Table 5.2: Groundwater Sampling Results

S.No.	Test Parameters	Unit	GW-1	GW-2	IS 10500:2012 Drinking Water	
					Acceptable Limit	Permissible Limit
1.	Colour	Hazen	<5	<5	5	15
2.	Odour	-	Agreeable	Agreeable	Agreeable	Agreeable
3.	Taste	-	Not Agreeable	Not Agreeable	Agreeable	Agreeable
4.	pH	-	7.08	7.10	6.5-8.5	No Relaxation
5.	Electrical Conductivity	µS/cm	3890	1120	-	-
6.	Turbidity	NTU	<1	<1	1	5
7.	Total Dissolved Solids	mg/l	2528	728	500	2000
8.	Total Alkalinity	mg/l	590	320	200	600

[13] According to OSL ESIA report, both the ground water samples have been collected from NP Kunta Village, However ERM has changed the location of GW-2 post analyzing monitoring location map presented in ***Figure 5.4.***

S.No.	Test Parameters	Unit	GW-1	GW-2	IS 10500:2012 Drinking Water	
					Acceptable Limit	Permissible Limit
9.	Total Hardness ($CaCO_3$)	mg/l	900	380	200	600
10.	Calcium (Ca)	mg/l	112	40	75	200
11.	Magnesium (Mg)	mg/l	151	68	30	100
12.	Chloride (Cr^-)	mg/l	485	50	250	1000
13.	Sulphate (SO_4)	mg/l	225	13	200	400
14.	Iron (Fe)	mg/l	0.67	0.28	0.3	No relaxation
15.	Boron (B)	mg/l	BDL (DL:0.01)	BDL (DL:0.01)	0.5	1
16.	Free Residual Chlorine (Cl_2)	mg/l	BDL (DL:1)	BDL (DL:1)	0.2	1
17.	Fluoride (F)	mg/l	1.08	0.90	1	1.5
18.	Nitrate	mg/l	BDL (DL:2)	BDL (DL:2)	45	No relaxation
19.	Sulphide	mg/l	BDL (DL:0.05)	BDL (DL:0.05)	0.05	No relaxation
20.	Phenolic Compounds	mg/l	Absent	Absent	0.001	0.002
21.	E-coli	Per 100 ml	<2	<2	Should be Absent	
22.	Total Coliform	Per 100 ml	1600	900	Should be Absent	

*Note: **BDL-** Below Detection Limit; **DL**-Detection Limit*

Source: Environmental Monitoring by third party (NABL approved) commissioned by OSL

Interpretation of Results

The results of ground water samples were compared with the desirable/permissible concentration limits of the analyzed parameters, as given in IS10500:2012 and most of the parameters were found well within the range, except for TDS, Hardness & Iron in GW-1 that has exceeded the Permissible limit. (Refer **Appendix B** for detailed groundwater report).

However, it is suggested that this ground water is treated with R.O so that the identified inorganic contaminations are removed before domestic consumption. Surface water in all the parameters were found well within the permissible limits.

5.2.6.2 Surface Water Quality

Surface water samples were collected from two (2) locations near the project site. The details of surface water sampling locations are presented in below table and results of sampling are presented in **Table 5.3 and 5.4**.

Table 5.3: Surface Water Sampling Location

S.No.	Sample Code	Sample Location	Number of Samples
1	SW-1	NP Kunta Village Pond	1
2	SW-2	Velligallu Dam	1

Table 5.4: Surface Water Sampling Results

S.No.	Test Parameters	Unit	SW-1	SW-2	Surface Water Quality Standards (IS 2296-1982 Class C)
1.	Colour	Hazen	20	5	300
2.	Odour	-	Agreeable	Agreeable	-
3.	Taste	-	Not Agreeable	Not Agreeable	-
4.	pH	-	8.03	8.80	6.5-8.5
5.	Electrical Conductivity	µS/cm	990	930	-
6.	Turbidity	NTU	600	<1	-
7.	Total Dissolved Solids	mg/l	643	604	1500
8.	Total Alkalinity	mg/l	150	290	-
9.	Total Hardness ($CaCO_3$)	mg/l	140	180	-
10.	Calcium (Ca)	mg/l	20	12	-
11.	Magnesium (Mg)	mg/l	22	36	-
12.	Chloride (Cr^-)	mg/l	80	75	600
13.	Sulphate (SO_4)	mg/l	105	15	400
14.	Iron (Fe)	mg/l	7.1	0.12	50
15.	Boron (B)	mg/l	0.02	BDL(DL:0:01)	-

S.No.	Test Parameters	Unit	SW-1	SW-2	Surface Water Quality Standards (IS 2296-1982 Class C)
16.	Free Residual Chlorine (Cl_2)	mg/l	BDL (DL: 1)	BDL (DL:1)	-
17.	Fluoride (F)	mg/l	0.9	1.10	1.5
18.	Nitrate	mg/l	13	7.8	50
19.	Sulphide	mg/l	BDL (DL:0.05)	BDL(DL:0.05)	-
20.	Phenolic Compounds	mg/l	Absent	Absent	0.005
21.	E-coli	Per 100 ml	<2	<2	-
22.	Total Coliform	Per 100 ml	280	220	5000

Note: BDL- Below Detection Limit; DL-Detection Limit

Source: Environmental Monitoring by third party (NABL approved) commissioned by OSL

Interpretation of Results

As observed in the above table, all the parameters of surface water for both the locations were found to be within the permissible limits. (Refer **Appendix F** for surface water quality standards issued by CPCB and **Appendix C** for detailed surface water quality monitoring results).

5.2.7 Ambient Air Quality

The objective of the ambient air quality monitoring during an ESIA study for a solar project is to record the baseline ambient air quality in the area prior to project and identify current sources of air pollution. Ambient air quality monitoring was carried out during September 2018. Ambient air samples were collected using methods specified by the Central Pollution Control Board and analysed by NABL & MoEFCC approved in house laboratory of OSL South Asia.

Ambient concentrations of major air pollutants viz. particulate matters (PM 10 and PM 2.5), Sulphur dioxide (SO2), nitrogen oxides (NO2) and carbon monoxide (CO) were monitored at two locations on 24 hourly basis. The below table shows the ambient air quality sampling locations.

Table 5.5: Ambient Air Quality Sampling Locations

S.No	Sample code	Location of sample	Number of samples
1	AAQ-1	AASPL 250 MW Kadiri Project site	1[14]
2	AAQ-2	NP Kunta Village	1

The results of the ambient air quality are presented in below **Table 5.6**.

[14] According to OSL ESIA report, air quality samples were monitored at two locations with **two samples** each. However, based on analysis of monitoring location map presented in ***Figure 5.5*** and monitoring results from lab presented in ***Appendix E***, it was observed that only one sample has been collected from each location. Hence ERM has revised the number of samples in ***Table 4.5*** accordingly.

Table 5.6: Ambient Air Quality Sampling Results

S.No.	Test Parameter	Units	AAQ-1	AAQ-2	NAAQ (2009)* Limits	WHO Ambient Air Quality Standards
1.	Sulphur Dioxide (SO_2)	$\mu g/m^3$	6.2	7.4	80	20
2.	Nitrogen Dioxide (NO_2)	$\mu g/m^3$	17.5	18.7	80	-
3.	PM 10	$\mu g/m^3$	52.3	48.2	100	50
4.	PM 2.5	$\mu g/m^3$	26.8	24.8	60	25
5.	Ammonia (NH_3)	$\mu g/m^3$	BDL (DL:5.0)	BDL (DL:5.0)	400	-
6.	Ozone O_3	$\mu g/m^3$	BDL (DL:5.0)	BDL (DL:5.0)	180	100

Note: BDL- Below Detection Limit; DL-Detection Limit

Source: Environmental Monitoring by third party (NABL approved) commissioned by OSL

Interpretation of Results

It is understood from the above table that none of the assessed parameters exceeded the NAAQS and WHO standards of Ambient Air Quality except for $PM_{2.5}$ in AAQ1 which exceeded the WHO limit but is within the NAAQS limit. (Refer **Appendix D** for ambient air quality standards).

5.2.8 Ambient Noise Quality

Ambient noise levels within the Project area were monitored at two locations for 24 hours. Details regarding the samples collected and the results obtained have been presented in the **Table 5.7**. Details of ambient noise monitoring locations have been presented in the table below.

Table 5.7: Ambient Noise Quality Monitoring Locations

S.No.	Sample Code	Sample Location	No. of Sample
1	NQ-1	AASPL 250 MW Kadiri Project site	1
2	NQ-2	NP Kunta Village	1

Table 5.8: Results of Ambient Air Quality Monitoring

Monitoring Location	**Result**		**CPCB Permissible Limits (Commercial)**		**WB Permissible Limit**	
	Leq day dB(A)	**Leq Night dB(A)**	**Leq Day dB(A)**	**Leq Night dB(A)**	**Leq Day dB(A)**	**Leq Night dB(A)**
NQ-1	53.8	43.8	75	70	70	70
NQ-2	51.5	42.1	75	70	70	70

*Note: * Day time is from 6 am to 10 pm, Night time is 10 pm to 6.00 am as per CPCB*

Day time is 7 am to 10 pm, Night time is 10 pm to 7 am as per World Bank

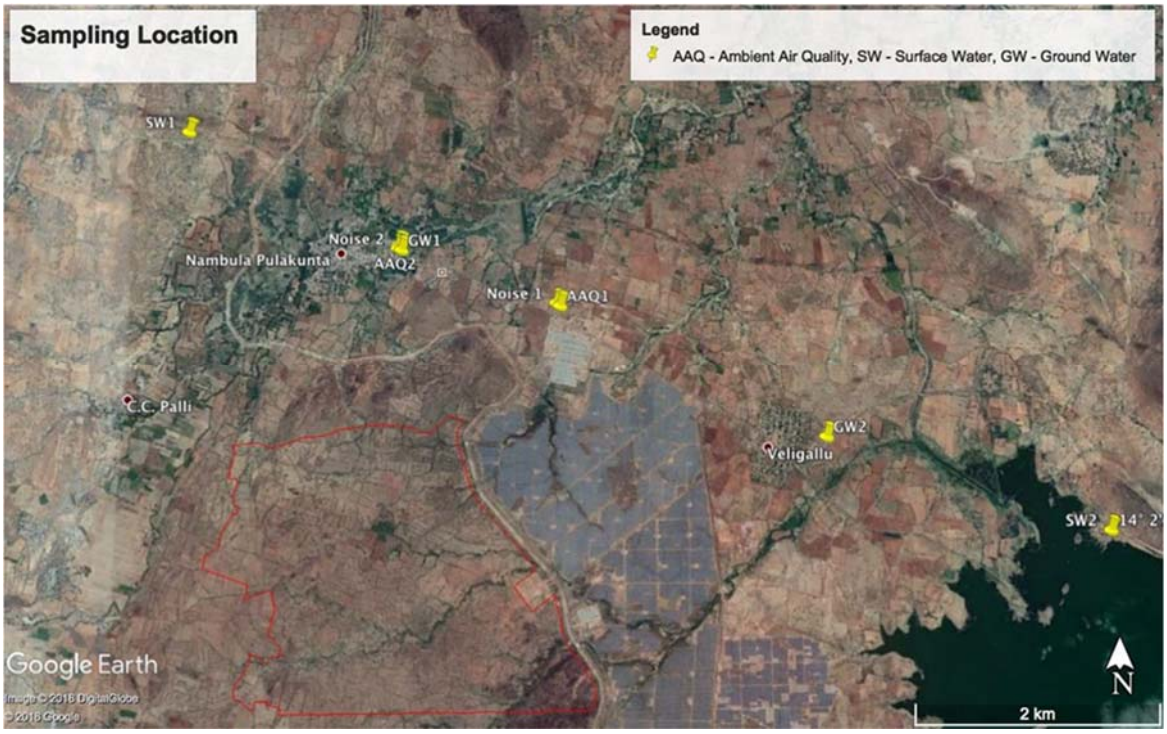
Source: Environmental Monitoring by third party (NABL approved) commissioned by OSL

Interpretation of Results

The average ambient noise during day time at all the locations were observed to be within the limit as prescribed by Ambient Noise Quality Standard 2000 for commercial areas and IFC/WB limits. During

night-time the Leq night values for both the locations were also observed to be within limits. Hence confirming to the limit as per the standard, Noise level were found well within specified limit defined by CPCB and WB (Refer **Appendix F** for ambient air noise standards) in both the area (NQ-1, NQ-2). Ambient Noise samples were collected using methods specified by the Central Pollution Control Board and analyzed by NABL & MoEFCC approved in house laboratory of OSL South Asia.
Map showing Monitoring Locations for the Project site is presented in **Figure 5.5**.

Figure 5.5: Map Showing Monitoring Locations



Source: OSL ESIA Report

5.2.9 Soil Type

The soils of Anantapur originated from both the granite and granite-gneisss land forms, as wells as the Dharwar landforms. Both these land forms are characterized by hills and ridges having undulating and gently-sloping lands. The soils in Anantapur District are predominantly red except Kanekal, Bommanahal, Vidapanakal, Uravakonda, Vajrakarur, Guntakal, Gooty, Pamidi, Peddavadugur, Yadiki, Tadipatri, Yellanur, Peddapappur and Putlur mandals. In these Mandals red and black soils occur almost in equal proportion. Thus 76% red soils, 24% are black soils.

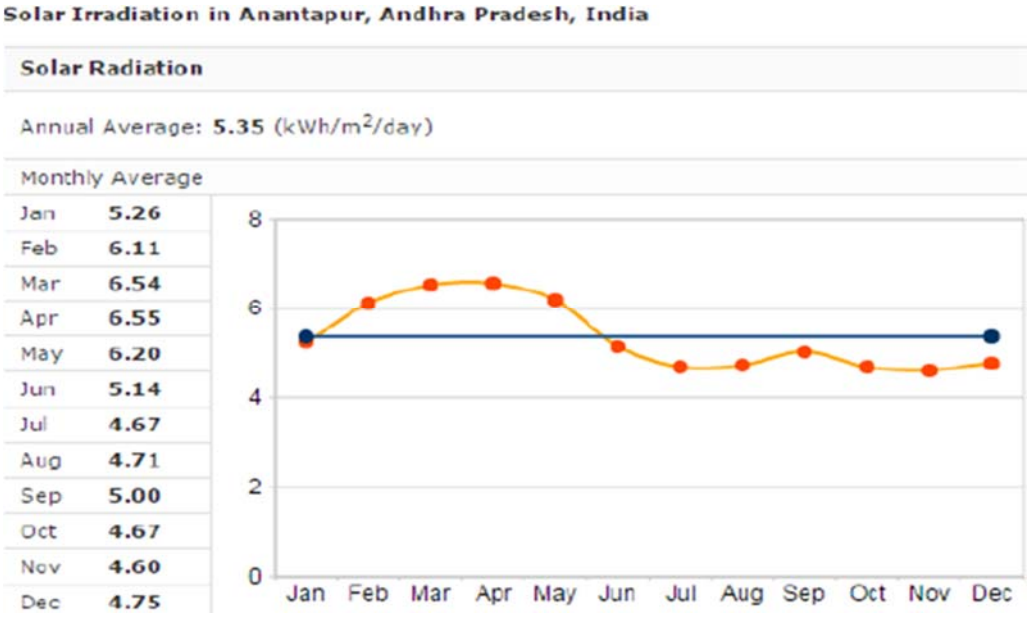
Based on geological investigation conducted within project area by drilling around 50 samples (up to 3 meters), Lithological stratification of the soil of project area mainly consists of Murram Soil from ground level upto 1.5 meter and Special Drawing Rights (S.D.R.) from 1.5 meter upto 3 meter. Based on these soil findings the site appears to be suitable for the proposed development of a solar plant from geotechnical point of view. This also suggest that materials that will be excavated are mostly consist sand or sand gravel mix. Both sand and sand gravel mix is suitable for filling in project area or for other construction needs as required during project development.

The project area mostly comprise of uneven terrain region comprising of small patches of flat terrain mixed with mostly rocky waste land. Geology of the area is composition of rock with very thin layer topsoil unsuitable for any kind of agriculture. Topography of this region has large diversified surface. No major agriculture land/ activity were seen.

5.2.10 Solar Irradiation Data

As per the solar irradiation data given below, almost all parts of Anantapur districts of the Andhra Pradesh state receive average insolation of 5.35 kWh/m2/day annually.

Figure 5.6: Average Annual Insolation (kWh/m^2/day) in Anantapur District



5.2.11 Climate and Meteorology

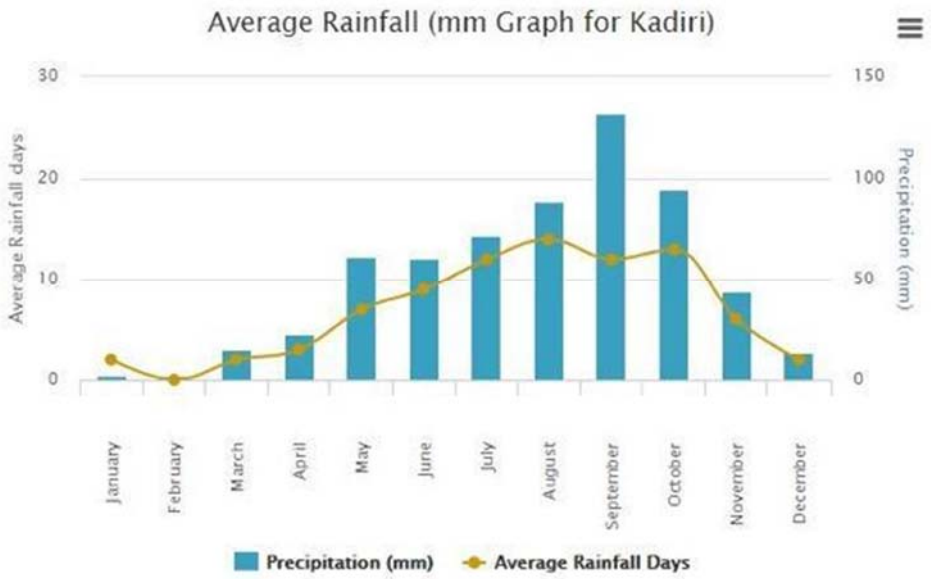
Kadiri is a town in the Anantapur district of Andhra Pradesh. It is a municipality, mandal headquarters and also the revenue divisional headquarters of Kadiri. The proposed site is situated approximately 30 km West of Kadiri town.

The site experiences semi-arid climate with extreme summer and moderate winters. Incidence of drought occurs due to inadequate and erratic distribution of rainfall in space and time. The district experiences the temperature variation between 25°C and 43°C. The year is divided in to summer season from March to May, monsoon season from June to September, post-monsoon season from October to November. The district receives an average annual rainfall of 668mm.

The average rainfall for the last 100 years is 668 mm. The highest monthly rainfall & wet day frequency was recorded 418.58 mm & 12.34 in September 1960. The maximum monthly average rainfall was recorded for the September and October months (156.6 mm & 124.4mm) respectively. The rainy days recorded in the district are 44 days in the year. Since the non-availability of long period rainfall data for the nearest location, the district rainfall is considered in this study and for the rainfall intensity calculation, the local available rainfall data collected at NP kunta Mandal revenue office for 13 years period (2005 to 2017). The soil at the site is predominantly red loam, red sandy soil along with mixed black soil.

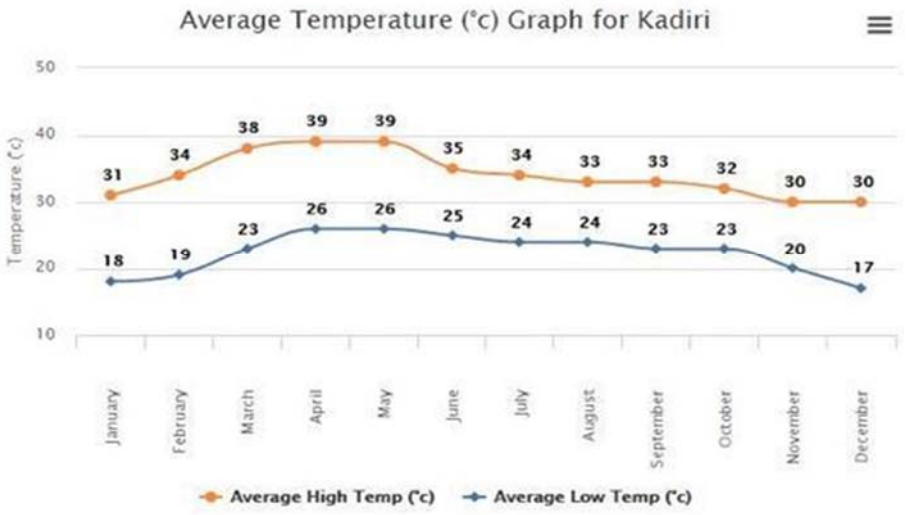
The climate in Kadiri region is referred to as a local steppe climate. There is little rainfall throughout the year. The average annual rainfall is 593 mm and average temperature in Kadiri is 26.5°C. Figure 5.6 and Figure 5.7 presents average rainfall and average temperature in Kadiri respectively.

Figure 5.7: Average Rainfall in Kadiri



Source: https://en.climate-data.org/asia/india/andhra-pradesh/kadiri-968117/

Figure 5.8: Average Temperature of Kadiri



5.3 Socio-economic Environment

The social baseline has been developed on the basis of secondary data collection and review. The secondary data has been gathered from ESIA Study (2018), from the administrative records of the Government of Andhra Pradesh, Census of India 2011, District hand book and State and District portals.

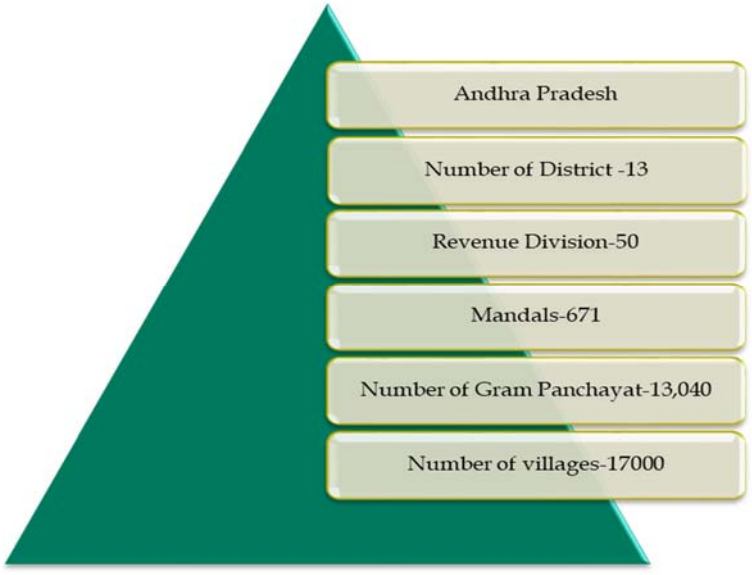
Data with regards to population, family composition, education, occupation and service provision, amongst others, has been collected from secondary sources and analysed. Data on amenities available in the study area has been reviewed and analysed from secondary sources like District Annual Statistical Handbook, Anathapur Government website (http://www.Anantapur.ap.gov.in/), and Census of India and Village Directory data, 2011.

5.3.1 State Profile

Andhra Pradesh is one of India's Southern states and is situated on the south-eastern coast of the country. The state has the second longest coastline of 972 km (604 mi) among all the states of India, second only to Gujarat. It borders Telangana in the northwest, Chhattisgarh in the North, Odisha in the northeast, Karnataka in the west, Tamil Nadu in the south and the water body of Bay of Bengal in the east. There are two regions in the state namely Coastal Andhra and Rayalaseema. The state is spread across an area of 160,205 sq. km[15].

Andhra Pradesh has 13 districts, which are further divided into 50 revenue divisions. The 50 revenue divisions are in turn divided into 671 Mandals. There are a total of 31 cities which include, 16 municipal corporations and 14 municipalities[16].

Figure 5.9 Administrative Structure of Andhra Pradesh[17]



Source: Andhra Pradesh Human Resource Development Institute (APHRDI) 2018

As per Census of India, 2011, the total population of Andhra Pradesh was 84,580,777 of which male and female are 42,442,146 (50.18 %) and 42,138,631 (49.18 %) respectively[18]. Sex ratio in Andhra Pradesh is 993 females per 1000 males, which is more than national figure of 940, as per census 2011 data. The average literacy rate stands at 67.41%, which is significantly lower than the national average of 73.0 %. A comparative analysis is presented in **Table 5.9** below.

Table 5.9: Demographic Profile of Andhra Pradesh

Attribute	Andhra Pradesh
Area (sq. km)	160,205 (8.37% of India)
Total population	84,580,777 (6.99% of India)
Males	42,442,146 (7.8 % of India)
Females	42,138,631 (6.6 % of India)

[15] Census of India, 2011

[16] https://www.ap.gov.in/

[17] The administrative structure for Andhra Pradesh and Telangana are the same and hence is not repeated

[18] The State of Andhra Pradesh was reorganised in 2014 to form a new state called Telangana in addition to the existing state. The 2011 data includes data for Telangana as well.

Attribute	Andhra Pradesh
Sex ratio	993
Percentage of rural Population	66.64
Percentage of urban population	33.36
Percentage of SC population	16.4
Percentage of ST population	5.52
Total literacy rate	67.02
Male Literacy rate	74.88
Female Literacy Rate	59.88

Source: Census of India, 2011

5.3.2 Ananthapur (or Ananthapuramu) District and NP Kunta Mandal

As can be seen from the **Table 5.10**, Ananthapur district has a population of 4,083,315 and a population density of 213 persons/sq. km which has a decadal growth rate 12.16 %[19] from 2001 to 2011. Out of the total population, 50.59 % are males and 49.41 % are females. Ananthapur district has lower sex ratio in comparison to the state as well as Mandal level.

The district has an average literacy rate of 56.1 %, which is lower than the average literacy rate of the state (average literacy rate of 67%). In the district the male literacy rate is 73.02 % against state average of 74.88 %. In the same way the literacy rate of females in the districts 53.97 % against state average of 59.15 %.

The Scheduled Caste constitutes nearly 14.29 % of the total district population, against state average of 16.41%. The Scheduled Tribes (ST) constitute 3.78 % of total district population. The population of Scheduled Tribes in the district is lower than State's average Scheduled Tribe population[20]. On the other hand, NP Kunta Mandal has slightly higher ST population than the state and district.

Table 5.10: Demographic Profile of Andhra Pradesh, Ananthapur and NP Kunta Mandal

Region	Total population	Sex ratio	SC%	ST%	Literacy rate (%)	Female literacy rate (%)	Rural population (%)
Andhra Pradesh	84,580,777	993	16.4	5.52	67.02	59.88	66.64
Ananthapur district	4,083,315.	977	14.29	3.78	56.16	53.97	71.93
NP Kunta Mandal	31404	994	8.93	6.23	55.92	43.07	100.00

Source: Census of India, 2011

5.3.2.1 Livelihood Profile

As per socio-economy survey, 2017-18[21], the major source of livelihood for the people in the district is agriculture. However, majority of the agriculture is rain fed and the areas is exposed to recurrent droughts and associated yield risks. Major crops cultivated include groundnut, sunflower, rice, cotton,

[19] Census of India, 2011

[20] As per socio economic survey 2015 ,AP, Reddy, Rao, Vaishya, Chaudhari, Setty, Rao, Lingabaleja etc. are comes under general category (O.C.); Kurma, Valamiki, Boya, Pinjari, Dudekula, Yadaya, Kurva, Kumbari, Golla, Dukula, Chakali, Mangala, Wadde, Uppare etc. comes under Backward Caste (B.C.); Madiga, Mala, Harizana, Dasari etc. comes under Schedule Caste (SC) and Yerukala, Nayak comes under Scheduled Tribes of social group at the district level.

[21] Socio-economic survey, 2017-18, PLANNING DEPARTMENTGOVERNMENT OF ANDHRA PRADESH

maize, chillies, sesame and sugarcane[22]. There are limited industries in the district, some of which comprise Silk trade, limestone quarrying, iron and diamond mining constitute the few industries in the district[23].

5.3.3 Socio-economic status of Study Area

This sub section provides an understanding of the socio-economic profile of the Study Area. This understanding is based on the information present in 2018 ESIA report, secondary information available on the area, primarily the Census of India data and other secondary sources. This understanding shall allow for the assessment of the potential impacts from the project as well as the formulation of specific mitigation plans.

The area of up to 5 km radius from the project boundary (250 MW AASPL solar plant area) has been demarcated as study area for the project by considering the extent of project impact in terms of noise, water resources, human settlement, cultural heritage sites, location of labour sites, location of the access roads besides considering the actual land area which has been procured for the project. The study area is further divided into core zone and buffer zone. The core zone for this study has been considered as 1 km from the project area, and the buffer zone stretches from 2 to 5 km from the site. No village is falling within 1 Km from the Project boundary, while there are 2 villages namely Nambulipulikunta (N.P. Kunta) and Pedaballikothapalle (P. Kothapalle) villages falling within 2 to 5 kms from the Project boundary.

5.3.3.1 Demographic Profile

NP Kunta and P. Kothapalle villages in the study area fall under the NP Kunta Mandal. Demographic profile of the villages that could be located in the Census data 2011 and Village Directory 2011 is captured in table below.

Table 5.11: Demographic Profile of Study Area

Name of the village	No. of households	Total population	Sex Ratio	SC %	ST %	Literacy rate (in %)	Female literacy rate (in %)
Nambulipulikunta (N.P. Kunta)	1427	5464	1025.20	11.01	2.98	61.93	48.99
Pedaballikothapalle (P. Kothapalle)	532	2193	947.60	8.01	3.10	58.32	44.52
Total	**1959**	**7657**	**1002**	**10.02**	**3.02**	**60.21**	**45.61**

Source: Census of India, 2011

The study area has a total population of 7,657. It could also be observed from the table above that the SC population in the study area is about 10.02 % and 3.02 % ST population.

NP Kunta village is the larger in terms of population than P. Kothapalle village. The sex ratio in the study area is observed to be 1002 which is significantly higher than the state, district and Mandal level sex ratio.

5.3.3.2 Educational Infrastructure

As can be seen from ***Table 5.12***, there is only 1 private pre-primary school (1) in the study area. There are 8 Government-run primary schools and 7 private run primary school. There are 4

[22] DISTRICT SURVEY REPORT - ANANTAPURAMU DISTRICT, 2018, DEPARTMENT OF MINES AND GEOLOGY, Government of Andhra Pradesh.
[23] SOCIO ECONOMIC SURVEY 2018-19, Andhra Pradesh

government run middle schools. There are 2 government run senior secondary schools. The information is compiled from village directory, 2011.

Table 5.12: Educational institutions (Schools) in the study area

Name of the village	Govt. Pre - Primary School (Nursery/LKG/UKG)	Private Pre - Primary School (Nursery/LKG/UKG)	Govt. Primary School	Private Primary School	Govt. Middle School	Private Middle School	Govt. Secondary School	Private Secondary School	Govt. Senior Secondary School	Private Senior Secondary School
N.P. Kunta	0	1	8	0	4	0	2	0	2	0
P. Kothapalle	0	0	7	0	1	0	0	0	0	0
Total	**0**	**1**	**15**	**0**	**5**	**0**	**2**	**0**	**2**	**0**

Source: Village directory, Census of India, 2011

5.3.3.3 Occupation and Livelihood Profile

As per the limited virtual consultations and 2018, ESIA report, it is understood that agriculture is the mainstay of the local economy of the study area. However, due to lack of irrigation facility and erratic rainfall, people are diversifying their sources of livelihood (See next section),

The WPR (Work Participation ratio)[24] of the study area is 52.94 %. This figure suggests the study area villages have moderate employment rate and as less than 50 % of the people are unemployed in the study area.

Approximately 95 % of workers are categorised as Main Working population, as per Census 2011 data, i.e. employment or earning more than 6 months and approx. 4.95% are involved in Marginal activity providing livelihood for less than 6 months. Out of the total workers in the Study Area, 35.9 % were casual labourers (Working in construction sites etc.) and 43.43 % were working as Agricultural labourer.

Table 5.13: Workforce Participation Rate (WPR) in the study area

Name of the village	Total Population	WPR	Main Workers %	Marginal Workers %	Casual Labourers %	Agricultural Labourers %
NP Kunta	5464	49.17	96.39	3.61	26.35	46.26
P. Kothapalle	2193	62.33	93.71	6.29	45.45	40.6
Total	7657	52.94	95.05	4.95	35.9	43.43

Source: Census of India, 2011

5.3.3.4 Land Use

This sub section provides an understanding of the land resources in the Study Area. Land resources, whether private or common are an extremely important asset for rural communities. At the village level it is the land resources which allow for the satisfaction of the needs/demands of fuel wood, and fodder for livestock and other everyday resources.

[24] Work Participation ratio (WPR) is defined as percentage of total workers including main and marginal workers, out of the total population of the study area.

As can be seen from ***Table 5.14,*** out of the total geographical area, more than 50 % is under barren and un-cultivable land, there is 2.26 % of forest cover in the project area. Approximately 40 %t of the total land is under agriculture use.

Table 5.14 Land Use Pattern in the Study Area[25]

Name of the village	Total Geographical Area (in Hectares)	Forest Area (I %)	Area under Non-Agricultural Uses (%)	Barren & Un-cultivable Land Area (in %)	Permanent Pastures and Other Grazing Land Area (in %)	Land Under Miscellaneous Tree Crops etc. Area (in %)	Culturable Waste Land Area (in %)	Fallows Land other than Current Fallows Area (in %)	Current Fallows Area (in %)	Net Area Sown (in %)
N.P. Kunta	2529	0	0.05	43.73	0.20	0.44	2.19	2.01	0.40	50.98
P. Kothapalle	4113	3.65	0.006	63.21	0.08	0.00	0.43	0.51	0.23	31.88
Total	6642	2.26	0.22	55.80	0.13	0.17	1.10	1.08	0.30	39.15

Source: Census 2011 data

Agriculture Land Use

As can be seen from the table above, approximately 40 % of the total land is under agriculture use. However, more than 90 % of the land is characterised as unirrigated land[26]. The area falls in the Rayalaseema region which is chronically drought affected.

According to the ESIA report, 2018, majority of households cultivated groundnut in the year 2016, prior to giving away lands to the Project. A large proportion of the area was affected by drought and majority of the land was left uncultivated. Community reported lack of irrigation facilities and erratic rainfall in the region for the past six years that has affected agricultural practices negatively. Ground water was available at a depth of more than 400 ft below ground level. The consultations with villagers undertaken through Video conferencing (in June 2020) and face-to face in January 2019 (during ESDD by ERM team) also suggested that the extent of rainfall has reduced significantly over the last decade, which makes agriculture less viable in the area.

In such scenario, the farmers and land owners are becoming less interested in cultivation and most farmers cultivate their lands for a single crop in a year as agriculture is becoming less remunerative. Irregular monsoons, lack of access to irrigation water through ponds and other water bodies, most of which were observed to be dry during ESDD site visit undertaken by ERM team or are in low lying areas which are able to support farming only in the nearby fields that too for a single season; while the remaining farm lands continue to depend on the erratic rainfall. This situation has made the

[25] -Fallow land other than current fallow land are lands, which are taken up for cultivation but are temporarily out of cultivation for a period of not less than one year and not more than five years , i.e., equal or greater than one year but less than or equal to five years. The reasons for keeping such lands fallow may be one or more of the following:
i) Poverty of the cultivator
ii) Inadequate supply of water
iii) Malarial climate
iv) Silting of canals and rivers and
v) Unremunerated nature of farming
- Current fallow area is the Cropped area which are kept fallow during the current year but was cultivated in the previous year. For example with any seeding area is not cropped in the same year, it may be treated as current fallow.
- Net sown area is the total area sown with crops and orchards, counting area sown more than once in the same year, only once.

[26] As per Census of India, 2011, approximately 99.89 % of agriculture land in the area was unirrigated.

people look for alternate sources of livelihood. It was also reported that owing to continual losses, the farmers leave some of the plots uncultivated.

5.3.3.5 Social and Physical Infrastructure

Water Supply and Sanitation

As per the Census of India, 2011 data, NP Kunta and P. Kothapalle village has access to treated tap water. These villages in the Study Area do not have access to hand pumps and dug wells. However, P Kothapale village has water bodies such as Pond and lakes. According to the ESIA report, 2018, drinking water pipeline from Satya Sai Drinking water scheme is the main source of drinking water.

In addition as per secondary sources, households in Andhra Pradesh can now purchase water from RO plants installed in their villages. These water treatment plants were installed during 2015 as a part of the NTR Sujala Sravanthi Scheme wherein, water treatment plants were installed based on resource availability in all 48,206 rural habitations in the state[27]. Each household had to pay INR 2/litre for 20-litre supply per day[28]. However, the status of availability of the same at the village level cannot be ascertained.

Health Facilities and Health Seeking Behaviour

The health facilities in the Study Area are characterised by a three tier health infrastructure. The health facilities available at the village level comprise of sub centres and Public Health Centres (PHC). While the sub centres cater to a population of 5,000 individuals, the PHCs are for a population of 10,000-30,000 individuals. While the PHCs are mostly for OPD (Out Patient Department) and basic IPD (Indoor Patient Department) cases, sub centres usually have a delivery room and 2 resident nurses (one male and one female). Each PHC has 5-6 sub centres under them. In turn, a cluster 6-10 PHCs come under a CHC (Community Health Centre), which caters to a population of 1 lakh plus, and also provides emergency services. The CHCs in turn report to the public hospitals at the district.

As per Rural Health Statistics 2015, there are 576 sub-centers, 83 PHC, 18 CHC, 1 Sub divisional Hospital and 1 District Hospital in Anantapur District. At the village level, there are no Community Health Centres (CHC) in the study area. There is only 1 Primary Health Centre (PHC) in NP Kunta village. There are no Maternity and child Welfare centres or TB clinics in the study area.

5.4 Ecology and Biodiversity Baseline[29]

The project area does not fall within 10 km radius of any significant sensitive receptors like Wild Life Sanctuaries, Biosphere Reserves, and National Parks etc. Removal of herbaceous vegetation from the soil and loosening of the top soil generally causes soil erosion. However, such impacts would be primarily confined to the project site during initial periods of the construction phase and would be minimized through adoption of mitigation measures like paving and surface treatment and water sprinkling.

5.4.1 Objectives for Ecological Surveys

5.4.1.1 On Floral Profile

Identification of floral species, endangered as well as endemic species (if any), important habitats, forests area within the study area;

[27] https://economictimes.indiatimes.com/news/politics-and-nation/andhra-pradesh-government-may-supply-drinking-water-at-rs-2-per-litre/articleshow/48529417.cms
[28] Ibid
[29] This section comprise of data retrieved from ESIA report dated 20.12.2018 prepared by OSL for the 250 MW solar power project in Anantapuramu, Andhrra Pradesh.

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.

5.4.1.2 On Faunal Profile

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 recognized 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 includes migratory corridors/ avian migratory routes.

Identification and assessment of aquatic fauna near the study area.

5.4.2 Methodologies for Ecological Surveys

5.4.2.1 Desktop Review

Under the ESIA Study (2018) scope, desktop study was undertaken prior to site visit (2018) for biodiversity impact assessment for the proposed project. The desktop study was done to understand the background of the project area for biodiversity through collection of secondary information from relevant and authentic sources, type of habitats involved in the project area, presence of rare and endangered species if any of flora and fauna and other relevant details required to undertake the site visit for primary data collection and assessment.

5.4.2.2 Flora Survey

Under the ESIA Study (2018) scope, the primary floral survey was conducted to record site specific floral species and its diversity. A walk through of the project area was carried out (in 2018) covering project site and transmission route. The proposed access of roads and surrounding area was also covered to understand the floral diversity. At the time of the survey, woody/small trees and ephemeral layer of ground flora consisting of seasonal or annuals were recorded around the project study area. Further seasonal species data were gathered from secondary sources like governmental department records, forest officials and local residents. As per the observations made in 2018 ESIA Study, none of the species recorded during ecological survey fall in the IUCN red list category.

5.4.2.3 Faunal Survey

To assess the presence of fauna in the project site, a walk through survey area was carried out in 2018 (previous ESIA Study conducted by OpenSense). The proposed project site was visited to find out the presence of faunal species near the project site. The faunal survey focused mainly on three groups viz. mammals, avifauna and herpeto fauna of the study area.

Vantage point (VP) survey was conducted at project site covering the entire site including the transmission routes in the early morning, afternoon and evening to keep a record on all the target species. The VP survey locations were selected upon the flight pattern of different birds, rich representation of bird species, conducive habitat of bird species and most importantly the potential to suffer significant impact from collision etc. Data related to the other faunal species were also noted, based on the direct sightings and from authentic secondary sources. Secondary sources like published books and reports, government departmental records, interviews with forest department and information from local residents were further used to gather information and support primary observations.

5.4.3 Flora

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 floral species (woody trees/ small tree species as well as ephemeral ground vegetation) within the study area. As reported, the site comprise of only bushes and shrubs. Feeling of trees is not envisaged within project site and its vicinity.

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.

5.4.4 Fauna

Few of the forest mammals eg. Dears, rabbits, Antilope were sighted by the survey team during site visit. Presence of wild bears are reported during consultation and pug mark indicating presence of such animals were evident. Domestic animal like cow, sheep, buffalo and goat are reported in the study area. The birds like Crows, Parrots, Doves, Weaver birds and Mynas were more common among birds. In addition, none of the species are on the International Union for the Conservation of Nature's (IUCN) Red List of Threatened Species under endangered category.

An Ecology and Biodiversity survey/ study was commissioned by OSL for purpose of this ESIA. The complete report is attached as **Appendix G** of the report.

Figure 5.10: Typical Flora and Fauna at the Project Site (ESIA Report 2018)[30]

Source: OSL

[30] The project site comprise of bushes and shrubs as shown in the Figure. As confirmed by Ayana, there are no trees present within Project site and vicinity.

6. STAKEHOLDER ENGAGEMENT

This section provides the stakeholder identification and analysis as well as a brief understanding of the engagement process for the project.

"*A stakeholder is defined as a party that has an interest in an enterprise or project. The primary stakeholders in a typical corporation are its investors, employees, customers and suppliers. However, modern theory goes beyond this conventional notion to embrace additional stakeholders such as the community, government and trade associations*"

- "Stakeholder Analysis" is understood as the process of identifying the individuals or groups that are likely to affect or be affected by a proposed project, and sorting them according to their impact on the project and the impact the project will have on them. This information is then used to assess the manner in which the interests of the stakeholders should be addressed in the project plan, policy, program, or other action.
- The importance of such an analysis lies in the role played by this understanding in the assessment of the socio-political environment surrounding the project. It allows for the:
- Identification of key stakeholders, their primary groupings and sub groupings;
- Identification of the interests, concerns and potential risks surrounding the stakeholders, as well as conflicts of interests (if any);
- Identification of relations between stakeholders that may enable "coalitions" of project sponsorship, ownership and co-operation as well as the mechanisms which may have a role in influencing other stakeholders;
- Key groups/ individuals to be pin pointed who need to be informed about the project;
- Identifying stakeholders (those who are likely to have an adverse impact on the project) and taking appropriate measures to combat their influence;
- Identification of the impact and influence of the project on the stakeholders and of the stakeholders on the project;
- Generation of information essential to the planning, implementation and monitoring of the project; and;
- Development of a framework for participatory planning and implementation of various project activities

6.1 Stakeholder Consultation and Disclosure Requirement for the Project

The disclosure of project information and consultations with stakeholders has been increasingly emphasized by project finance institutions and government regulatory bodies. A brief overview of the requirements of public disclosure and stakeholder consultation applicable to this project is provided below.

Table 6.1: Overview of Disclosure and stakeholder consultation requirement

DFI	Reference Regulation/ Standard	Requirements
IFC	PS-1 (Assessment and Management of Environmental and	■ Community engagement is to be undertaken with the affected communities and must be free of external manipulation, interference, or coercion, and intimidation.

DFI	Reference Regulation/ Standard	Requirements
	Social Risks and Impacts)	■ Furthermore, in situations where an affected community may be subject to risks or adverse impacts from a project, the proponent must undertake a process of consultation so as to provide the affected communities with an opportunity to express their views on the project risks, impacts, and mitigation measures, as well as allow the proponents to consider and respond to them. ■ *Informed participation:* For projects with significant adverse impacts on affected communities, the consultation process must ensure that free, prior and informed consultation with affected communities occurs and that processes exist to facilitate participation by those affected. ■ Apart from such a consultation process, the project proponents are also to establish a Grievance Redress Mechanism, which will allow the affected communities' concerns and grievances about the project proponent's environmental and social performance to be received and allow for steps to be taken to resolve the same. ■ *Broader stakeholder engagement:* The proponent must identify and engage with stakeholders that are not directly affected by the project but those that have established relationships with local communities and/or interest in the project – local government, civil society organizations, etc. – and establish a dialogue.
AIIB	AIIB Requirement	■ AIIB believes that transparency and meaningful consultation is essential for the design and implementation of a Project and works closely with its Clients to achieve this objective Stakeholder Engagement: Stakeholder engagement should be conducted in a manner commensurate with the risks to, and impacts on, those affected people, ■ A suitable grievance mechanism to receive and facilitate resolution of the concerns or complaints of people who believe they have been adversely affected by the Project's environmental or social impacts, and to inform Project affected people of its availability.

6.2 Stakeholder Characterisation and Identification

Stakeholders, as also defined above, vary in terms of the degree of interest, influence and control they have over the project. While those stakeholders who have a direct impact on or are directly impacted by the project are known as Primary Stakeholders, those who have an indirect impact or are indirectly impacted are known as Secondary Stakeholders. Keeping in mind the nature of the project and its setting, the stakeholders have been categorised in the table given below.

Table 6.2: Stakeholder Group Categorisation

Stakeholder Groups	Primary Stakeholders	Secondary Stakeholders
Community	■ Land sellers/users of private/patta land, government land and assigned land; ■ Contractors; ■ Local Laborers	Local community Vulnerable Communities
Institutional Stakeholders	■ N.P. Kunta and P. Kothapalle Gram Panchayats (GPs)	Civil Society/ Local NGOs
Government Bodies	■ Regulatory Authorities such as Renewable Energy Development Corporation of Andhra Pradesh, Andhra Pradesh Power Generation Corporation, Andhra Pradesh Solar Power Corporation Pvt. Ltd;	

Stakeholder Groups	Primary Stakeholders	Secondary Stakeholders
	■ District /Tehsil Administration.	
Other Groups	■ Employees ■ Contractual Labourers	Other Projects in the Solar Park and in nearby area area

Note: As ERM did not undertake a site visit and consultation were not held with majority of stakeholders (such as land sellers (private/patta land), local community of N.P. Kunta and P. Kothapalle village and Gram Panchayat members, APSPCL team etc.) the stakeholder identification, mapping and analysis is based on review of documents, review of 2018 ESIA repot, discussions with Ayana team and ERM's previous experience of conducting solar ESIA's.

6.2.1 Stakeholder Mapping

Stakeholder mapping" is a process of examining the relative influence that different individuals and groups have over a project as well as the influence of the project over them. The purpose of a stakeholder mapping is to:

- Identify each stakeholder group;
- Study their profile and the nature of the stakes;
- Understand each group's specific issues, concerns as well as expectations from the project
- Gauge their influence on the Project;

The significance of a stakeholder group is categorized considering the magnitude of impact (type, extent, duration, scale and frequency) or degree of influence (power and proximity) of a stakeholder group and urgency/likelihood of the impact/influence associated with the particular stakeholder group in the project context. The magnitude of stakeholder impact/influence is assessed taking the power/responsibility and proximity of the stakeholder group and the group is consequently categorized as negligible, small, medium or large. The urgency or likelihood of the impact on/influence by the stakeholder is assessed in a scale of low, medium and high. The overall significance of the stakeholder group is assessed as per the matrix provided in Table below.

Table 6.3: Stakeholder Significance and Engagement Requirement

		Likelihood of Influence on/ by Stakeholder		
		Low	**Medium**	**High**
Magnitude of Influence/ Impact	Negligible	Negligible	Negligible	Negligible
	Small	Negligible	Minor	Moderate
	Medium	Minor	Moderate	Urgent
	Large	Moderate	Urgent	Urgent

6.3 Stakeholder Analysis

The table below has been used to classify the identified stakeholders (directly or indirectly impacting the project) in accordance to their levels of influence on the project. The influence and priority have both been primarily rated as:

- **High Influence**: This implies a high degree of influence of the stakeholder on the project in terms of participation and decision making or high priority to engage with the stakeholder;
- **Medium Influence**: Which implies a moderate level of influence and participation of the stakeholder in the project as well as a priority level to engage the stakeholder which is neither highly critical nor are insignificant in terms of influence; and

- **Low Influence**: This implies a low degree of influence of the stakeholder on the project in terms of participation and decision making or low priority to engage that stakeholder.

The intermediary categories of low to medium or medium to high primarily imply that their influence and importance could vary in that particular range subject to context specific conditions or also based on the responses of the project towards the community.

The coverage of stakeholders as stated above includes any person, group, institution or organization that is likely to be impacted (directly or indirectly) or may have interest/influence over project. Keeping this wide scope of inclusion in stakeholder category and the long life of project, it is difficult to identify all potential stakeholders and gauge their level of influence over project at the outset of the project. Therefore the project proponent is advised to consider this stakeholder mapping as a live document which should be revised in a timely manner so as to make it comprehensive for any given period of time.

Table 6.4: Stakeholder Analysis

Stakeholder Group	Profile/ Status	Impact/Influence of the project on this Stakeholder Group	Impact/Influence of the Stakeholder Group on the project	Expectations, Opinions Key Concerns of Stakeholders	Overall Rating of Stakeholder Influence
Primary Stakeholder					
Land sellers/users of private/patta land, government land and assigned land.	■ Please refer to **Chapter 3** for the land seller profile. ■ Even though the land procurement for the Solar Park was under the scope of APSPCL, along with assistance from the state government and District Revenue Department of Ananthapuramu, the land owners may have some expectations from AASPL project in terms of employment or other benefits.	■ It was understood during the virtual consultations with sample Assigned landowners that they were willing to sell their land due to the low productivity of the agricultural land, dependency on monsoons for agriculture and lack of irrigation facilities. The consulted land sellers informed that the compensation received after selling their land was reinvested into purchase of fertile land in other nearby villages. Selling land is therefore also considered as an option of liquidating their assets.	■ The stakeholder groups' influence on the project pertains to the smooth functioning of the project and the timely completion of the project activities.	■ The major concern of the stakeholder include availability of employment opportunities that the project will generate.	High
Local Labourers	■ As the project is in construction stage and local community was not consulted in a limited manner about this project, during the SIA process. It is envisaged that the employment opportunities generated during the construction period will attract local workers.	■ It is understood that approximately 700-800 number of workers will be required during the peak construction period (both skilled and unskilled workers) for the Project; ■ Once the information regarding the Project reaches the local community, the local wage earners will have higher expectations for employment in the project.	■ Any labour unrest and protests may cause delays in construction schedule and create a non-congenial social atmosphere; consequently, delay in construction activities will have financial implications on the project. ■ AASPL and the contractors are therefore required to be aware of any such incidents.	■ The major concerns of this stakeholder group may include; ■ Regular payment of wages for the work rendered; ■ Continued employment even beyond the completion of construction work; ■ Adequate Health and Safety provisions for them to be implemented at work; and ■ Leaves, benefits and entitlements as per labour laws applicable etc.	Medium
N.P. Kunta and P. Kothapalle Gram Panchayats (GPs)	■ Gram Panchayat is at the lowest level of local governance, as per Indian administrative systems. This stakeholder group comprises of the Panchayat and its members which govern the villages in the study area	■ The Gram panchayat might expect positive impact from the project in the following manner: ■ Generation of employment opportunities at the local level ■ Adequacy of the community development initiatives to be undertaken by the project ■ Timely and adequate disclosure of information throughout the life of the project	■ Most of the rural development schemes and funds for central schemes are channelled through this body of governance. ■ Also, it is the Panchayats who are bestowed with the decision making authority for economic development and social justice. ■ Panchayats also play a key role in the opinion formulation towards the project.	■ Gram Panchayats may have the following expectations: ■ Preference in employment opportunities for locals ■ Involvement in the formulation of the community development activities (construction of toilets through CSR activity being one) and their implementation ■	Medium
Regulatory Authorities	■ This stakeholder group comprise of the central, state and district level regulatory authorities. These authorities influence the project in terms of establishing policy, granting permits and approvals for the project, monitoring and enforcing compliance with the applicable rules and regulations. ■ The primary regulator for renewable energy projects in Andhra Pradesh are: ■ Renewable Energy Development Corporation of Andhra Pradesh; ■ Andhra Pradesh Power Generation Corporation; ■ Andhra Pradesh Solar Power Corporation Pvt. Ltd; ■ IREDA at national level;	■ The influence of the project on this stakeholder group pertains to the role the project will play in the development of solar energy in Andhra Pradesh. ■ The project should comply with applicable regulatory framework comprising of the guidelines and policies of the State Government such as the AP Solar Energy Policy 2015 and Solar Energy Corporation of India (SECI) guidelines.	■ The failure of the project to comply with the various rules and regulations applicable is instrumental for the timely implementation of the project	■ The sole expectation of the Regulatory Authorities from the project Proponents will be abidance to all applicable guidelines, policies and laws.	Low

Stakeholder Group	Profile/ Status	Impact/Influence of the project on this Stakeholder Group	Impact/Influence of the Stakeholder Group on the project	Expectations, Opinions Key Concerns of Stakeholders	Overall Rating of Stakeholder Influence
	■ AP State Pollution Control Board.				
Employees	■ This stakeholder group comprises of the regular employees of AASPL who are to be involved in the various stages of the project	■ The expectations of this stakeholder group in regards to the project pertain to the following: ■ Job security ■ Safe working conditions ■ Provision of rewards and recognitions for good performances and safe behaviour ■ Proper work-life balance ■ Ethical and professional conduct ■ Employee engagement within & after working hours ■ Regular updating of rules and regulations ■ Facilitation and maintenance of everyday convenience in regards to facilities such as transport, seating, food, accommodation etc	■ The influence of these stakeholders pertains to the roles played by them in the overall smooth functioning of the project operations as well as the brand value. ■ They will also serve an extremely important role in the maintenance and improvement of services and facilities.	■ The primary concern of the stakeholder group will pertains to the role of the project in ensuring continued economic opportunities and work generation	• High
Contractual Labourers	■ This stakeholder group comprises of those workers who are to be engaged in the project on a contractual basis through the different phases of project life. ■ These labourers will be primarily semi-skilled and unskilled workers.	■ These stakeholder group's influence on the project pertains to their role in the smooth functioning of the project and the opinion formation towards the project.	■ The primary concern of the stakeholder group pertaining to the project will be as following: ■ The role of the project in continued economic opportunity, work generation and a source of income	■ The main expectations from the project will be: ■ timely settlement of dues and payments in keeping with the legal requirements ■ continued work opportunities ■ safety at work	Medium
District/Tehsil Administration	■ The project area is administered at three levels by different Government Bodies: at the district level, at the block/tehsil level and at the Panchayat level in each village/or cluster of villages; ■ In this context, local administration refers to the district level and block level administration comprising of the offices of the Tehsildaar, District Magistrate Collectors, and Revenue officer etc.; and ■ The sub-registrar of the revenue department is responsible for registration of sale of land, land mutation, updating of records of transfer of land.	■ The primary concern of the stakeholder group can be: ■ project's compliance towards the regulatory requirement ■ role played by the project in the development of the area	■ These authorities not only serve as important points of contact for villagers or other party wanting to liaise with higher authorities but are also critical in obtaining permissions and support for the various project activities	■ The main expectations of the stakeholders from the project might be: ■ Compliance with the regulatory requirements and legal provisions specific to the project ■ Timely disclosure of information pertaining to the project activities ■ Involvement in the formulation and implementation of the community development activities throughout the life of the project	Low
Construction & O & M Contractors	■ Contractors such as TPSSL etc. responsible for construction & O & M.	■ Smooth operation of the construction activity and to complete the work within the scheduled time and cost.	■ Non-compliance to the legal requirements;	■ Developers and EPC Contractors	Contractors will be responsible for construction, operation and maintenance of the Project.
Secondary Stakeholders					
Local Community	■ The stakeholder group comprising of local communities around a radius of 5 kms inhabit the villages NP Kunta and P. Kothapalle.	■ Though a number of other solar power projects already exist in the area, the project can play a critical role in the development of the community through economic opportunities and CSR projects.	■ The local community's support of the project and its activities is extremely crucial to ensure smooth functioning of the project and meeting of the timelines for the project. ■	■ No consultations were held by ERM with the local community and therefore exact expectations are not know at this stage. However, some of the most common expectations of a community include: ■ Receiving benefits from the project in terms of employment and development of infrastructure and the community	Low

Stakeholder Group	Profile/ Status	Impact/Influence of the project on this Stakeholder Group	Impact/Influence of the Stakeholder Group on the project	Expectations, Opinions Key Concerns of Stakeholders	Overall Rating of Stakeholder Influence
				■ Preference to the local community in contractor and employment opportunities from the project ■ Regular updates on the project activities and the opportunities from the same ■ Minimal disturbance to the community in regards to access issues, pollution and if there is any influx of migrant workers (if any).	
Vulnerable Groups such as women headed households, BPL and Landless households	■ This stakeholder group includes women headed household, BPL household and landless. These subdivisions are on the basis of the understanding of the possibility of differentiated impacts on the community on the basis of the economic and social status in the society.	■ In view of the poor social and economic conditions of the Vulnerable Communities, the project Proponent may have to provide engagement avenues for the group.	■ The influence of this stakeholder group in regards to the Project pertains to the smooth functioning of the project and the opinion formation of the same. While due to the position of this group in the community, the level of influence towards the project is limited, the project can disproportionately influence this group.	■ The primary expectations of this stakeholder group from the Project may include the following: ■ Appropriate community development activities in keeping with the needs of the community ■ Compensation for the land purchased due to the project at market rates (It cannot be ascertained by ERM , if any land has been purchased from any women headed household and BPL families (See section 2.4.1). ■ Involvement in the formulation of the community development activities and their implementation ■ Timely disclosure of information through the life of the project	Low
Civil Society/Local NGOs	■ Not only local NGOs but NGO's based out of Delhi act as a social watchdog in matters relating to securing the livelihoods of rural communities along with their related socio-cultural facets.	■ With respect to contributing towards the cause of local development, the project proponent can either participate in the ongoing developmental activities of the Government or might take up interventions on its own or through partnerships with NGOs and CBOs after obtaining prior approval from competent authorities. ■	■ The opinion of the NGOs and Civil Society Groups towards a project is determined largely by whether the impacts of setting up of the development venture is being viewed/ perceived in positive light by the local population with special reference to the vulnerable communities or not. ■ The key concerns of this stakeholder group centres around justice and equal opportunities in matters of economic and social development being provided to the Vulnerable Communities.	■ The NGOs and Civil Society Groups often play a critical role in bringing to the limelight the issues of vulnerable communities in the society; and ■ They can also play a major role in community mobilization, building trust and even participate in implementing CSR initiatives.	Low
Other Projects in the area	■ The Project is being developed as part of the 1500 MW Solar park, with other developers and plants in the vicinity.	■ The influence of the stakeholder group is likely to be extremely limited due to the nature of interaction likely to exist amongst the industries and the project		■ The main concerns of the stakeholders towards the project pertain to the influence of the project on the community's perception towards solar power projects in the area and their relations with the same.	Low

Box 6.1 Key feedback received from stakeholders as per 2018 ESIA report

As per ESIA report, 2018 by '*M/S Opensense Labs Private Limited*', following feedback was provided by local community and other stakeholders:

- Interaction with Local community of N.P Kunta village:
  - The community was aware of the Project and expected that it will contribute to the socio-economic development of the area;
  - Villagers from NP Kunta were informed that one of the family members would be given employment after the completion of proposed project.
  - The main perception and notion of the local population of the project area is "due to the installation of solar power plant there will be increase in employment opportunities, there will be an increase in their income and their standards of living will increase.
  - Few members from the community were concerned over payment of land compensation. Members of community informed that they do not have ownership of the land (no documents) however they were enjoying rights over the land and are claiming compensation for the land.
- Interaction with Other Stakeholders (social workers/NGO).
  - As per the ESIA report the NGOs and social workers were observed to be supportive to the project but were not fully aware of the same. They felt that the land being allotted for the project was not of any significant use due to the barren, undulating, rocky infertile and general lack of irrigation facilities;

Details of stakeholder consultations undertaken during 2018 ESIA as well as MoMs of discussion with Assigned land sellers are covered in Appendix H.

A standard format for documentation of stakeholder engagement activities shall be followed for the project as per the sample provided below.

Table 6.5 Sample format for documentation of engagement activities

S. No.	Stakeholder Groups	Date	Location and Venue	Name of Key Representatives	Purpose of Engagement	Method of Engagement	Key outcomes and Actions	Status of actions identified in previous consultations	Reference to records

6.4 Information Disclosure

One of the most important aspects of any consultation or engagement process is information disclosure. This process is not only part of certain regulatory requirements but also a requirement of the investors in the project. The process of information disclosure can be undertaken in two manners, either voluntary disclosure or disclosure as part of the regulatory requirements.

While regulatory disclosure involves the provisioning of information as required by the authorities and agencies involved in the project, voluntary disclosure refers to the process of disclosing information to the various stakeholders in a voluntary manner. The process of disclosure involves the provisioning of information in an accessible manner (a manner which allows for easy understanding, such as in the local language) to the various stakeholders in a project. This disclosure not only allows for trust to be build amongst the stakeholders through the sharing of information but also allow for more constructive participation in the other processes of consultation and resolution of grievances due to availability of accurate and timely information.

All relevant information such as local employment and training opportunities provided by AASPL, should be disclosed to the target stakeholders as early as possible.

AASPL or the contractors endeavours to refrain from creating false expectations. When possible, an attempt shall be made to disclose actual numbers, even estimates, wherever available.

This disclosure of impact assessment reports and relevant plans will be carried out in a manner which would make the information available to the community in an accessible and timely manner. Some of the disclosure related activities are as follows:

- Making copies of the main reports/executive summary, available in the Panchayat offices or the community centres and/or other locations readily accessible (through means such as pamphlets or leaflets) to the entire community in the locally preferred language.
- Provision of these reports and plans at the Panchayat Office or a small open meeting with the community so as to notify the stakeholders of the documents being disclosed and their nature and location as well as decide a date for receiving feedback from the community.

- Engage the community during the various other community development activities, including livelihood development, farmers meeting etc. These forums could also be used for the disclosure of the information to the community;
- As a part of the disclosure, the reports or the key public consultation findings and the grievance redress mechanisms for the project shall be displayed at key locations, and as per need.

ARPPL has a corporate Stakeholder Engagement framework that provides guidance to the sites on stakeholder engagement activities to be undertaken at all its projects and the same is attached as **Appendix I.**

7. GRIEVANCE REDRESS MECHANISM

The formalised Grievance Redress Mechanism adopted by ARPPL shall be extended for all its SPVs, including AASPL. This GRM is developed as part of IMS manual of ARPPL and aims to understand community expectations and manage any local concerns or grievances in a systematic and transparent manner.

- AASPL has a special Grievance Cell comprising of all top management persons and site Managers. The cell is established for addressing the grievances of third party/ stakeholders, project staff and contracted staffs that has direct contact with project affected communities. The GRM mentions that information for filing a grievance shall be displayed at site, along with the details of lodging the grievances through the following modes:
- Company Website. www.ayanapower.com --> Contact --> Grievance
- Email: grievance@ayanapower.com
- Grievance cell Phone Number +91 080-48511001, on all working-days 10:00 am to 5:00pm (Monday to Friday).

7.1 Grievance Receipt and Recording

AASPL shall maintain records of all grievances received as part of Grievance management process, in the form of a tracker, along with date of receipt of Grievance, nature and details of Grievance, concerned department or personnel linked to Grievances, resolution details and date of closure. Additionally provision of communication of resolution to the aggrieved shall also be maintained by AASPL during project lifecycle. The format to be used for recording of grievances is presented below.

Table 7.1 Grievance Recording Form

GRIEVANCE REGISTRATION FOR EXTERNAL STAKEHOLDERS		
Case No.:	Date:	
Name:		
District:	Village:	
Contact number:		
Details of grievance:		
Name of person recording the grievance:		
Designation of recording person:		
Proposed date of response:		
Signature of the recording person	Signature of complainant	
Date of resolution:		
Decision of the GRC (give full details):		
Complainant accepts the outcome:	Accepted	Not accepted

GRIEVANCE REGISTRATION FOR EXTERNAL STAKEHOLDERS	
Signature of the complainant	
Signature of the SP Manager	

Additionally, the format be used for Grievance Tracker is provided below.

Table 7.2 Format for Grievance Tracker

S. No	Date	Individual Name	Department/ Village	Medium of Communication	Details of Issue	Grievance within Scope	Investigation Requirement	Concerned Department	Timeline for Closing Grievance	Present Status	Remarks

For management of internal grievances, AASPL and contractors shall provide relevant provisions for disclosure, receiving, reporting and resolving grievances.

8. IMPACT ASSESSMENT AND MITIGATION MEASURES

8.1 Introduction

This section elaborates upon the various interactions of the Project with physical, ecological or social environment thereby leading to potential impacts to resources/ receptors. It has been organized as per the various phases of the Project life cycle to understand the risks and impacts associated with each phase.

8.1.1 Scope of the Assessment

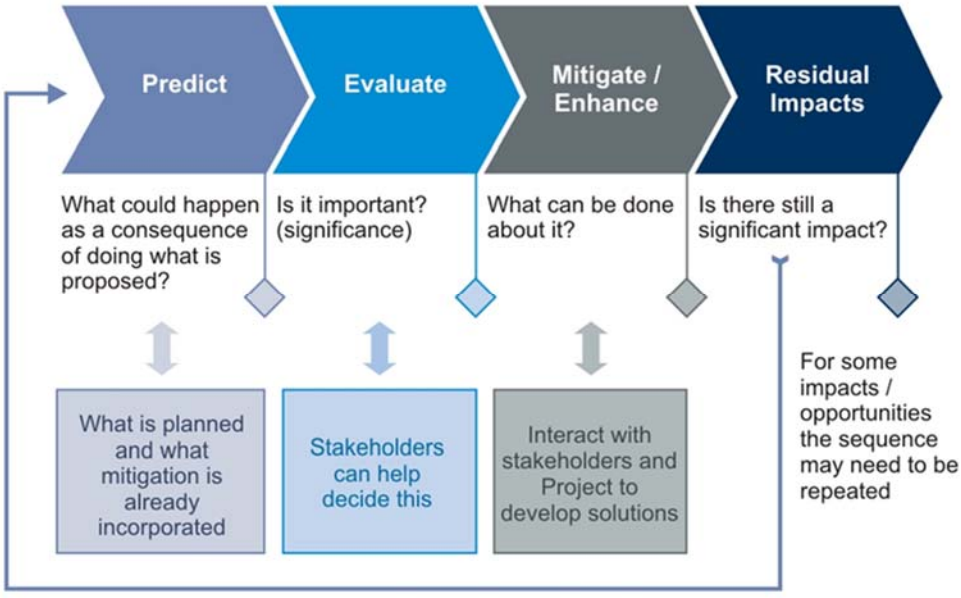
The scope of the assessment captures the understanding on the envisaged risks and impacts assessed during the scoping exercise of this impact assessment study as well as the risks identified during subsequent physical baseline assessment and impact evaluation process. The key environmental and social issues and risks identified are further elaborated in the following sections.

8.1.2 Assessment Methodology

Impact identification and assessment starts with scoping and continues through the remainder of the Impact Assessment (IA) Process. The principal IA steps are summarized in Figure 8.1 and comprises of

- Impact prediction: to determine what could potentially happen to resources/receptors as a consequence of the Project and its associated activities.
- Impact evaluation: to evaluate the significance of the predicted impacts by considering their magnitude and likelihood of occurrence, and the sensitivity, value and/or importance of the affected resource/receptor.
- Mitigation and enhancement: to identify appropriate and justified measures to mitigate negative impacts and enhance positive impacts.
- Residual impact evaluation: to evaluate the significance of impacts assuming effective implementation of mitigation and enhancement measures.

Figure 8.1: Impact Assessment Process



Source: ERM Impact Assessment Standard

8.1.2.1 Prediction of Impacts

Prediction of impacts was carried out with an objective to determine what is likely to happen to the environment as a consequence of the Project and its associated activities. From the potentially significant interactions the impacts to the various resources/receptors were elaborated and evaluated.

8.1.2.2 Evaluation of Impacts

Each impact was described in terms of its various relevant characteristics (e.g., type, scale, duration, frequency, extent). The terminology used to describe impact characteristics is shown in **Table 8.1.**

Table 8.1: Impact Characteristic Terminology

Characteristic	Definition	Designations
Type	A descriptor indicating the relationship of the impact to the Project (in terms of cause and effect)	■ Direct ■ Indirect ■ Induced
Extent	The “reach” of the impact (e.g., confined to a small area around the Project Footprint, projected for several kilometres, etc.)	■ Local ■ National ■ Global
Duration	The time period over which a resource/ receptor is affected.	■ Temporary ■ Short-term ■ Long-term ■ Permanent
Scale	The size of the impact (e.g., the size of the area damaged or impacted, the fraction of a resource that is lost or affected, etc.)	■ [no fixed designations; intended to be a numerical value or a qualitative description of “intensity”]
Frequency	A measure of the constancy or periodicity of the impact.	■ [no fixed designations; intended to be a numerical value or a qualitative description]

The definitions for the type designations are given in **Table 8.2**. Definitions for the other designations are resource/receptor-specific.

Table 8.2: Impact Type Definitions

Type	Definition
Direct	Impacts that result from a direct interaction between the Project and a resource/ receptor
Indirect	Impacts that follow on from the direct interactions between the Project and its environment as a result of subsequent interactions within the environment
Induced	Impacts that result from other activities (which are not part of the Project) that happen as a consequence of the Project.

The above characteristics and definitions apply to planned and unplanned events. An additional characteristic that pertains only to unplanned events is likelihood. The likelihood of an unplanned event occurring was designated using a qualitative scale, as described in **Table 8.3**.

Table 8.3: Definitions for Likelihood Designations

Likelihood	Definition
Unlikely	The event is unlikely but may occur at some time during normal operating conditions (probability less than 20%)
Possible	The event is likely to occur at some time during normal operating conditions (probability greater than 20% and less than 50%)
Likely	The event will occur during normal operating conditions (probability greater than 50%

Once an impact's characteristics were defined, each impact was assigned a 'magnitude'. Magnitude is typically a function of a combination (depending on the resource/receptor in question) of the following impact characteristics:

- Extent;
- Duration;
- Scale; and
- Frequency.

In case of unplanned events only, magnitude incorporates the 'likelihood' factor discussed above. Magnitude essentially describes the intensity of the change that was predicted to occur in the resource/receptor as a result of the impact. As discussed above, the magnitude designations themselves are universally consistent, but the descriptions for these designations vary on a resource/receptor-by-resource/receptor basis. The universal magnitude designations are:

- Positive;
- Negligible;
- Small;
- Medium; and
- Large.

In the case of a positive impact, no magnitude designation (aside from 'positive') was assigned. It was considered sufficient for the purpose of the IA to indicate that the Project was expected to result in a positive impact, without characterising the exact degree of positive change likely to occur. In the case of impacts resulting from unplanned events, the same resource/ receptor-specific approach to concluding a magnitude designation was followed, but the 'likelihood' factor was considered, together with the other impact characteristics, when assigning a magnitude designation.

In addition to characterising the magnitude of impact, the other principal impact evaluation step was definition of the sensitivity/ vulnerability/ importance of the impacted resource/receptor. There are a range of factors that was taken into account when defining the sensitivity/ vulnerability/ importance of the resource/receptor, which may be physical, biological, cultural or human. Other factors were also considered when characterising sensitivity/ vulnerability/importance, such as legal protection, government policy, stakeholder views and economic value. The sensitivity/ vulnerability/importance designations used herein for all resources/receptors are:

- Low
- Medium
- High

Once magnitude of impact and sensitivity/ vulnerability/ importance of resource/ receptor have been characterised, the significance was assigned for each impact. Impact significance is designated using the matrix shown in **Figure 8.2.**

Figure 8.2: Impact significance

		Sensitivity/Vulnerability/importance of Resource/Receptor		
		Low	Medium	High
Magnitude of Impact	Negligible	Negligible	Negligible	Negligible
	Small	Negligible	Minor	Moderate
	Medium	Minor	Moderate	Major
	Large	Moderate	Major	Major

Source: ERM Impact Assessment Standard

The matrix applies universally to all resources/receptors, and all impacts to these resources/receptors, as the resource/receptor-specific considerations are factored into the assignment of magnitude and sensitivity/ vulnerability/ importance designations that enter into the matrix. ***Box 8.1*** provides a context of what the various impact significance ratings imply.

Box 8.1: Context of Impact Significances

An impact of **negligible** significance is one where a resource/ receptor (including people) will essentially not be affected in any way by a particular activity or the predicted effect is deemed to be 'imperceptible' or is indistinguishable from natural background variations.

An impact of **minor** significance is one where a resource/ receptor will experience a noticeable effect, but the impact magnitude is sufficiently small and/or the resource/receptor is of low sensitivity/ vulnerability/ importance. In either case, the magnitude should be well within applicable standards/ guidelines.

An impact of **moderate** significance has an impact magnitude that is within applicable standards/guidelines, but falls somewhere in the range from a threshold below which the impact is minor, up to a level that might be just short of breaching a legal limit. Clearly, to design an activity so that its effects only just avoid breaking a law and/or cause a major impact is not best practice. The emphasis for moderate impacts is therefore on demonstrating that the impact has been reduced to a level that is as low as reasonably practicable (ALARP). This does not necessarily mean that impacts of moderate significance have to be reduced to minor, but that moderate impacts are being managed effectively and efficiently.

An impact of **major** significance is one where an accepted limit or standard may be exceeded, or large magnitude impacts occur to highly valued/sensitive resource/receptors. An aim of IA is to get to a position where the Project does not have any major residual impacts, certainly not ones that would endure into the long-term or extend over a large area. However, for some aspects there may be major residual impacts after all practicable mitigation options have been exhausted (i.e. ALARP has been applied). An example might be the visual impact of a facility. It is then the function of regulators and stakeholders to weigh such negative factors against the positive ones, such as employment, in coming to a decision on the Project.

Source: ERM Impact Assessment Standard

It is important to note that the impact prediction and evaluation takes into account any embedded controls (i.e., physical or procedural controls that are already planned as part of the Project design, regardless of the results of the IA Process).

8.1.2.3 Identification of Mitigation and Enhancement Measures

Once the significance of an impact has been characterised, the next step was to evaluate what mitigation and enhancement measures are warranted. For the purposes of this IA, ERM adopted the following mitigation hierarchy:

- Avoid at Source, Reduce at Source: avoiding or reducing at source through the design of the Project.
- Abate on Site: add something to the design to abate the impact.
- Abate at Receptor: if an impact cannot be abated on-site then control measures can be implemented off-site.
- Repair or Remedy: some impacts involve unavoidable damage to a resource (e.g. agricultural land and forestry due to creating access or materials storage areas) and these impacts can be addressed through repair, restoration or reinstatement measures.
- Compensate in Kind, Compensate Through Other Means: where other mitigation approaches are not possible or fully effective, then compensation for loss, damage and disturbance might be appropriate (e.g., planting to replace damaged vegetation, financial compensation for damaged crops or providing community facilities for loss of fisheries, access, recreation and amenity space).

The priority in mitigation was to first apply mitigation measures to the source of the impact (i.e., to avoid or reduce the magnitude of the impact from the associated Project activity), and then to address the resultant effect to the resource/receptor via abatement or compensatory measures or offsets (i.e., to reduce the significance of the effect once all reasonably practicable mitigations have been applied to reduce the impact magnitude).

8.1.2.4 Management and Monitoring

The final stage in the IA Process was the definition of the basic management and monitoring measures that are needed to identify whether: a) impacts or their associated Project components remain in conformance with applicable standards/ guidelines; and b) mitigation measures are effectively addressing impacts and compensatory measures and offsets are reducing effects to the extent predicted. This is covered in **Chapter 9** under Environmental and Social Management Plan (ESMP).

8.2 Key Environmental Impacts – Construction phase

8.2.1 Change in Land Use

The area identified for the project mostly comprises of barren rocky waste land. As reported in ESIA report prepared by OSL, agriculture and horticulture practices are carried out in very small patch of approximately 3-4 acres of land within the project area. Crops such as groundnut are grown over the small patch of land. As reported by Ayana, the project land overall was covered mainly with bushes and shrubs, however, currently the site has been cleared and it is free of bushes and scrubs. Thus, receptor sensitivity is assessed as **medium.**

The main impact on land use could be mainly from clearing of vegetation from land prior to construction activities. The potential for alteration of land use of the proposed site is moderate as it can alter water holding and erosion pattern. The land in Project area had some amount of vegetation cover in form of shrubs and bushes and that have been cleared. Thus, magnitude of the impact has been assessed to be **medium.**

8.2.1.1 Embedded/In-built Control

The actual area of land use impact would be limited to the footprint of 1274 acres of barren land and immediate vicinity of the solar farm site. After construction work, any land taken for a temporary basis for storage of material will be restored to their original form.

8.2.1.2 Significance of Impact

The overall impact significance will therefore be **moderate**.

8.2.1.3 Additional Mitigation Measures

- Construction activities should be restricted to designated area;
- On completion of construction activities, land used for temporary facilities such as stockyard if any should be restored to the extent possible; and
- The land use in and around permanent project facilities should not be disturbed.

8.2.1.4 Residual Impact Significance

The residual impact significance will remain **moderate** as changes in land use will be for long term for majority of the project component (installation of PV modules, access roads, central monitoring station, switchyard).

Table 8.4: Change in Land Use during Construction Phase

Impact	Changes in Land use during construction phase				
Impact Nature	Negative	Positive	Neutral		
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Limited to project site and associated facilities				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource /Receptor Sensitivity	Low	Medium	High		
Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **Moderate.**				
Residual Impact Magnitude	Positive	Negligible	Small	Medium	Large
Residual Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **Moderate**				

8.2.2 Impact on Topography

The project area exhibits undulating topography. The elevation ranges from 430 to 470 m above mean sea level. There are no water bodies that pass though the proposed project site. The project may involve levelling of land for construction of internal access roads, however a small portion of land will be occupied by internal roads. Hence, the receptor sensitivity has been assessed to be **low**.

Due to undulating topography, study area exhibit presence of micro drainage channels. Though the solar power project does not require levelling of land, construction of access road for the project

purpose could potentially alter topography but the chances of that are miniscule. Therefore, the impact magnitude has therefore been assessed as **small**.

8.2.2.1 Embedded/In built Control

The EPC contractor will be instructed to avoid any unnecessary changes in the topography.

8.2.2.2 Significance of Impact

Significance of impact is assessed to be negligible to minor.

8.2.2.3 Additional Mitigation Measures

No further mitigation measures are suggested as embedded/in-built control will be sufficient to reduce the impact on topography.

8.2.2.4 Residual Impact Significance

The residual impact significance will be reduced to **negligible** after implementing above mentioned mitigation measures.

Table 8.5: Change in Topography

Impact	Change in topography				
Impact Nature	Negative	Positive	Neutral		
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Limited to project site and access road				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource/ Receptor Sensitivity	Low	Medium	High		
Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **Negligible to Minor.**				
Residual Impact Magnitude	Positive	Negligible	Small	Medium	Large
Residual Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **Negligible.**				

8.2.3 Impact on Soil Environment

8.2.3.1 Soil Compaction and Erosion

Soil compaction and erosion will be more pronounced during the construction and decommissioning phase. The receptor sensitivity has been assessed to be **medium** as the project area comprise of rocky land with very thin layer of topsoil unsuitable for any kind of agriculture.

There will be clearance of vegetation that covers the top soil, site levelling and grading during the construction phase. These activities will largely affect the top layers of the soil and loss of top soil quality is envisaged but the effects can be reversed over time.

Based on the above, the impact magnitude has been assessed to be **small** as the impacts are mainly reversible and will be contained majorly over the construction phase.

Embedded/In-built Controls for Compaction and erosion prevention

- All site preparation activities will be limited to the project site only and areas should be demarcated for storage of construction material, parking of vehicles etc.; and
- Topsoil will be retained and reused to the extent possible.

Significance of Impact

The overall impact significance on soil erosion and compaction has been assessed as **minor.**

Additional Mitigation Measures

Site clearance, piling, excavation and access road construction will not be carried out during the monsoon season to minimize erosion and run-off.

Residual Impact Significance

The significance of residual impacts has been reduced to **negligible** taking into account the recommended mitigation measures.

Table 8.6: Impact on Soil Environment (Compaction and Erosion)

Impact	Soil Erosion and Compaction (Construction and Decommissioning)				
Impact Nature	Negative	Positive	Neutral		
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Limited to Project areas				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource/ Receptor Sensitivity	Low	Medium	High		
Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **Minor.**				
Residual Impact Magnitude	Positive	Negligible	Small	Medium	Large
Residual Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **Negligible.**				

8.2.3.2 Waste Generation and Soil Contamination

General construction waste generated onsite will comprise of concrete, steel cuttings/filings, packaging paper or plastic etc. Municipal solid wastes consisting of food waste, plastic, glass and waste paper will also be generated by the construction workforce at canteen facility (if any). A small proportion of the waste generated during construction phase will be hazardous and will include waste fuel, grease and waste oil containing rags. Use transformer oil which is also categorised as hazardous waste will be generated from the plant. If improperly managed, solid waste could create impacts on soil quality. Therefore, the receptor sensitivity has been assessed as **medium.**

The impact magnitude has been assessed as **small** since the client has managed other solar power projects as well and has effective management systems for waste and hazardous substances being

generated or utilized during the project life cycle as part of Ayana's Environmental and Social Management Plans.

Embedded/in-built control

Solid and hazardous waste generated by the project during construction phase will be managed as per detailed management plans. Ayana will ensure that waste management procedures are integrated as part of the Project EHS management plan.

Significance of Impact

The impact significance for waste generation and soil contamination has been assessed as **minor.**

Additional Mitigation Measures

- EPC Contractor should ensure that no unauthorized dumping of used oil and other hazardous waste is undertaken at the site;
- Designated areas should be provided for Solid Municipal Waste and daily collection and period disposal should be ensured;
- Construction and Demolition Waste should be stored separately and be periodically collected by an authorized treatment and storage facility;
- All waste should be stored in a shed that is protected from the elements (wind, rain, storms, etc.) and away from natural drainage channels;
- A log book should be maintained for quantity and type of hazardous waste generated; and
- In case of accidental/unintended spillage, the contaminated soil should be immediately collected and stored as hazardous waste.
- The broken solar panels, batteries (dry type or wet type), electronics if any, will be sent back to the vendor as part of buyback arrangement;

Residual Impact Significance

The significance of impacts due to waste generation during the construction phase after implementation of mitigation measures has been considered as **negligible.**

Table 8.7: Impact on Soil Environment (Waste Generation and Soil Contamination)

Impact	Impact on soil environment due to waste generation (hazardous and non-hazardous)				
Impact Nature	Negative	Positive	Neutral		
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Limited to project area				
Frequency	Occasionally				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource/Receptor Sensitivity	Low	Medium	High		
Impact Significance	Negligible	Minor	Moderate	Major	

	Significance of impact is considered **Minor.**				
Residual Impact Magnitude	Positive	Negligible	Small	Medium	Major
Residual Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **Negligible.**				

8.2.4 Impact on Water Environment

Water is a prime requirement for the execution of civil works, especially with regard to preparation of raw materials like concrete etc. for civil works associated with the Project (i.e. construction of proposed site office, SCADA room). It is estimated that approximately 10 KL/Month water will be required for construction activities. Reportedly, water for the constriction work will be supplied by the EPC contractor. Source of water during construction phase will be through water tankers procured from nearby villages. It is also reported that Ayana has plans to install bore wells at the site for emergency purpose. According to CGWB study for Anantapur district, NP Kunta Mandal where the project site falls is categorised as “semi critical” in terms of ground water development.

In addition, Veligallu reservoir, which shares boundary with Ananthapuramu solar power park, is considered to be one of the sources of water for the project.

As per the agreement between APSPCL and Solar Power developer (SPD), APSPCL is not expected to provide water supply during construction phase. Ayana is required to obtain necessary approvals/ permission from local authorities to install bore well or to get water from nearest reservoir by tankers and APSPCL will extend necessary support in arranging such approvals/ permission if required.

In addition to the above, storage of chemicals and fuels may be carried out at the site. Accidental spillage of chemical and fuel may easily contaminate the ground water. Therefore, the spillage of chemicals and fuel may cause measurable changes in the ground water quality during construction activities

Therefore, considering the above scenario receptor sensitivity and impact magnitude has been assessed as **medium** for water environment.

8.2.4.1 Embedded/In built Control

- Hazardous material must be kept on impervious layer with secondary containment;

8.2.4.2 Significance of Impact

The overall impact significance is therefore assessed to be **moderate**.

8.2.4.3 Additional Mitigation Measures

- Authorised water tankers should be hired if water is abstracted from nearby reservoirs;
- Permission/ no objection certificate will be sought from the Rural Development Department, Government of Andhra Pradesh, if ground water abstraction will be undertaken;
- Regularly monitor the ground water quality;
- Maintain logbook for water consumption;
- Prepare and implement water conservation scheme e.g., rainwater harvesting at the project site

8.2.4.4 Residual Impact Significance

Residual impact significance has to be retained as **minor** upon application of additional mitigation measures.

Table 8.8: Impact on Water Environment

Impact	Water quality due to spillage of oil, hazardous waste (waste oil) and water resource due to requirement of water for construction phase				
Impact Nature	Negative	Positive	Neutral		
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Limited to project areas				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource/Receptor Sensitivity	Low	Medium	High		
Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **Moderate.**				
Residual Impact Magnitude	Positive	Negligible	Small	Medium	Major
Residual Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **Minor.**				

8.2.5 Impact on Air Quality

Air quality impacts in the construction phase will be largely due to the following sources:

- Fugitive dust emissions from site clearance, piling work, handling of construction materials, emission due to movement of vehicles on unpaved roads, plying of vehicles, etc.
- Vehicular emissions due to increased traffic movement on site and on the approach roads;
- Exhaust emissions from construction machinery and other equipment such as pile drivers; and
- Emissions from diesel generators required to be run for construction power purposes.

Considering the baseline conditions of the project area through air quality monitoring conducted at the project site, all the parameters were found to be within NAAQS limits. However, construction activities will increase fugitive dust emissions due to site clearance and vehicular emissions due to plying of vehicles. Therefore, the receptor sensitivity is considered **medium.**

The construction activities are going to occur for a small period (~6 months). Therefore, impact magnitude has been categorized as **small** as dust emissions will only occur only for a short period.

8.2.5.1 Embedded/in-built control

- Diesel generator use will be restricted to emergencies and power back-up only to minimize air emissions; and
- Vehicle engines need to be properly maintained and should have a valid Pollution under Control (PUC) to ensure minimization in vehicular emissions

8.2.5.2 Significance of Impact

The impact significance for air quality in the construction phase is assessed as **minor**. There will be some impacts due to plying of vehicles on the access roads. The impacts however, are not anticipated to be significant considering short duration of the construction phase of the project

8.2.5.3 Additional Mitigation Measures

- Speed of vehicles on site should be limited to 10-15 km/hr;
- Switch off machinery and equipment when not in use; and
- Prevent idling of vehicles and equipment

8.2.5.4 Residual Impact Significance

The significance of residual impact will be **negligible to minor** after implementing mitigation measures.

Table 8.9: Impact on Air Quality (Construction Phase)

Impact	Ambient Air quality – Construction phase				
Impact Nature	Negative	Positive	Neutral		
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Project area and vicinity				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource Sensitivity	Low	Medium	High		
Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **Minor.**				
Residual Impact Magnitude	Positive	Negligible	Small	Medium	Major
Residual Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **Negligible to Minor**				

8.2.6 Impact on Ambient Noise

The sources of noise in the construction phase include construction activities, operation of DG sets and movement of vehicles. There will also be increased noise levels because of increased anthropogenic movement in the area.

Based on ambient noise monitoring conducted for the project, the noise level in the project area is within CPCB permissible limit. No settlements are located within 1 km of the project site. Hence, the receptor sensitivity is assessed to be **low.**

Impact magnitude is considered to be **small** considering the construction period of the project to last for approximately 6 months.

8.2.6.1 Embedded/in-built control

Normal working hours of the contractor to be defined (preferable 8 am to 6pm). If work needs to be undertaken outside these hours, it should be limited to activities which do not generate noise.

8.2.6.2 Significance of Impact

The impact significance has therefore been assessed as **negligible.**

8.2.6.3 Additional Mitigation Measures

- Only well-maintained equipment should be operated on-site;
- If it is noticed that any particular equipment is generating too much noise then lubricating moving parts, tightening loose parts and replacing worn out components should be carried out to bring down the noise and placing such machinery far away from the households as possible;
- Machinery and construction equipment that may be in intermittent use should be shut down during non-work periods; and
- Minimal use of vehicle horns and heavy engine breaking in the area needs to be encouraged

8.2.6.4 Residual Impact Significance

Significance of residual impact is assessed to be **negligible** taking into consideration above mentioned mitigation measures.

Table 8.10: Impact on Ambient Noise (Construction Phase)

Impact	Ambient Noise Levels – Construction & Decommissioning Phase				
Impact Nature	Negative	Positive	Neutral		
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Project area and vicinity				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource Sensitivity	Low	Medium	High		
Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered to be **Negligible**.				
Residual Impact Magnitude	Positive	Negligible	Small	Medium	Major
Residual Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **Negligible**				

8.2.7 Impact on Occupational Health and Safety

Working at height will be undertaken during stringing of wires. Construction of support structure for PV module would require operation of pile drivers. The installation of solar module will involve operation of cranes and other mechanical lifting equipment. Laying of interconnecting cable with require digging. The commissioning of the inverter rooms and SCADA room will also involve live power lines. The working at height has the risks of falling from the height and working on live wires carrying power has dangers of electric shock and electrocution.

The project site also needs to implement proper measures for fire safety, structural safety and any for emergency situations.

The occupational health and safety concerns mentioned above would be consistent across the project life cycle (construction, operation and decommissioning stages) and therefore the impacts would be similar in nature.

NOTE: COVID 19 concerns may be relevant for the project. The project is required to implement precautions directed by the state and central govt.

8.2.7.1 Embedded/in-built control

- All construction activities will be carried out during daytime hours and vigilance should be maintained for any potential accidents. In case night work is pertinent to be carried out to meet timelines, appropriate H&S provisions like lights, Permit to Work, etc will be ensured along with compliance to labour regulations on working hours, minimum wages and overtime wages. Additionally equipment generating high noise levels should be used, in order to avoid community H&S related issues;
- Personal Protective Equipment (PPEs) including safety shoes, helmet, goggles, ear muffs and face masks;
- Cranes and other lifting equipment are operated by trained and authorised persons;
- Training of the workers on climbing techniques, and rescue of fall-arrested workers;
- Excavated areas should be temporarily fenced to avoid access to outsiders and wildlife;
- An up-to-date first aid box should be provided at all construction sites and a trained person should be appointed to manage it; and
- Electrical and maintenance work should not be carried out during poor weather and during lightning strikes.
- In addition, ARPPL is undertaking measures to spread awareness related to Covid-19, its spread, symptoms, precautions and guidelines for its staff and community (https://www.facebook.com/ayanapowerltd)
- Additional measures to be implemented as per state and central guidelines concerning COVID 19 pandemic.

8.2.7.2 Significance of Impacts

The impact on occupational health and safety during the construction phase is evaluated to be of **minor** significance, as the installation of solar module and other construction work will be done through experienced and trained workers.

8.2.7.3 Additional mitigation measures

- All workers (regular and contracted) should be provided with training on Health and Safety management system of the EPC contractor during construction stage and company's EHS policies and procedures during the operation stage;
- Obtain and check safety method statements from contractors;
- Monitor health and safety performance and have an operating audit system;
- Permitting system should be implemented to ensure that cranes and lifting equipment is operated by trained and authorized persons only;
- Appropriate safety harnesses and lowering/raising tools should be used for working at heights;
- All equipment should be turned off and checked when not in use; and

- A safety or emergency management plan should be in place to account for natural disasters, accidents and any emergency situations.

8.2.7.4 Residual impact significance

Significance of residual impact is assessed to be **negligible** considering above mentioned mitigation measures.

Table 8.11: Impact on occupational health and safety (Construction Phase)

Impact	Occupational health and safety during construction, operation & maintenance and decommissioning.				
Impact Nature	Negative	Positive	Neutral		
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	The construction work involves construction of solar power station				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource Sensitivity	Low	Medium	High		
Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered to be **Minor**.				
Residual Impact Magnitude	Positive	Negligible	Small	Medium	Major
Residual Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **Negligible.**				

8.3 Key Ecological Impacts- Construction Phase

This section has primarily referred to the data retrieved from ESIA report dated 20.12.2018 prepared by OSL for the 250 MW solar power project in Anantapuramu, Andhrra Pradesh.

The impacts from the construction phase of the Project on the local ecology have been assessed with respect to the following activities:

- Vegetation Clearance and Other Construction Impacts; and
- Barrier Effect and Loss of Resources

8.3.1 Impact due to Vegetation Clearance and Construction Activity

The Project site is located in dry and arid in nature comprising dry, thorny scrubs mixed with pockets of private agriculture land. Considering the fact that the site is already in construction phase and vegetation clearance has already been done, displacement of species may have already happened.

8.3.1.1 Embedded/ In-built Controls

The Project site has been planned on rocky dry land with no mature trees or dense vegetation.

8.3.1.2 Significance of Impacts

Based on habitat sensitivity value, shrubs, bushes and some small trees were found to be in Least Concern species actegory and such habitat is widespread in the study area (Refer **Appendix G** for the ecological assessment report prepared as a part of ESIA Study (2018)). The loss of such habitat

for project activity affects only a small portion of such habitat. So the impact magnitude on habitat, based on “Habitat-Impact Assessment Criteria” is considered to be “**Negligible**”.

Based on species sensitivity value, project construction activity is not going to cause a substantial change in the population of the species or other species dependent on it. So based on “Species-Impact Assessment Criteria” the impact magnitude on species was also found to be “**Negligible”.**

8.3.1.3 Mitigation Measures

Vegetation clearance should be kept restricted to project site only and should be avoided wherever possible. Moreover it is recommended that the selected EPC contractor should display and educate labourers not to collect fuel wood from adjacent scrublands and alternate arrangement for fuel, like LPG must be made available in the labour camps for cooking.

Table 8.12 Impact significance of vegetation clearance during the construction phase

Impact	Clearance of vegetation				
Impact Nature	Negative	Positive	Neutral		
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Limited to construction area and immediate surroundings				
Frequency	Construction phase				
Likelihood	Likely				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource Sensitivity (Agricultural lands)	Low	Medium	High		
Resource Sensitivity (Species)	Low	Medium	High		
Impact Significance	Not Significant	Minor	Moderate	Major	
	Significance of impact is considered **Negligible** for habitat and species**.**				
Residual Impact Magnitude	Positive	Negligible	Small	Medium	Large
Residual Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **Negligible** for habitats and species**.**				

8.3.2 Impact on ecology due to Influx of Migrant Labour and Labour Camps

Local labours are not aware of the local biodiversity values and there is always risk of hunting and trapping of local wildlife (eg. Goat) by labours for “goat meat” as well as for easy source of money by selling products like skin. Apart from impact like direct hunting or trapping, careless disposal of kitchen waste like discarded vegetable materials and excess food, may attract wildlife like herbivores like deer, Antilope and rabbit as well as scavengers like crows, rat, this unwanted interaction with wild animals may lead to human-wildlife conflict. Collection of fuel wood for cooking from outside project area, may result in additional habitat degradation.

8.3.2.1 Significance of Impacts

Based on habitat sensitivity value, shrubs, bushes and some small trees were found to sustain only Least Concern species, and such habitat is widespread in the study area (Refer **Appendix G**), so the loss of such habitat for project activity affects only a small portion of such habitat. So the impact magnitude on habitat, based on “Habitat-Impact Assessment Criteria” is considered to be “**Negligible**”.

Based on species sensitivity value, project construction activity is not going to cause a substantial change in the population of the species or other species dependent on it. So based on “Species-Impact Assessment Criteria” the impact magnitude on species was also found to be “**Negligible”.**

Only species with “Low Sensitivity value” is found in the study area, and hunting trapping of animals like deer, antelope, rabbit may result in substantial change in abundance and/or reduction in distribution of a population locally, but does not threatened the long term viability. So based on “Species-Impact Assessment Criteria” the impact magnitude on species was also found to be “Minor”. Most of the mammals found in the study area are scheduled animals, including Schudule II, III, IV species like rat, wild boar, tree snake etc (Refer **Appendix G**). All Scheduled animals are protected under “Wildlife Protection Act, 1972” and its amendments, and hunting and trapping of such animals are criminal offence and punishable by law.

Table 8.13 Impact due to Influx of Migrant Labour and Labour Camps during the construction phase

Impact	Impact due to Influx of Migrant Labour and Labour Camps during the construction phase				
Impact Nature	Negative	Positive	Neutral		
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Limited to construction area and immediate surroundings				
Frequency	Construction phase				
Likelihood	Likely				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource Sensitivity (Agricultural lands)	Low	Medium	High		
Resource Sensitivity (Species)	Low	Medium	High		
Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **Negligible** for habitat and species**.**				
Residual Impact Magnitude	Positive	Negligible	Small	Medium	Large
Residual Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **Negligible** for habitats and species**.**				

8.4 Key Social Impacts – Construction Phase

This section discusses socio-economic impacts in the pre-construction, construction, operation & maintenance and decommissioning phase of the Project. The overview of key impacts identified in these stages of project life-cycle is provided below.

8.4.1 Reduction of Land-holding and loss of agricultural income

8.4.1.1 Source of Impact and Overview of Baseline Conditions

- The 250 MW power project being developed by AASPL is situated on 1274 Acres of land allotted to Ayana, out of the approximately 7181 Acres of land for 1500 MW ultra -solar power park. The land lease agreement was signed between Andhra Pradesh Solar Power Corporation Pvt. Ltd. and AASPL on 23rd October 2018, for a period of 25 years. As per the data provided, 3.6% of land for the Solar Park is purchased from private land sellers, while the rest is Government land and Assigned Land31. As per the Land lease agreement, APSPCL is responsible for development of common infrastructure in the Solar Park, comprising Internal Transmission System, Water Supply, Road Connectivity, Drainage systems, Weather stations and Street Lightings.
- The land procurement for the Solar Park was under the scope of APSPCL, along with assistance from the state government and District Revenue Department of Ananthapuramu, as per The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation & Resettlement Act,

[31] Govt. land given to vulnerable or landless local households for livelihood related purposes.

2013 (No. 30 of 2013) – Andhra Pradesh. As per information collected during primary socio-economic survey and presented in 2018 ESIA report, approximately 1200 families are getting directly or indirectly affected by the overall project activities.

- The AASPL 250 MW Power Plant is situated on 1274 acres land parcel with 24 acres of unusable land. The breakup of the land procured is presented in table below.

Table 8.14: Land ownership breakup of AASPL power plant

Type of land	Total land (in acres)
Government Land Acquired in Acres	610.59
Assigned Land Acquired in Acres	582.38
Patta Land Acquired in Acres	81.04
Total	**1274.00**

Source: AASPL

- Based on review of Land Lease Agreement and understanding developed basis discussion with AASPL team, there were approx. 235 Assigned Land parcels and approx. 14 Private land parcels have been identified to be procured for 250 MW AASPL project.

Landlessness

- The land identified for the project comprises mostly of Government land and Assigned land, with very small proportion of private land (6.3% for AASPL and 3.6% for the 1500 MW Solar Park). The Assigned land owners belong to vulnerable groups, who were assigned land parcels for livelihood related use. The extent of land procured from Assigned land owners and their remaining land holdings post project related land procurement is not presently known by ERM. There were sample consultations undertaken with Assigned Land Owners, where it was understood that some Assigned land holders may have been rendered landless post procurement of land for solar project; however they reported to opportunistically cultivate Government land parcels at locations, which were more viable for agriculture, due to better water availability.

Encroachment

- The land identified for the project comprises majorly of Government land parcels, some of which were previously reported to be encroached by the local community for opportunistic cultivation. However, the provision of encumbrance free land to AASPL lies in the scope of APSPCL and while handling over the possession of land, all the encroachments were cleared by APSPCL. It has been reported that the encroachers were paid an amount of INR 1 lac.

Common Property Resources

- The Government land identified for the project was being used for cattle grazing by the residents of the nearby villages.

- Limited consultations were held with landowners of the assigned land, it was indicated that as the agricultural land has low productivity, there was not much cultivation being undertaken since the year 2016. The land sellers have used the money from the sale of the land parcels to procure better cultivable land in the areas surrounding their villages (See Chapter 3). However, out of the total Landowners (Assigned, patta land) and government land users, only a few assigned landowner were consulted and therefore there is lack of information on the socio-economic condition, landlessness of other land sellers of assigned land, patta land and compensation details for users of government.

Physical Displacement

- It is understood from the discussion with MRO, review of 2018 ESIA report and discussion with Ayana team that the Project did not result in any Physical displacement.

8.4.1.2 Embedded/In-built Controls

The private land owners (approx. 13 land owners), contributing to 6.3% of total land for 250 MW power plant, are reportedly paid a compensation of INR 3.25 lac per Acre; however the sale deeds have not been provided to ERM team for review, to state this conclusively. The Assigned land owners are reportedly paid compensation at the rate of INR 2 lacs per acre. The table below presents the rates understood to be paid for different categories of land.

Table 8.15: Land procurement rates

S. No	Land Ownership/ Claim	Number of Land parcels	Compensation amount (in INR)
1.	Private land (owners with valid Patta/ Old Patta), having selling rights	14 land parcels	3.25 lac per acre
2.	Assigned Land (Depatta land or DKT land)	235 land parcels	2 lac per acre
3.	Encroachers (cultivating of government vested land for generations within the site location) – referred to *Sivai Jamedar* by the Land Revenue Department	• 1150 – Initial claims from land users (**for entire 1500 MW Solar Park**)* • 934 – Reduced number of valid claims after verification of documents (**for entire 1500 MW Solar Park**)	1 lac per head

Source: Discussion with APSPCL and Land Lease Agreement

**Break up for encroachers on AASPL not available*

8.4.1.3 Impact Significance

The overall impact significance due to reduction in landholding has been assessed as **Moderate.**

8.4.1.4 Mitigation Measures

In the absence of SIA and SMP and documents supporting compensation for private and Assigned, and the core responsibility of compensation lying under scope of Solar Park Developer (APSPCL), the following measures are recommended for AASPL to implement:

- Ensure, to the extent practicable, that compensation was paid as per section 26 of LAAR Act 2013 (to land owners whose land was acquired by government);
- Ensure that documentation for payment to Private land owners for AASPL parcel is made available and the compensation was not paid below market price;
- Explore possibilities of employment of locals, land sellers, erstwhile Assigned land users during construction phase of the project;
- Ensure inclusion of members of land seller households for project, in the Skill Development program being conducted and other community development activities by AASPL.

8.4.1.5 Residual Impact Significance

After implementation of mitigation measures, the significance of residual impacts will be reduced to **Minor.**

Table 8.16: Land holding and agriculture income

Impact	Land Holding and Agriculture Income				
Impact Nature	Negative	Positive	Neutral		
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Limited to habitation within the study area and land sellers.				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource Sensitivity	Low	Medium	High		
Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered to be Minor to Moderate				
Residual Impact Magnitude	Positive	Negligible	Small	Medium	Major
Residual Impact Significance	Negligible	Minor	Moderate	Major	
	After implementation of Mitigation measures the residual significance of impact is considered **Minor.**				

8.4.2 Impact on local economy and employment

8.4.2.1 Source of Impact and overview of baseline conditions

As per the secondary research and consultation with limited landowners (see section ***5.3*** and section 2.4 for details), it is understood that scenario of water availability and rainfall impacts agriculture in the area making it unviable to cater to livelihood requirements of the people who are solely dependent upon it. Therefore, people (especially in rural areas) tend to diversify their sources of income. Since income from agriculture seems to be diminishing in the Study area, people will look for non-agriculture sources of livelihood. It is understood that the Project will generate approximately 700-800 skilled and unskilled jobs during construction phase and most of the workers will be locally sourced.

Ayana along with other partners such as DFID, SEWA Bharat, CDC, SEED CSR, Xynteo are undertaking 'Pilot project on skill development & livelihood generation in green jobs' in the Study area. The main aim of program is to promote gender equality and empower women to acquire right set of skills that enable them to have access to job opportunities upcoming in close proximity to their residences and entrepreneurship, reducing migration and improving livelihood (refer ***Annexure J)***

8.4.2.2 Enhancement Measures

- The Project will ensure that a significant segment of unskilled and semi-skilled labour during the construction phase are sourced locally. During construction phase of the Project, employment opportunities will be significant for local people whereas during the operation phase, it could be restricted to the requirement of few security personnel and few housekeeping staff at site office. As the impacts from the Project on local economy and employment is positive, the following enhancement measures have been recommended.

- Sourcing local labour wherever possible should be made obligatory for the sub-contractors and in all major procurement activities. The Project proponent should establish a mechanism to audit subcontractors and suppliers with respect to compliance of utilizing local labour and resources;
- It should be clearly communicated to the workers working during the construction period that this will be short term employment and the duration should be informed;
- Information on local employment should be communicated to the gram panchayat (GP) and information on availability of employment opportunities should be displayed at GP office premises (preferably in the local language) in consultation with the Sarpanch;
- The Grievance Redress Mechanism of the project shall be made available to these groups, including contractual workforce engaged during construction phase in order to provide a platform to share any concerns or grievances.

8.4.2.3 Impact Significance

The impacts have been assessed as **positive** due to employment opportunities for locals. The increased employment opportunities will also increase spending potential of the local community and therefore promote local businesses and economy.

Table 8.17: Impact on local employment opportunities and local economy

Impact	Impact on local employment opportunities during the Project life cycle				
Impact Nature	Negative	Positive	Neutral		
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Locals will mostly have short term employment opportunities during construction phase of the Project. However, people in limited numbers, from the neighbouring districts are likely to be engaged in the Project, especially in the highly skilled category of manpower.				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
	The impact magnitude will be positive as people from the locality will definitely be employed, especially during the construction phase of the Project.				

8.4.3 Labour Influx

8.4.3.1 Source of Impact

- During the construction phase and operation phase, it is estimated that the project will require approximately 700-800 unskilled labourers. As reported majority of them will be sourced from the local labour pool. Details regarding the exact number of local labourers to be hired have not been finalised at this stage. However, it is understood that the labour camp will be constructed in NP Kunta village, i.e. 1.5 km from the Project boundary,
- If migrant labour are hired, there is a high likelihood of regular interaction between the local community and migrant labourers. If not monitored; these interactions may create interpersonal and communal conflicts due to differences in cultures, beliefs, social practices, food habits etc. moreover, these interactions can also lead to spread of transferable diseases.
- Furthermore, the influx of labourers for short term will increase the demand for basic necessities and put burden on local resources including water, food, electricity etc. which may result in

additional pressure on scarce resources such as water for the local community. The use of migrant labours for construction also creates potential for use of bonded and forced labour.

8.4.3.2 Embedded/in-built control

As reported, the Project will hire maximum number of unskilled and semiskilled workers from the local neighbourhood.

8.4.3.3 Significance of Impact

The overall impact significance due to labour influx has been assessed as **Moderate.**

8.4.3.4 Mitigation Measures

The following mitigation measures are suggested to reduce the impact due to labour influx:

To the extent possible, locate the labour camp(s) within the project footprint area identified;

- Adequately monitor the contractor's compliance to the applicable rules and regulations;
- Development of the labour camp in keeping with the IFC Worker's Accommodation Guideline;
- Provide adequate sanitation and waste management facilities including, such as safe drinking water, proper waste collection and disposal system, etc.;
- Undertake health awareness among the local community,
- Provide the local community an understanding of the project activities and the possible health and safety risks associated with the same as part of the engagement process;
- Implement on-site vector control measures;
- Access to the local community to the grievance redress mechanism for the project;
- Implement ARPPL's policy of non-discrimination and prevent unequal distribution of project benefit.

8.4.3.5 Residual Impact Significance

The significance of residual impacts has been reduced to **minor** taking into account the recommended mitigation measures.

Table 8.18: Labour Influx and Labour Welfare

Impact	Labour Influx and Labour Welfare				
Impact Nature	Negative		Positive		Neutral
Impact Type	Direct		Indirect		Induced
Impact Duration	Temporary	Short-term		Long-term	Permanent
Impact Extent	Local		Regional		International
Impact Scale	Limited to Study area and vicinity				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource/ Receptor Sensitivity	Low		Medium		High
Impact Significance	Negligible	Minor		Moderate	Major
	Significance of impact is considered Minor				

8.4.4 Community Health and Safety

8.4.4.1 Source of Impact

- The receptors for impacts on community health and safety include project site workers, settlements in the close proximity of the project site (within 1km and along the access road and transmission line (within 100 m from the centreline), which will be exposed to health impacts from the project activities.
- The construction phase activities such as installation of solar PV panels, construction of transmission lines and substations and movement of material and personnel may result in impacts on the health and safety of the community.
- Construction activities will involve the use of heavy machinery and live transmission power lines. Furthermore, the movement of material and personnel via the access roads may result in damage to human life or livestock due to accidents. The major community health and safety risks include structural failure of project infrastructure, life and fire safety, public accessibility and management of emergency situations. As per IFC EHS guidelines, the occupational and community health and safety hazards during the construction, operation, and decommissioning of solar power projects are generally similar to those of most large infrastructure projects.

8.4.4.2 Embedded/In-built Controls

Ayana has the Transportation and Traffic Management Plan in place for the Project.

The key objectives of the TMP are:

- Efficient utilization of the existing roadways;
- Minimise traffic congestion and consequent delays;
- Ensure safety of employees, contractors, local users including general public;
- Ensure timely completion of the proposed construction/widening of access roads; and
- Minimise disturbance to the social environment.
- The plan encompasses the addresses of community safety related impacts that may arise from the increased vehicular traffic due to movement of equipment/machineries and vehicles along the site access and approach roads particularly during construction phase.
- This plan shall be implemented by AASPL all contractors and sub- contractors or any other third parties associated with the construction phase of the project will be made to be adhered to. As the construction phase progresses, the plan shall be reviewed by AASPL and modified if necessary.

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 (if required) near sensitive locations viz. school and 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.

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.

8.4.4.3 Significance of Impact

The impact to community health and safety during the construction phase is evaluated to be of **minor to moderate significance**.

8.4.4.4 Additional Mitigation measures

The following risk mitigation measures are suggested to minimize the risks/ hazards of construction activities onsite;

- Developing an onsite ESMS and EHS Policy by the developer;
- Ensuring that the sub-contractor agreements that the developer enters into require all contractors to possess an EHS plan with provisions for monitoring of the EHS performance of contractors and their workers; and
- As part of the stakeholder engagement and information disclosure process, providing an understanding to the community concerning the activities proposed to be undertaken and the precautions being adopted for safety.

8.4.4.5 Residual Impact Significance

After the implementation of the above mitigation measures, the residual impact significance is anticipated to remain negligible to minor.

Table 8.19: Impact on community health and safety

Impact	Community Health and Safety				
Impact Nature	Negative	Positive	Neutral		
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Project area and vicinity				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource Sensitivity	Low	Medium	High		
Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **Minor to Moderate**				
Residual Impact Magnitude	Positive	Negligible	Small	Medium	Major

Residual Impact Significance	Negligible	Minor	Moderate	Major
	Significance of impact is considered **Negligible to Minor**			

8.5 Key Environmental impacts – Operation phase

8.5.1 Impact on Soil Environment

8.5.1.1 Soil Compaction and Erosion

In the operation phase, soil compaction and erosion may occur due to vehicle movement, which only happens during the occasional maintenance activities. Soil compaction for the operation phase has therefore, been considered to be infrequent and **low**.

Since the chances of soil compaction and erosion during the O&M phase are less, the impact magnitude is assessed to be **small**.

Embedded/in-built control

Vehicles will utilise the existing access road to undertake maintenance activities at the solar plant.

Significance of Impact

The overall impact significance on soil erosion and compaction has been assessed as **negligible**.

Additional Mitigation Measures

No further mitigation measures are suggested as embedded/in-built control will be sufficient to reduce the impact on soil environment.

Residual Impact Significance

The significance of residual impacts has been reduced to **negligible** taking into account the recommended mitigation measures.

Table 8.20: Impacts due to Soil Erosion and Compaction (Operation Phase)

Impact	Soil Erosion and Compaction (Operations)				
Impact Nature	Negative	Positive	Neutral		
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Limited to Project areas				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource/ Receptor Sensitivity	Low	Medium	High		
Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **Negligible.**				

8.5.1.2 Waste Generation and Soil Contamination

During operation phase, the waste generated from project includes domestic solid waste at SCADA building and substation and hazardous waste like waste oil and lubricants and oil containing jutes and rags will be generated during maintenance activities. The quantity of hazardous waste generated will

be much lesser quantity than during the construction phase. Therefore, receptor sensitivity has been assessed as **low.**

The quantity of municipal and hazardous waste generated will be much lesser in quantity in operation phase than during the construction phase. Thus, the Impact magnitude has been assessed to **small.**

Embedded/in-built control

The waste generated will be disposed of through approved vendors in accordance with Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016. The hazardous wastes will be stored onsite at separate designated covered area provided with impervious flooring and sent for disposal through an authorised vendor. During operation phase, the quantity of municipal waste and hazardous waste generated is less and probability of the hazardous waste generation is only during plant maintenance and therefore occasional. The waste generated would be routed through proper collection and containment.

Significance of Impact

The overall impact significance on land due to waste disposal during O&M phase has been assessed as negligible to **minor.**

Additional Mitigation Measures

- Municipal domestic waste generated at site to be segregated onsite;
- Ensure hazardous waste containers are properly labelled and stored onsite provided with impervious surface, shed and secondary containment system;
- Ensure routinely disposal of hazardous waste through approved vendors and records are properly documented;
- Disposal of hazardous wastes shall be done through authorised vendor; and
- Use of spill control kits to contain and clean small spills and leaks during O&M activities.

Residual Impact Significance

The significance of residual impacts will be **negligible** post implementation of recommended mitigation measures.

Table 8.21: Impacts due to waste generation and soil contamination (Operation Phase)

Impact	Waste Generation and Soil Contamination (Operations)				
Impact Nature	Negative	Positive	Neutral		
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Limited to Project areas				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource/ Receptor Sensitivity	Low	Medium	High		
Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **Negligible to Minor.**				
Residual Impact Significance	Positive	Negligible	Small	Medium	Large
	Negligible	Minor	Moderate	Major	

8.5.2 Impact on Water Environment

Water requirement during O&M phase is primarily for module cleaning. As mentioned earlier in this report, it is estimated approximately 1.5 litre water per module will be utilised and 18 cycles per year for 11,20,000 modules will be undertaken. Therefore, 30,240 KL water will be required annually for module cleaning. For domestic purpose, approximately 1500 litre per day and 548 KL per year will be required (Refer **Section 2.4.2**).

Reportedly, APSPCL has provisioned for a reservoir extending in 25 acres of land within Ultra Mega Solar Park for storage of water for requirement during operation phase of PV plants. An Implementation and Support Agreement (ISA) has been signed between APSPCL and Ayana Ananthapuramu solar Private Limited. According to the ISA, APSPCL will arrange and provide the necessary water supply for operation and maintenance of solar power plant from date of commissioning. APSPCL has proposed to supply 16 KL/MW/Month so as to complete one cycle every fortnight, however supply of water is not restricted. Veligallu reservoir, which shares boundary with Ananthapuramu solar power park, is considered to one of the sources of water for the project.

APSPCL has connected natural drains and man-made canal with its reservoir to collect rain water. The APSPCL reservoir is also connected with Veligallu reservoir. As APSPCL is responsible for supplying water to other solar power project developers as well which may put stress on water resources, therefore, the receptor sensitivity and impact magnitude is assessed to be **medium.**

8.5.2.1 Embedded/in-built control

- Maintain logbook for water consumption;
- Prepare and implement water conservation scheme e.g., rainwater harvesting at the project site

8.5.2.2 Significance of Impact

The overall significance of impacts is assessed to be **moderate.**

8.5.2.3 Additional Mitigation Measures

- Optimising water usage in the SCADA building by application of water conservation measures such as sensor based taps, low flush urinals etc.;
- Workers and staffs deputed onsite to be sensitised about water conservation and encouraged for optimal use of water;
- Regular inspection for identification of water leakages and preventing wastage of water from water supply tankers.
- Recycling/reusing to the extent possible.
- Options for dry and semi dry module cleaning techniques should be explored and studies for implementation of the same at site should be considered to reduce overall water demand for the project during operation phase.

8.5.2.4 Residual Impact Significance

The residual impact significance is envisaged to be **minor to moderate** upon application of embedded controls and additional mitigation measures.

Table 8.22: Impact on Water Environment (Operation Phase)

Impact	Impact on water environment operation phase		
Impact Nature	Negative	Positive	Neutral

Impact Type	Direct		Indirect		Induced
Impact Duration	Temporary	Short-term		Long-term	Permanent
Impact Extent	Local		Regional		International
Impact Scale	Limited to project area				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource/Receptor Sensitivity	Low		Medium		High
Impact Significance	Negligible	Minor		Moderate	Major
	Significance of impact is considered **Moderate**				
Residual Impact Magnitude	Positive	Negligible	Small	Medium	Major
	Negligible	Minor		Moderate	Major
	Significance of impact is considered **Minor to Moderate**				

8.5.3 Impact on Noise and Air Quality

During operation phase, noise and air emission from operation of the solar plant will be limited to the use of DG sets. Reportedly, the DG sets will be used occasionally during O&M phase for power back, hence the receptor sensitivity is assessed to be **low** and impact magnitude is assessed to be **small** for air and noise emissions during operation phase.

8.5.3.1 Embedded/in built controls

- Diesel generator use will be restricted to emergencies and power back-up only to minimize air emissions; and
- DG sets will be equipped with acoustic enclosure to minimise noise emission.

8.5.3.2 Significance of Impact

The impact significance for air quality and noise quality in the operation phase is assessed as **negligible.**

8.5.3.3 Additional Mitigation Measures

No further mitigation measures are suggested as embedded/in-built control will be sufficient to reduce the impact on air and noise quality.

8.5.3.4 Residual Impact Significance

The residual impact significance will be **negligible** after implementing above mentioned embedded controls.

Table 8.23: Change in Noise and Air Quality

Impact	Change in Noise and Air Quality				
Impact Nature	Negative		Positive		Neutral
Impact Type	Direct		Indirect		Induced
Impact Duration	Temporary	Short-term		Long-term	Permanent
Impact Extent	Local		Regional		International
Impact Scale	Limited to project site				
Impact Magnitude	Positive	Negligible	Small	Medium	Large

Resource/ Receptor Sensitivity	Low	Medium	High		
Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **Negligible**				
Residual Impact Magnitude	Positive	Negligible	Small	Medium	Large
Residual Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **Negligible.**				

8.6 Key Ecological Impact- Operation Phase

8.6.1 Collision and Electrical hazards from Transmission Infrastructure

Transmission lines and poles can potentially constitute an electrocution and collision hazard to birds. Some birds also utilize the transmission towers for nesting.

8.6.1.1 Embedded/ in-built Control

There are no embedded controls to prevent birds from roosting/nesting on transmission poles and colliding with transmission wires.

8.6.1.2 Significance of Impacts

Transmission line from the Pooling Substation to the Grid Substation is passing through corridor scrublands, so risk of mature tree cutting is almost nil. Furthermore baseline has already established that the study area only provides habitat for only Least Concerned Species. So the impact magnitude on habitat, based on "Habitat-Impact Assessment Criteria" is considered to be **"Minor".**

Faunal species found in the study area included Least Concern as per the IUCN Red List and Schedule II, III, IV and V species as per the Wildlife Protection Act, 1972 of India (Refer **Appendix G**). So based on "Species-Impact Assessment Criteria" the impact magnitude on species was also found to be **"Minor".**

8.6.1.3 Additional Mitigation Measures

Since the installation and operation transmission line is under the scope of APSPCL, therefore implementation of mitigation measures does not fall under the scope of ARPPL.

8.6.1.4 Residual Impact Significance

After implementation of mitigation measures, the significance of residual impacts will be **Minor**. We retain this significance, as while the mitigation measures are likely to reduce mortality, we do not expect complete cessation of mortality.

Table 8.24 Impact significance of electrical hazards on avifaunal species

Impact	Electrocution hazards			
Impact Nature	Negative	Positive	Neutral	
Impact Type	Direct	Indirect	Induced	
Impact Duration	Temporary	Short-term	Long-term	Permanent
Impact Extent	Local	Regional	International	
Impact Scale	Limited to electrical components of the solar farm.			
Frequency	Operation phase			

Likelihood	Likely				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource Sensitivity (Species)	Low		Medium	High	
Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is **Minor** for species.				
Residual Impact Magnitude	Positive	Negligible	Small	Medium	Large
Residual Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **Minor.**				

8.7 Key Social Impacts – Operations Phase

8.7.1 Impact on Economy and Employment

8.7.1.1 Impacts

As explained in **section 4.3.3.3** the extent of agricultural activity due to diminished water availability in the study area is not suitable to meet requirements of the people who are solely dependent upon it.

During the operation phase, the employment will be restricted to the requirement of few security personnel and few housekeeping staff at site office. As the impacts from the Project on local economy and employment is positive, the following measures should be put in place to ensure that the local community receives maximum benefit from the presence of the project.

- Sourcing local labour wherever possible should be made obligatory for the sub-contractors and in all major procurement activities. The Project proponent should establish a mechanism to audit subcontractors and suppliers with respect to compliance of utilizing local labour and resources;
- Information on local employment should be communicated to the gram panchayat (GP) and information on availability of employment opportunities should be displayed at GP office premises (preferably in the local language) in consultation with the Sarpanch;
- The Grievance Redress Mechanism of the project shall be made available to these groups, including contractual workforce engaged during operation phase in order to provide a platform to share any concerns or grievances. During the operations phase, the requirement for unskilled and semi-skilled labour is expected to drastically reduce. The locally procured services will include maintenance work, of the facility, 24 hour security, bush and undergrowth cleaning and housekeeping activities etc.

8.7.1.2 Significance of Impact

The overall impact significance of the impact on economy and employment during the operations phase is assessed as **positive.**

8.7.1.3 Additional Mitigation Measures

While, the significance of the impact on economy and employment opportunities during the operations phase is understood to be positive, the following measures should be put in place to ensure that the local community receives maximum benefit from the presence of the project:

- Preference should be provided to local labour or suppliers to pass on maximum economic benefit locally;

- Preference should be provided to the vulnerable population/ in the Study Area;

8.7.1.4 Residual Impact Significance

The significance of the residual impacts will remain **positive**

Table 8.25 Impact on Economy and Employment

Impact	Impact on local employment opportunities during operations phase				
Impact Nature	Negative		Positive		Neutral
Impact Type	Direct		Indirect		Induced
Impact Duration	Temporary	Short-term		Long-term	Permanent
Impact Extent	Local		Regional		International
Impact Scale	Local population in the Study Area. The impact may also be experienced at the regional level.				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
	Significance of impact is considered positive				

8.8 Key environmental impacts – Decommissioning Phase

8.8.1 Impact on Soil Environment

The decommissioning activities will cause following impacts on soil:

- Soil compaction due to the increased vehicular and workforce movement, dismantling and storage of plant components on the adjacent land, removal of internal electric lines/ poles etc.
- Waste will be generated in form of dismantled plant components and demolition debris from plant foundations, storage yard and substation complex. Electric components such as transformers, insulators, wires will be generated. The waste will be mainly of inert nature;

The possibility of soil contamination during decommissioning phase is very less though may occur due to leakage from machinery and transportation vehicles and during collection of remaining oil/ lubricants in the plant.

Receptor sensitivity, based upon the context presented above, is assessed to be **medium.**

Removal of grounded structures and demolition of during decommissioning phase may affect the top layers of the soil and loss of top soil quality but the effects can be reversed over time. Also, as the plant is spread over 1274 acres, number of labours required during the decommissioning phase is assumed to be significant However, decommissioning phase is anticipated to last for a short period of time Thus, the Impact magnitude has been assessed to be **small**

8.8.1.1 Embedded/ in-built control

- The decommissioning of the solar plant will be carried out in a planned manner.
- During decommissioning phase, the quantity of waste generated will be high. The waste will be routed through proper collection, storage and disposal. The waste will be evaluated for its recycling/ reuse/ scrap value and disposed accordingly.

8.8.1.2 Significance of Impact

The overall impact significance is assessed to be **minor**.

8.8.1.3 Additional Mitigation Measures

Following mitigation measures are proposed to reduce the impacts of solar plant decommissioning activities on soil environment:

- The vehicular movement during decommissioning activities should be restricted to the designated route path;
- The demolition/ dismantling waste should not be left over in the project area and to be collected and stored at designated area only for further segregation and disposal.

8.8.1.4 Residual Impact Significance

The significance of impacts due to waste generation and soil contamination after implementation of mitigation measures will be **negligible to minor.**

Table 8.26: Impact on Soil Environment (Decommissioning Phase)

Impact	Impact on soil environment during decommissioning phase				
Impact Nature	Negative	Positive	Neutral		
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Limited to project area				
Frequency	Occasionally				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource/Receptor Sensitivity	Low	Medium	High		
Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **Minor.**				
Residual Impact Magnitude	Positive	Negligible	Small	Medium	Major
	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **Negligible to Minor.**				

8.8.2 Impact on Water Environment

Water during the decommissioning phase will be consumed by labourers for drinking and domestic purposes. The source of water is not known at this stage. However, since Ayana has plans to install borewells at site, it is anticipated that groundwater may be abstracted for meeting the water requirement. According to CGWB study for Anantapur district, NP Kunta Mandal where the project site falls is categorised as “semi critical” in terms of ground water development.

Also, there is a potential for contamination of groundwater and surface water resources resulting from improper management of sewage and accidental spills/leaks at the storage areas. Therefore, the receptor sensitivity is assessed to be **medium.**

8.8.2.1 Embedded/in-built control

- The provisions of septic tank and soak pits will be provided onsite for treatment and disposal of sewage, thereby minimizing the impacts of wastewater discharge. Planning of toilets, soak pits and septic tanks, waste collection areas should be away from natural drainage channels;
- Use of licensed contractors for management and disposal of waste and sludge;
- Spill/ leakage clearance plan to be adopted for immediate cleaning of spills and leakages;

- Permission from Rural Development Department, Government of Andhra Pradesh, to be obtained if groundwater is abstracted.

8.8.2.2 Significance of Impact

The overall impact significance is assessed to be **moderate.**

8.8.2.3 Additional Mitigation Measures

- Ensure proper cover and stacking of loose construction material to prevent surface runoff and contamination of receiving water body;
- Labourers will be given training towards proactive use of designated areas/bins for waste disposal and encouraged for use of toilets. Open defecation and random disposal of sewage shall be strictly restricted;
- Construction labour deputed onsite to be sensitised about water conservation and encouraged for optimal use of water;
- Regular inspection for identification of water leakages and preventing wastage of water from water supply tankers.
- Recycling/reusing to the extent possible.

8.8.2.4 Residual Impact Significance

The residual impact significance is envisaged to be **minor** upon application of embedded controls and additional mitigation measures.

Table 8.27: Impact on Water Environment during Decommissioning Phase

Impact	Impact on water environment during decommissioning phase				
Impact Nature	Negative	Positive	Neutral		
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Limited to project area				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource/Receptor Sensitivity	Low	Medium	High		
Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **moderate**				
Residual Impact Magnitude	Positive	Negligible	Small	Medium	Major
	Negligible	Minor	Moderate	Major	
	Residual Impact is considered to be **minor**				

8.8.3 Impact on Air Quality

Air quality will largely get impacted from the following sources during the decommissioning phase:

- Fugitive dust emissions from site clearing, excavation work, cutting and levelling work at site and access/ internal roads, stacking of soils, handling of construction material, transportation of material, emission due to movement of vehicles and heavy construction machinery etc.;
- Vehicular emissions due to traffic movement on site and on access roads;

- Particulate emissions from operation of batching plant;
- Exhaust emissions from construction machineries, other heavy equipment like bull dozers, excavators, and compactors;
- Emissions from emergency power diesel generator used during decommissioning activity.

Based on the above, the receptor sensitivity is assessed to be **medium.**

The biggest source of emissions in the decommissioning phase is the fugitive dust emissions from demolition activities. The demolition activities are likely to occur for a very small period of time and therefore the impact magnitude has been assessed as **small.**

8.8.3.1 Embedded/in-built control

- Emissions from the emergency DG set and other stationary machines will be controlled by ensuring that the engines are always properly tuned and maintained.
- Minimize stockpiling by coordinating excavations, spreading, re-grading and compaction activities;
- Speed of vehicles on site will be limited to 10-15 km/hr which will help in minimizing fugitive dust emissions due to vehicular movement; and
- Idling of vehicles and equipment will be prevented.

8.8.3.2 Significance of Impact

The impact significance for air quality in the decommissioning phase is assessed as **minor.**

8.8.3.3 Additional Mitigation Measures

- Burning of any waste material shall be prevented;
- Labourers shall be provided with gas connection to prevent burning of fuel wood for cooking purposes;
- Work shall be ceased or phased down if excess fugitive dust is observed. Source of dust shall be investigated and proper suppression measures ensured;
- Proper maintenance of engines and use of vehicles with Pollution under Control (PUC) Certificate shall be ensured.

8.8.3.4 Residual Impact Significance

The significance of residual impact will be **negligible to minor** after implementing mitigation measures because of the fugitive dust emissions anticipated during demolition activities.

Table 8.28: Impact on Air Quality during Decommissioning Phase

Impact	Ambient Air quality – Decommissioning Phase				
Impact Nature	Negative		Positive		Neutral
Impact Type	Direct		Indirect		Induced
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local		Regional		International
Impact Scale	Project area and vicinity				
Frequency	Regular during decommissioning				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource Sensitivity	Low		Medium		High

Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **minor.**				
Residual Impact Magnitude	Positive	Negligible	Small	Medium	Major
Residual Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **negligible.**				

8.8.4 Impact on Ambient Noise

During decommissioning phase of the project, noise will generate from movement of vehicles carrying dismantled structure and equipment. The receptor sensitivity is assessed to be **low to medium.**

Impact magnitude is considered to be **small** considering the decommissioning period to last for small duration.

8.8.4.1 Embedded/in-built control

Normal working hours of the contractor to be defined (preferable 8 am to 6pm). If work needs to be undertaken outside these hours, it should be limited to activities which do not generate noise.

8.8.4.2 Significance of Impact

The overall impact significance is envisaged to be **negligible to minor**

8.8.4.3 Additional Mitigation Measures

- Only well-maintained equipment should be operated on-site;
- If it is noticed that any particular equipment is generating too much noise then lubricating moving parts, tightening loose parts and replacing worn out components should be carried out to bring down the noise and placing such machinery far away from the households as possible;
- Machinery and equipment that may be in intermittent use should be shut down or throttled down during non-work periods; and
- Minimal use of vehicle horns and heavy engine breaking in the area needs to be encouraged.

8.8.4.4 Residual Impact Significance

Significance of residual impact is assessed to be **negligible** upon incorporation of the above mentioned mitigation measures.

Table 8.29: Impact on Ambient noise levels during Decommissioning Phase

Impact	Ambient Noise Levels –Decommissioning Phase				
Impact Nature	Negative		Positive		Neutral
Impact Type	Direct		Indirect		Induced
Impact Duration	Temporary	Short-term	Long-term	Temporary	
Impact Extent	Local		Regional		International
Impact Scale	Project area and vicinity				
Frequency	Regular during decommissioning				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource Sensitivity	Low		Medium		High
Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered to be **negligible to minor**.				

Residual Impact Magnitude	Positive	Negligible	Small	Medium	Major
Residual Impact Significance	Negligible	Minor		Moderate	Major
	Significance of impact is considered **negligible.**				

8.8.5 Impact from solid waste generation and decommissioning requirements

If the facility is to be decommissioned and the solar array is to be removed at the end agreement, the impacts will be similar to the construction phase, but in reverse sequence. All decommissioning of electrical devices, equipment, and wiring/cabling will be conducted in accordance with local, municipal, provincial and federal standards and guidelines. Any electrical decommissioning will include obtaining the required permits and following procedures before de-energizing, isolating, and disconnecting electrical devices, equipment and wiring/cabling. The procedures will include the following:

- Equipment will include, at a minimum: The use of cranes to remove the panels, racking, inverters and transformers and the use of trucks for the removal of panels, racking, inverters and transformers.
- In the case of the project, driveways and culverts (if installed) will be removed unless Solar park makes arrangements with requests the same to be in place. Driveway bedding material will be removed and replaced with clean sub- and top-soil for reuse by the landowner
- Decommissioning of on-site electrical lines and foundations.
- During decommissioning, mitigation measures similar to those used for a construction site (e.g., sediment and erosion controls) will be implemented and maintained by the Contractor and inspected by the Contractor's Environmental Site Inspector. The Contractor will be responsible for preparing and submitting environmental monitoring reports to AIIB to ensure conformance with applicable regulatory requirements.

8.8.5.1 Mitigation Measures and decommission plan

Dismantling PV modules, Racks and supports

- All modules will be disconnected, removed from the racks, packaged and transported to a designated location for resale, recycling or disposal. If the modules are not to be reused in a different location, the glass and silicon will be reclaimed and the aluminum frames will be recycled. Any disposal or recycling will be done in accordance with local by-laws and requirements. The connecting underground cables and the junction boxes will be de-energized, disconnected and removed.
- The steel lattice racks supporting the modules will be unbolted and disassembled using standard hand tools, possibly assisted by a small portable crane. The vertical steel posts supporting the racks and all steel support posts (driven or screwed) will be completely removed by mechanical equipment and transported off-site for salvage (driven piles) or reuse (screw piles).
- Any demolition debris that is not salvageable will be transported by truck to an approved disposal area. Other salvageable equipment and/or material will be removed from the site for resale, scrap value or disposal depending on market conditions.

Dismantling Electrical Equipment, Buildings and Foundations

All decommissioning of electrical devices, equipment, and wiring/cabling will be in accordance with local, municipal, provincial and federal agency standards and guidelines. Any electrical decommissioning will include obtaining the required permits, and following before de-energizing, isolating, and disconnecting electrical devices, equipment and wiring/cabling.

Decommissioning will require dismantling and removal of the electrical equipment, including inverters, transformers, underground cables and overhead lines, the prefabricated inverter enclosures and substation electrical building. The equipment will be disconnected and transported off-site by truck. Any foundations on the land may be left in place at the request of the property owner. The larger slab-on-grade concrete foundations and support pads may be broken up by mechanical equipment (backhoe-hydraulic hammer/shovel, jackhammer), loaded onto dump trucks and removed from the site, at the request of the property owners; and smaller pre-cast concrete support pads may be removed intact by cranes and loaded onto trucks for reuse or be broken up and hauled away by dump trucks.

Prior to removal of the transformers, the oil will be pumped into a disposal container and sealed to prevent any spill during storage and/or transportation. Equipment and material may be salvaged for resale or scrap value depending on the market conditions.

Dismantling Roads, Parking Area and Substation Yard

The access roads, the parking area and fenced yards will be removed to allow for the restoration of these areas. Granular may be removed, and dump trucks used to haul the aggregate to a recycling facility or approved disposal facility. The underlying subsoil, if exhibiting significant compaction (more likely for the site entrance road than the interior access roads) will then be disked using a tractor and disk attachment to restore the soil structure and aerate the soil. Clean topsoil would be replaced over this area, from where it may have been temporarily stored elsewhere on-site by dump truck, to match the surrounding grade. Depending upon the time of year and the planned use of the land, the area will be returned to its pre-construction condition.

8.9 Key Social Impacts – Decommissioning Phase

8.9.1 Impact on Economy and Employment

8.9.1.1 Impacts

The major social impacts associated with the decommissioning phase are linked to the loss of jobs and associated income. This has implications for the households who are directly affected, including their families. However, the impacts are likely to be limited due to relatively small number of permanent employees (mainly security guards) who will be affected.

8.9.1.2 Significance of Impact

The overall impact significance is envisaged to be **Minor.**

8.9.1.3 Additional Mitigation Measures

The decommissioning phase will require removal of machinery, workers and other temporary structures. The mitigation measures for decommissioning shall include the following:

- ARPPL should ensure proper communication in terms of decommissioning timelines, and shall evaluate options of internal transfer of employees to other projects before planning for closure, in order to minimize retrenchment linked job losses;
- The contractor shall inform the workers and local community about the duration of work, in advance, to clearly set out and manage expectations;
- Reduction of worker will be done phase wise and corresponding to completion of each activity.

8.9.1.4 Residual Impact Significance

Significance of residual impact is assessed to be **negligible** upon incorporation of the above mentioned mitigation measures.

Table 8.30 Impact on Economy and Employment

Impact	Impact on Economy and Employment				
Impact Nature	Negative		Positive		Neutral
Impact Type	Direct		Direct		Direct
Impact Duration	Temporary	Temporary	Temporary	Temporary	
Impact Extent	Local		Regional		International
Impact Scale	Project area and vicinity				
Frequency	Regular during decommissioning				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource Sensitivity	Low		Medium		High
Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered to be **minor**.				
Residual Impact Magnitude	Positive	Negligible	Small	Medium	Major
Residual Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **negligible.**				

8.10 Cumulative Impacts

As mentioned earlier, the project site falls under Ananthapuramu Ultra Mega Solar Park having a 1500 MW capacity. The solar park comprises of solar power developers such as Tata Power Solar (500 MW) and others may comprise of Soft Bank, Sprng Energy etc; however the same is yet to be finalized. This section assesses the cumulative impacts the solar park will have on the local soil, water, land, air and ambient noise environment.

8.10.1 Impact on Water Environment

As mentioned earlier in this report, water requirement during construction phase will be under the scope of EPC contractor. It is estimated that approximately 10 KL/month of water will be required by Ayana for construction work. The source of water for construction activities will be from tankers procured from nearby villages. It is reported that Ayana may install bore wells within its plant for emergency supply. Similarly, since there are other solar power projects present within the solar park and there will be upcoming solar projects in near future, water requirement during construction phase may include groundwater abstraction from nearby bore wells and surface water abstraction from veligallu reservoir located 330 m from the solar park towards east direction. Also, as per CGWB study for Anantapur district, NP Kunta Mandal where the project site falls is categorised as “semi critical” in terms of ground water development. However, the construction phase is anticipated to last for a short time span of approximately 6-8 months. Therefore, based on the above, the receptor sensitivity and impact magnitude is assessed to be **medium** during construction phase.

The project site falls under Ananthapuramu Ultra Mega Solar Park having a 1500 MW capacity. The solar park comprises of solar power developers such as Tata Power Solar (500 MW) and Softbank Power, Sprng Energy etc. however the same is yet to be finalized. Increased water use from all these developers is expected to raise demand for water use. For water related impacts, as APSPCL is responsible for supplying water to other solar power project developers as well which may put stress on water resources. However, this directly falls within the scope of APSPCL and not the project proponent. At present, the use of dry cleaning and semi dry cleaning mechanisms for module cleaning are not being considered. The impact significance cumulatively has been assessed as moderate. It must be noted that additional mitigation measures, which is directly under the purview of the project developer, such as optimizing water usage, sensitization of water use, regular inspection of water leaks, recycling/ reuse to the extent possible and opting for dry and semi dry module

cleansing mechanisms (to be considered based on feasibility) may reduce the overall impact directly arising from the project.

8.10.1.1 Significance of Impact

The overall impact significance during construction phase has been assessed to be **moderate.**

8.10.1.2 Mitigation Measures

It is recommended that the project follows the mitigation measures, as showcased in ***8.2.4.3***, to minimize the cumulative impacts on water environment.

Table 8.31: Cumulative Impact on Water Environment

Impact	Cumulative Impact on Water Environment				
Impact Nature	Negative	Positive	Neutral		
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Project area and vicinity				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource Sensitivity	Low	Medium	High		
Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered to be **Moderate**.				

8.10.2 Impact on Land Use

The total extent of land available to Ananthapurumu Ultra Solar Mega Park is 7181.01 acres. Since the land allotment for the solar power park is under the scope of APSPCL and solar developers have no role in identification of land for their respective solar projects, therefore cumulative impact on land use cannot be commented upon. However, the project is recommended to follow the mitigation measures as showcased in **section 8.2.1.3**to minimize the cumulative impact on land use.

8.10.3 Impact on Air Quality

Based on the primary environmental monitoring conducted at the project site, it is understood that the air quality parameters of the project area is within the CPCB permissible limits. Also, it is anticipated that the construction activities for all the upcoming projects will not take place at the same time. However, considering construction of two to three projects at the same time, air emission will be primarily due to site clearance and plying of vehicles. Therefore the receptor sensitivity is considered to be **medium**.

The construction activities are going to occur for a small period of time (~6- 8 months). Therefore, impact magnitude has been categorized as **small** as dust emissions will only occur only for a short period of time.

8.10.3.1 Significance of Impact

The overall impact significance for air quality has been assessed as **minor** as impacts arising during the construction phase will last for a short period of time and the ambient air quality will improve during the operation phase**.**

8.10.3.2 Mitigation Measures

It is recommended that the project follows the mitigation measures, as showcased in **section 8.2.5.3**, to minimize the cumulative impacts on air quality.

Table 8.32: Cumulative Impact on Air Quality

Impact	Cumulative Impact on Air Quality				
Impact Nature	Negative	Positive	Neutral		
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Project area and vicinity				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource Sensitivity	Low	Medium	High		
Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered to be **Minor**.				

8.10.4 Impact on Ambient Noise

The impacts arising due to high noise levels are confined to the construction and decommissioning phases. Noise levels during the O&M phase are negligible and may only arise during the maintenance phase of the solar plant.

It is anticipated that the construction activities for all the upcoming projects will not take place at the same time. However, considering construction of two to three projects at the same time, coupled with the fact that there are village located approximately 450 m from the solar park. The receptor sensitivity is assessed to be **medium.**

The impact magnitude is assessed to be **small** considering that the construction period, which will last for approximately only six to eight months whichmay lead to increased noise levels due to the following activities:

- Construction activities including site preparation, piling work, access road widening, construction of ancillary facilities;
- Transportation of construction materials, machinery and personnel;
- Operation of DG sets; and
- Demolition activities during decommissioning phase.

8.10.4.1 Significance of Impact

The overall impact significance for ambient noise has been assessed as **minor** as impacts arising during the construction phase will last for a short period of time and the ambient noise quality will improve during the operation phase**.**

8.10.4.2 Mitigation Measures

It is recommended that the project follows the mitigation measures, as showcased in **section 8.2.6.33**, to minimize the cumulative impacts on ambient noise.

Table 8.33: Cumulative Impact on Ambient Noise

Impact	Cumulative Impact on Ambient Noise Environment				
Impact Nature	Negative	Positive	Neutral		
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Project area and vicinity				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource Sensitivity	Low	Medium	High		
Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered to be **Minor**				

8.10.5 Impact on Soil Environment

Since the solar power projects require clearance of the limited vegetation in the area, the amount of soil being eroded can increase. Furthermore, waste generated and stored on site during a particular project's life cycle can lead to increased contamination of the soil if not maintained and managed properly, considering the number of projects that are operational or to be developed in the area.

Therefore, the resource sensitivity in the area is assessed to be **medium** taking into consideration 1500 MW capacity of the solar park with an extent of 7181.01 acres of land.

The impact magnitude is assessed **small** considering the movement of vehicles during construction and operation phase will be on existing roads however, storage of oil lubricants and wastes will be undertaken at each plant locations.

8.10.5.1 Significance of Impact

The overall impact significance for and soil compaction, erosion and soil contamination has been assessed as **minor**

8.10.5.2 Mitigation Measures

It is recommended that the project follows the additional mitigation measures, as showcased in **section 8.2.3.1** and **8.2.3.2**, to minimize the cumulative impacts on soil environment.

Table 8.34: Cumulative Impact on Soil Environment

Impact	Cumulative Impact on Soil Environment				
Impact Nature	Negative	Positive	Neutral		
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Project area and vicinity				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource Sensitivity	Low	Medium	High		
Impact Significance	Negligible	Minor	Moderate	Major	

	Significance of impact is considered **Minor**

8.10.6 Impact on Land Holding and Agriculture Land

8.10.6.1 Impacts

The project site falls under Ananthapuramu Ultra Mega Solar Park having a 1500 MW capacity. Approximately 7181 Acres of land is required for development of this 1500 MW ultra -solar power park. The solar park comprises of solar power developers such as Tata Power Solar (500 MW) and others may comprise of Soft Bank and Sprng Energy etc; however the same is yet to be finalized. Due to the above-mentioned reason, the land-use pattern of the area will change from agricultural to industrial area thereby bringing a change in the livelihood patterns in the area. In addition, due to increase in land requirement for the solar plants, the land market price is also envisaged to increase.

8.10.6.2 Significance of Impact

The impact magnitude is assessed to be **Positive**.

8.10.6.3 Significance of Impact

The overall impact significance for land holding has been assessed as **Positive**

Table 8.35 Cumulative Impact on Land Holding and Agriculture Land

Impact	Cumulative Impact on Land Holding and Agriculture Land			
Impact Nature	Negative	Positive	Neutral	
Impact Type	Direct	Indirect	Induced	
Impact Duration	Temporary	Short-term	Long-term	Permanent
Impact Extent	Local	Regional	International	
Impact Scale	Project area and vicinity			
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource Sensitivity	Low	Medium	High	
Impact Significance	Negligible	Minor	Moderate	Major
	Significance of impact is considered to be **Positive**.			

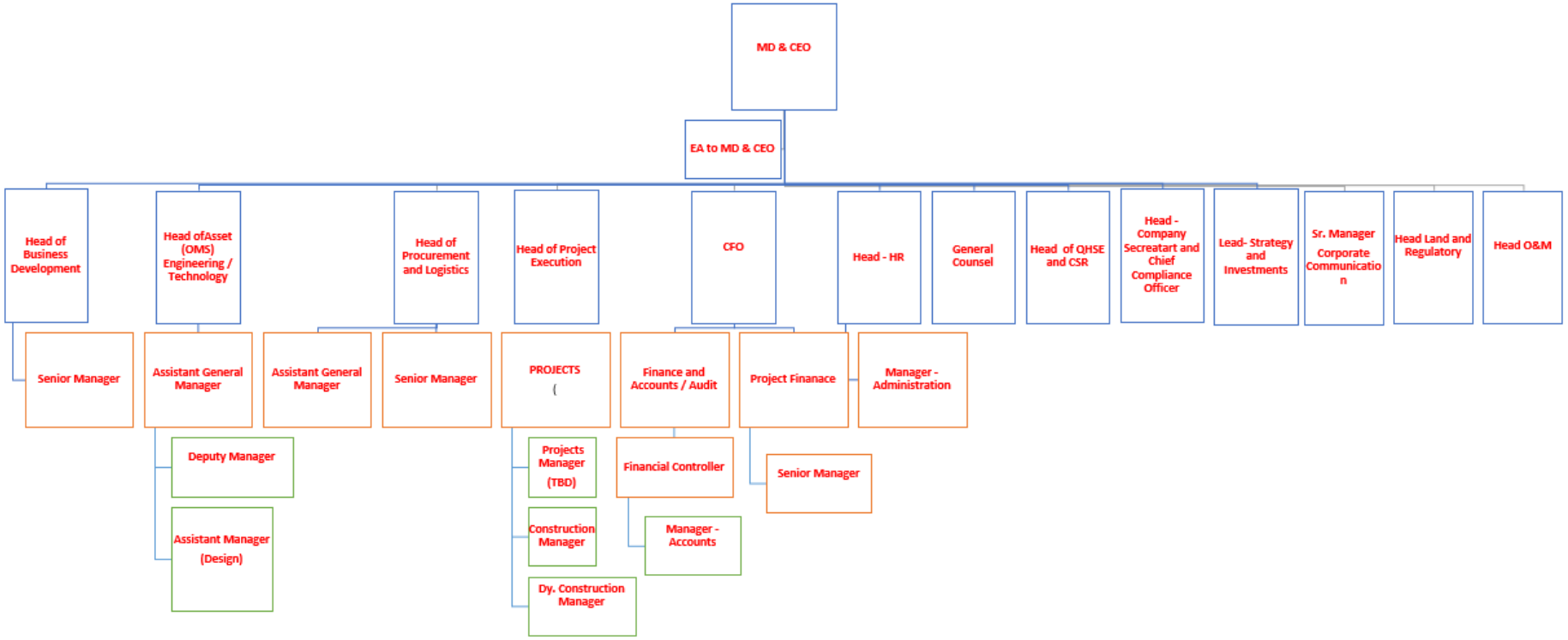
9. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

This section presents the Environmental and Social Management Plan (ESMP) for the Project. The purpose of this ESMP is to specify the standards and controls required to manage and monitor environmental and social impacts during construction and operation phase. To achieve this, the ESMP identifies potential adverse impacts from the planned activities and outlines mitigation measures required to reduce the likely negative effects on the physical, natural and social environment. This is in accordance to IFC Performance Standards 1 and AIIB standards which emphasizes the importance of managing social and environmental performance throughout the lifecycle of the Project.

9.1 Ayana's Organisational Structure

ARPPL is headed by the Managing Director (MD) and CEO, who is supported by Heads of various departments- Head -Finance and Account, Head - Business Development, Head-Engineering/ Technology, Head-Procurement, Head-Strategy and Investment, Head-Human Resources, Head-General Counsel, Head-QHSE and CSR, Head-Operation and Management, Head-Land, Head Regulatory (yet to be recruited). At present, there is only one resource (Head – QHSE-CDP) at the corporate office to manage the Quality, EHS and CSR functions. The organisation structure is presented in **Figure 9.1.**

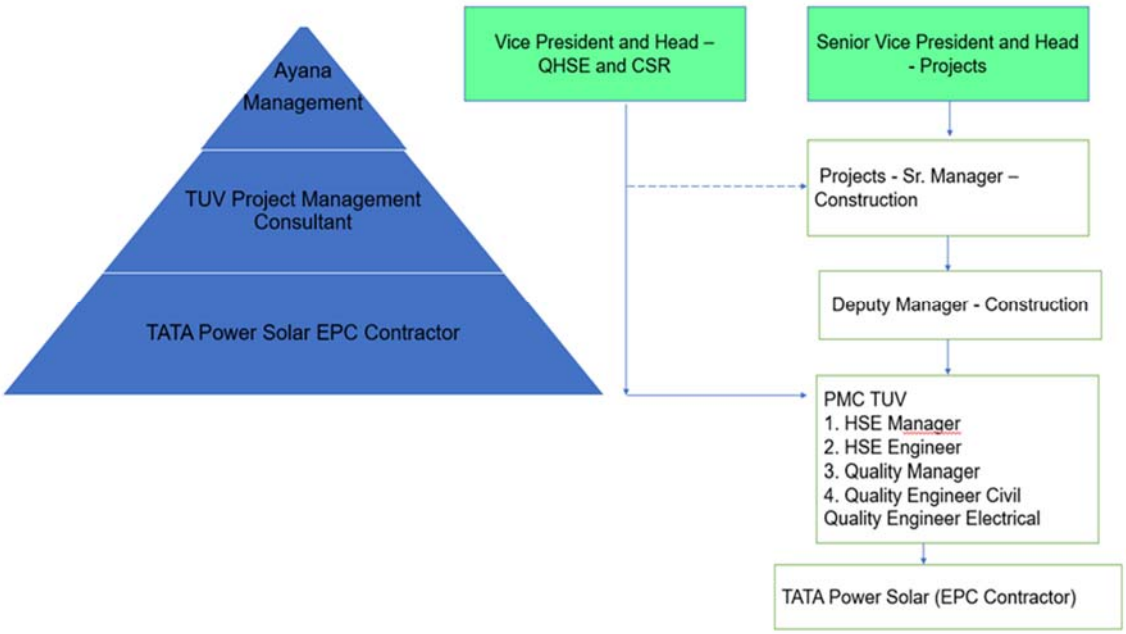
Figure 9.1: Corporate Organisation Chart of ARPPL



Source: ARPPL

At the Site level, as informed, during operation phase, ARPPL will depute a Site Manager/ Plant Head. Ayana's Plant Head will be responsible for managing the environment and social performance of the Site, in compliance with the Company's IMS system and the applicable legislation and shall also be responsible for reporting the EHS compliance status to the corporate office. The Plant head will be supported by the Site Incharge/ Safety Supervisor of the O&M Contractor. During construction phase, Ayana's Site Incharge will be supported by a Project Management Contractor Safety Supervisor, who will be responsible to oversee EPC's work progress and report the overall EHS status of the site during construction phase.

Figure 9.2: 250MW AASPL Project QHSE Organisation Structure



9.2 Roles and Responsibilities

An outline for responsibilities of the proposed EHS department is given below.

Environmental, Health and Safety Department (EHS Department)

Environment, Health and Safety department shall be responsible for monitoring the implementation of the various actions which are to be executed by the agencies specified in the ESMP.

In general, the EHS department shall perform the following activities:

- Preparation of required documents on environmental and social management;
- Ensuring availability of resources and appropriate institutional arrangements for implementation of ESMP;
- Implementation of the health and safety measures;
- Collection of the statistics of health of workers;
- Providing support during routine medical check-ups of workers;
- Awareness and implementing safety programmes;
- Providing job specific induction training;
- Compliance of regulatory requirements;

- Carrying out environmental audits;
- Identify unsafe acts and conditions and suggest remedies;
- Develop safety culture and comply with company's EHS policy and standard requirements;
- Encourage and enforce the use of PPE's;
- Educate all employees for the use of PPE's and safe practices;
- Direct, coordinate and orient the safety activities;
- Promulgate the spread of policy, objectives, rules and/or regulations;
- Perform a thorough investigation of all accidents and review the recommendations to avoid any repetition;
- Monitoring the progress of implementation of ESMP; and
- Reviewing and updating the ESMP as and when required for its effective implementation.

9.3 Inspection, Monitoring and Audit

Inspection and monitoring of the environmental impacts of the Project activities will increase the effectiveness of ESMP. Through the process of inspection and auditing, ARPPL will ensure that the conditions stipulated under various permits are followed. The inspections and audits will be done by EPC contractor (during construction phase), ARPPL's QHSE department and by external agencies/experts. The entire process of inspections and audits should be documented. The inspection and audit findings are to be implemented by the site in-charge.

9.3.1 Report and Documentation

ARPPL will develop and implement a programme of regular reporting through the stages of the project lifecycle. The personnel delegated EHS roles shall be required to fully comply with the monitoring programme in terms of timely submissions of reports as per acceptable level of detail. Reporting will be done in form of environmental check list, incident record register, training records, and environmental and social performance reports (weekly, monthly, quarterly, half yearly, yearly etc.). Additionally, AIIB SPS require submission of environmental and social monitoring report (refer ***Appendix K***) every six months. This shall be done as per templates shared by AIIB.

9.3.1.1 External Reporting and Communication

QHSE head is responsible for ensuring that communication with regulatory agencies and stakeholders are maintained as per the requirement. All complaints and enquiries are to be appropriately dealt with and records should be maintained in a Complaint/Enquiry Register by the delegated staff of EHS.

9.3.1.2 Internal Reporting and Communication

According to ARPPL's Integrated Management System and QHSE Manual, EHS personnel/ PMC supervisor at site will share inspection and audit findings with their suggested measures regularly to the Site In-Charge. Site In-Charge will further share the EHS findings to the QHSE department for their consideration. The EHS audit findings are also to be communicated within the staff working on the project. To maintain an open communication between the staff and management on HSE performance the followings are being used:

- Team Briefings,
- On-site work group meetings;

- Work Specific Instructions.

Monthly compliance reports will be shared by the contractors during construction and operation period. The compliance will be verified against applicable laws, IMS and other conditions as required by the contract.

9.3.2 Documentation

Documentation is an important step in the implementation of the ESMP, Ayana will establish a documentation and record keeping system in keeping with their IMS, to ensure recording and updating of documents as discussed in the ESMP. Responsibilities have to be assigned to relevant personnel for ensuring that the ESMP documentation system is maintained and that document control is ensured through access by and distribution to, identified personnel in form of the following:

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

9.3.3 ESMP Review and Amendments

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

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

9.4 Training Programme and Capacity Building

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

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

EHS head of EPC Contractor and Ayana will ensure that environmental health and safety induction training and job specific trainings are identified and given to the concerned personnel for construction activities and operation of the solar plant.

Also general environmental awareness will 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, compliance with the applicable regulations and standards, and achieving performance beyond compliance. The same level of awareness and commitment will be imparted to the contractors and sub-contractors prior to the commencement of the project.

9.5 Environmental and Social Management Plan

This section outlines the potential adverse impacts, mitigation measures, monitoring and management responsibilities during construction and operation phases of the Project.

The purpose of ESMP is to:

- Provide an institutional mechanism with well-defined roles and responsibilities for ensuring that measures identified in ESIA designated to mitigation potentially adverse impacts are implemented;
- List all suggested mitigation measures and control technologies, safeguards identified through the ESIA process;
- Provide Project monitoring program for effective implementation of the mitigation measures and ascertain efficacy of the environmental management and risk control systems in place; and
- Assist in ensuring compliance with all relevant legislations at local, state and national level for the Project.

As reported in the ESIA report prepared by OSL, Ayana and its contractor will have EHSS management plan in line with ISO 9001, ISO 14001 , ISO 45000 (OHSAS 18000) , IFC principle standards OSL recommends following guidelines to be covered under EHSS management plan. An effective Environment Health Safety and Social management system is a dynamic, continuous process initiated by management and involving communication between the client, its workers, and the local communities directly affected by the project (the affected communities). Ayana has shown it's commitment to implement an effective EHSS management plan 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.

Scope of work to be covered under EHSS Management plan are :-

- Construction plan
- Excavation
- Material Handling
- Manual handling.
- Batching Plant.
- Land Clearance and Land Leveling.
- Dust control.
- All SOPs in line with ISO 45000 / OHSAS, ISO 14001 and legal requirements.
- Transportation and Traffic Management Plan.
- Road Safety.
- Fire Prevention and Control.

- Labour and Working Condition (Provision of toilet, rest area, eating place, creche if applicable etc.)
- Security (Monitoring, Reporting, Use of Force)
- Medical checkup, Background verification (Photo Identity card).
- Workmen Camp.
- Payment of Wages.
- Electrical Safety (Work Permit and LOTO)
- Hot Work Permit.
- Waste management.
- Prohibition on use of Alcohol and Drugs.
- Prohibition on Smoking in undesignated area.
- Use of PPEs,
- SOP on use of motor bikes at site.
- Prohibition on Child and forced labour.
- Wild life management plan.
- Material Storage.
- SOP on Handling & Storage of Hazardous Waste Material
- Public Consultation and Information Disclosure Plan;
- Grievance Redress Mechanism;
- Pollution Prevention and abatement.
- Other relevant EHSS management plan.

Table 9.1: Environmental and social management and monitoring plan

S. No	Project Activity (ies)	Impacts/Issue	Applicable Project Phase	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines / Frequency of Monitoring	Responsibility for implementation of monitoring	Reporting Requirements	Estimated Cost/ Resources required
Land Use										
1.	■ Construction and strengthening of access road; ■ Installation of PV modules ■ Construction of Central Monitoring Station, Switching Yard; and ■ Establishment and operation of temporary structures such as temporary site office and store yard.	Permanent and temporary changes in land use	Construction	■ Construction activities should be restricted to designated area;	EPC Contractor	Site inspection	Monthly Monitoring	Site HSE Officer of EPC Contractor And PMC Safety officer at site	Report from HSE officer of EPC Contractor / PMC Safety officer to Site In-charge	-
2.				■ On completion of construction activities, land used for temporary facilities such as stockyard if any should be restored to the extent possible; and	EPC Contractor	Site inspection	Upon completion of task	Site HSE Officer of EPC Contractor and PMC Safety officer at site	Report from HSE officer of EPC Contractor / PMC Safety officer to Site In-charge	-
3.				■ The land use in and around permanent project facilities should not be disturbed	EPC Contractor	Site inspection	Monthly Monitoring	Site HSE Officer of EPC Contractor and PMC Safety officer at site	Report from HSE officer of EPC Contractor / PMC Safety officer to Site In-charge	-
4. Soil										
5.	■ Construction/ strengthening of access roads; ■ Vehicular movement; and ■ Piling and excavation work.	Soil compaction and soil erosion	Construction and Decommissioning	■ Site clearance, piling, excavation and access road construction will not be carried out during the monsoon season to minimize erosion and run-off.	EPC Contractor/O&M Team	Site inspection	Monthly Monitoring	Site HSE Officer of EPC Contractor and PMC Safety officer/ Site Manager of O&M team	Report from HSE officer of EPC Contractor and PMC safety officer/ O&M Contractor to Site In-charge	-
6.				■ Vehicles will utilize existing roads to access the site.	EPC Contractor/O&M Team	Site inspection	Monthly Monitoring	Site HSE Officer of EPC Contractor and PMC Safety officer/ Site In-Charge of O&M team	Report from HSE officer of EPC Contractor and PMC safety officer/ O&M Contractor to Site In-charge	-
7.	■ Storage and transport of construction materials; ■ Storage of oil and lubricants onsite; ■ Storage of hazardous waste onsite; ■ Storage of waste (MSW and construction/demolition) onsite from project site;	Soil Contamination	Construction, operation and decommissioning	■ EPC Contractor should ensure that no unauthorized dumping of used oil and other hazardous waste is undertaken at the site;	EPC Contractor/O&M Team	Site inspection	Monthly Monitoring	Site HSE Officer of EPC Contractor and PMC Safety officer/ Site Manager of O&M team	Report from HSE officer of EPC Contractor and PMC safety officer/ O&M Contractor to Site In-charge	HR Department of Ayana to include clauses in the EPC contract agreement Cost will be embedded within the cost of engagement of EPC contractor

S. No	Project Activity (ies)	Impacts/Issue	Applicable Project Phase	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines / Frequency of Monitoring	Responsibility for implementation of monitoring	Reporting Requirements	Estimated Cost/ Resources required
8.	and Sewage generated from the site office.			■ Designated areas should be provided for Solid Municipal Waste and daily collection and period disposal should be ensured;	EPC Contractor/O&M Team	Site inspection	Monthly Monitoring	Site HSE Officer of EPC Contractor and PMC Safety officer/ Site Manager of O&M team	Report from HSE officer of EPC Contractor and PMC safety officer/ O&M Contractor to Site In-charge	HR Department of Ayana to include clauses in the EPC contract agreement Cost will be embedded within the cost of engagement of EPC contractor
9.				■ Construction and Demolition Waste should be stored separately and be periodically collected by an authorized treatment and storage facility	EPC Contractor/O&M Team	Site inspection	Monthly Monitoring	Site HSE Officer of EPC Contractor and PMC Safety officer/ Site Manager of O&M team	Report from HSE officer of EPC Contractor and PMC safety officer/ O&M Contractor to Site In-charge	HR Department of Ayana to include clauses in the EPC contract agreement. Cost will be embedded within the cost of engagement of EPC contractor
10.				■ All waste should be stored in a shed that is protected from the elements (wind, rain, storms, etc.) and away from natural drainage channels	EPC Contractor/O&M Team	Site inspection	Monthly Monitoring	Site HSE Officer of EPC Contractor and PMC Safety officer/ Site Manager of O&M team	Report from HSE officer of EPC Contractor and PMC safety officer/ O&M Contractor to Site In-charge	HR Department of Ayana to include clauses in the EPC contract agreement. Cost will be embedded within the cost of engagement of EPC contractor
11.				■ A log book should be maintained for quantity and type of hazardous waste generated	EPC Contractor/O&M Team	Site inspection	Monthly Monitoring	Site HSE Officer of EPC Contractor and PMC Safety officer/ Site Manager of O&M team	Report from HSE officer of EPC Contractor and PMC safety officer/ O&M Contractor to Site In-charge	HR Department of Ayana to include clauses in the EPC contract agreement. Cost will be embedded within the cost of engagement of EPC contractor
12.				■ In case of accidental/unintended spillage, the contaminated soil should be immediately collected and stored as hazardous waste.	EPC Contractor/O&M Team	Site inspection	Monthly Monitoring	Site HSE Officer of EPC Contractor and PMC Safety officer/ Site Manager of O&M team	Report from HSE officer of EPC Contractor and PMC safety officer/ O&M	HR Department of Ayana to include clauses in the EPC contract agreement.

S. No	Project Activity (ies)	Impacts/Issue	Applicable Project Phase	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines / Frequency of Monitoring	Responsibility for implementation of monitoring	Reporting Requirements	Estimated Cost/ Resources required
									Contractor to Site In-charge	Cost will be embedded within the cost of engagement of EPC contractor
13. **Water Environment**										
14.	■ Water required for construction phase and operation phase	Depletion of water resource	Construction and Operation Phase	■ Authorised water tankers should be hired if water is abstracted from nearby reservoirs	EPC Contractor/O&M Team	Site inspection	Monthly Monitoring	Site HSE Officer of EPC Contractor and PMC Safety officer/ Site Manager of O&M team	Report from HSE officer of EPC Contractor and PMC safety officer/ O&M Contractor to Site In-charge	HR Department of Ayana to include clauses in the EPC contract agreement. Cost will be embedded within the cost of engagement of EPC contractor
15.				■ Obtain permission from Rural Development Department, Government of Andhra Pradesh if groundwater is planned to be abstracted	EPC Contractor/O&M Team	Site Inspection and permission from the relevant authority	Monthly Monitoring	Site HSE Officer of EPC Contractor and PMC Safety officer/ Site Manager of O&M team	Report from HSE officer of EPC Contractor and PMC safety officer/ O&M Contractor to Site In-charge	QHSE Head of Ayana to obtain permission
16.				■ Regularly monitor the ground water quality;	EPC Contractor/O&M Team	Site inspection	Monthly Monitoring	Site HSE Officer of EPC Contractor and PMC Safety officer/ Site Manager of O&M team	Report from HSE officer of EPC Contractor and PMC safety officer/ O&M Contractor to Site In-charge	HR Department of Ayana to include clauses in the EPC contract agreement. Cost will be embedded within the cost of engagement of EPC contractor
17.				■ Maintain logbook for water consumption;	EPC Contractor/O&M Team	Site inspection	Monthly Monitoring	Site HSE Officer of EPC Contractor and PMC Safety officer/ Site Manager of O&M team	Report from HSE officer of EPC Contractor and PMC safety officer/ O&M Contractor to Site In-charge	HR Department to include clauses in the EPC contract agreement. Cost will be embedded within the cost of engagement of EPC contractor
18.				■ Prepare and implement water conservation scheme e.g., rainwater harvesting at the project site	EPC Contractor/O&M Team	Site inspection	Monthly Monitoring	Site HSE Officer of EPC Contractor	Report from HSE officer of EPC Contractor and	HR Department of Ayana to include clauses in the

S. No	Project Activity (ies)	Impacts/Issue	Applicable Project Phase	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines / Frequency of Monitoring	Responsibility for implementation of monitoring	Reporting Requirements	Estimated Cost/ Resources required
								and PMC Safety officer/ Site Manager of O&M team	PMC safety officer/ O&M Contractor to Site In-charge	EPC contract agreement. Cost will be embedded within the cost of engagement of EPC contractor
19.			Operation Phase	■ Options for dry and semi dry module cleaning techniques should be explored and studies for implementation of the same at site should be considered to reduce overall water demand for the project during operation phase.	O&M Team	Site Inspection and review o water consumption details	Monthly Monitoring	Site Manager of O&M team	Report from Site Manager to QHSE department	Cost will depend on the type of technique and equipment planned to be implemented at site such as semi dry cleaning, manual dry cleaning or robotic dry cleaning.
Air Quality										
20.	■ Fugitive emissions from site clearing, excavation work, material handling etc.; ■ Fugitive emission from traffic movement; ■ Exhaust emission from operation of machineries like pile drivers, vehicles; ■ Point source emission from diesel generator.	Fugitive and point source emission	Construction, Operation, Decommissioning	■ Speed of vehicles on site should be limited to 10-15 km/hr;	EPC Contractor/O&M Team	Site inspection	Monthly Monitoring	Site HSE Officer of EPC Contractor and PMC Safety officer/ Site Manager of O&M team	Report from HSE officer of EPC Contractor and PMC safety officer/ O&M Contractor to Site In-charge	-
21.				■ Switch off machinery and equipment when not in use; and	EPC Contractor/O&M Team	Site inspection	Monthly Monitoring	Site HSE Officer of EPC Contractor and PMC Safety officer/ Site Manager of O&M team	Report from HSE officer of EPC Contractor and PMC safety officer/ O&M Contractor to Site In-charge	-
				■ Prevent idling of vehicles and equipment	EPC Contractor/O&M Team	Site inspection	Monthly Monitoring	Site HSE Officer of EPC Contractor and PMC Safety officer/ Site Manager of O&M team	Report from HSE officer of EPC Contractor and PMC safety officer/ O&M Contractor to Site In-charge	-
Ambient Noise										
22.	■ Construction and demolition activities;	Increase in noise level	Construction and Decommissioning	■ Only well-maintained equipment should be operated on-site;	EPC Contractor/O&M Team	Site inspection	Monthly Monitoring	Site HSE Officer of EPC Contractor	Report from HSE officer of EPC Contractor and	HR Department of Ayana to include clauses in the

S. No	Project Activity (ies)	Impacts/Issue	Applicable Project Phase	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines / Frequency of Monitoring	Responsibility for implementation of monitoring	Reporting Requirements	Estimated Cost/ Resources required
	■ Operation of DG sets; and ■ Vehicular movement							and PMC Safety officer/ Site Manager of O&M team	PMC safety officer/ O&M Contractor to Site In-charge	EPC contract agreement. Cost will be embedded within the cost of engagement of EPC contractor
23.				■ If it is noticed that any particular equipment is generating too much noise then lubricating moving parts, tightening loose parts and replacing worn out components should be carried out to bring down the noise and placing such machinery far away from the households as possible	EPC Contractor/O&M Team	Site inspection	Monthly Monitoring	Site HSE Officer of EPC Contractor and PMC Safety officer/ Site Manager of O&M team	Report from HSE officer of EPC Contractor and PMC safety officer/ O&M Contractor to Site In-charge	-
24.				■ Machinery and construction equipment that may be in intermittent use should be shut down during non-work periods; ■ Minimal use of vehicle horns and heavy engine breaking in the area needs to be encouraged	EPC Contractor/O&M Team	Site inspection	Monthly Monitoring	Site HSE Officer of EPC Contractor and PMC Safety officer/ Site Manager of O&M team	Report from HSE officer of EPC Contractor and PMC safety officer/ O&M Contractor to Site In-charge	-
Occupational Health and Safety										
25.	■ Working at heights; ■ Working with live electrical components; and ■ Operation of cranes and other mechanical lifting equipment	Injury, near-misses and fatalities for labour contracted on site.	Construction, Operation, Decommissioning	■ All workers (regular and contracted) should be provided with training on Health and Safety management system of the EPC contractor during construction stage and company's EHS policies and procedures during the operation stage;	EPC Contractor/O&M Team	Site inspection	Monthly Monitoring	Site HSE Officer of EPC Contractor and PMC Safety officer/ Site Manager of O&M team	Report from HSE officer of EPC Contractor and PMC safety officer/ O&M Contractor to Site In-charge	QHSE Department of Ayana to prepare EHS training calendar for its project site. Cost will be embedded within the cost of training programmes.
26.				■ Obtain and check safety method statements from contractors;	EPC Contractor/O&M Team	Site inspection	Monthly Monitoring	Site HSE Officer of EPC Contractor and PMC Safety officer/ Site Manager of O&M team	Report from HSE officer of EPC Contractor and PMC safety officer/ O&M Contractor to Site In-charge	HR Department of Ayana to verify safety method statements from site Contractors. Cost will be embedded within the cost of engagement of EPC contractor

S. No	Project Activity (ies)	Impacts/Issue	Applicable Project Phase	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines / Frequency of Monitoring	Responsibility for implementation of monitoring	Reporting Requirements	Estimated Cost/ Resources required
27.				■ Monitor health and safety performance and have an operating audit system;	EPC Contractor/O&M Team	Site inspection	Monthly Monitoring	Site HSE Officer of EPC Contractor and PMC Safety officer/ Site Manager of O&M team	Report from HSE officer of EPC Contractor and PMC safety officer/ O&M Contractor to Site In-charge	-
28.				■ Permitting system should be implemented to ensure that cranes and lifting equipment is operated by trained and authorized persons only;	EPC Contractor/O&M Team	Site inspection	Monthly Monitoring	Site HSE Officer of EPC Contractor and PMC Safety officer/ Site Manager of O&M team	Report from HSE officer of EPC Contractor and PMC safety officer/ O&M Contractor to Site In-charge	Cost will be embedded within the cost of training programmes
29.				■ Appropriate safety harnesses and lowering/raising tools should be used for working at heights	EPC Contractor/O&M Team	Site inspection	Monthly Monitoring	Site HSE Officer of EPC Contractor and PMC Safety officer/ Site Manager of O&M team	Report from HSE officer of EPC Contractor and PMC safety officer/ O&M Contractor to Site In-charge	-
30.				■ A safety or emergency management plan should be in place to account for natural disasters, accidents and any emergency situations.	EPC Contractor/O&M Team	Site inspection	Monthly Monitoring	Site HSE Officer of EPC Contractor and PMC Safety officer/ Site Manager of O&M team	Report from HSE officer of EPC Contractor and PMC safety officer/ O&M Contractor to Site In-charge	-
31.		COVID 19 concerns	All phases	■ COVID 19 concerns may be relevant for the project. The project is required to implement precautions directed by the state and central govt.	EPC Contractor/O&M Team	Site inspection	Daily monitoring	Site HSE Officer of EPC Contractor and PMC Safety officer/ Site Manager of O&M team	Site inspection report	-
Social Impacts										
31.	■ Sale of land by land owners will lead to loss of agricultural landholding that will lead to overall loss in agricultural income.	Reduction of land holding and loss of agricultural income	Construction Phase	■ Ensure, to the extent practicable, that compensation was paid as per section 26 of LAAR Act 2013 (to land owners whose land was acquired by government); ■ Ensure that documentation for payment to Private land owners for AASPL parcel is made available and the compensation was not paid below market price;	APSPCL and AASPL	Record Keeping	The proposed activities should be considered upon commencing any construction or operation work at the Project site to engage the family members to the extent possible.	Plant Head of AASPL along with Admin officer and Community Development Team	Monthly Progress Report	Embedded within cost of ongoing Skill development and community development programs

S. No	Project Activity (ies)	Impacts/Issue	Applicable Project Phase	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines / Frequency of Monitoring	Responsibility for implementation of monitoring	Reporting Requirements	Estimated Cost/ Resources required
				■ Explore possibilities of employment of locals, land sellers, erstwhile Assigned land users during construction phase of the project; ■ Ensure inclusion of members of land seller households for project, in the Skill Development program being conducted and other community development activities by AASPL.						
32.	■ Engagement of unskilled and semi-skilled local and migrant labour	Impact on local economy and employment	Construction Phase and Operation Phase	**Enhancement Measures** ■ Sourcing local labour wherever possible should be made obligatory for the sub-contractors and in all major procurement activities. The Project proponent should establish a mechanism to audit subcontractors and suppliers with respect to compliance of utilizing local labour and resources; ■ It should be clearly communicated to the workers working during the construction and Operation period that this will be short term employment and the duration should be informed; ■ Information on local employment should be communicated to the gram panchayat (GP) and information on availability of employment opportunities should be displayed at GP office premises (preferably in the local language) in consultation with the Sarpanch; ■ The Grievance Redress Mechanism of the project shall be made available to these groups, including contractual workforce engaged during construction phase in order to provide a platform to share any concerns or grievances.	AASPL along with Contractors engaged during construction phase	• Record of employment provided to members of Households affected due to project land take; • Records of Grievances being raised by locals or contractual workers engaged for the project.	Monthly	AASPL Plant Head along with EPC contractors and subcontractors	Monthly Progress Report	Embedded within cost of engagement of EPC contractor
33.			Decommissioning Phase	■ AASPL should ensure proper communication in terms of decommissioning timelines, and shall evaluate options of internal transfer of employees to other projects before	AASPL along with Contractors engaged	■ Communication strategy for retrenchment ■ Grievances records	During decommissioning phase- Monthly	AASPL Plant Head along with EPC contractors and subcontractors	Monthly Progress Report	Management Time

S. No	Project Activity (ies)	Impacts/Issue	Applicable Project Phase	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines / Frequency of Monitoring	Responsibility for implementation of monitoring	Reporting Requirements	Estimated Cost/ Resources required
				planning for closure, in order to minimize retrenchment linked job losses; ■ The contractor shall inform the workers and local community about the duration of work, in advance, to clearly set out and manage expectations; ■ Reduction of worker will be done phase wise and corresponding to completion of each activity.		■ Retrenchment plan				
34.	■ Migrant worker-community conflicts; ■ Pressure on local resources; ■ Risk of diseases	Impact due to Labour Influx	Construction Phase	■ To the extent possible, locate the labour camp(s) within the project footprint area identified; ■ Adequately monitor the contractor's compliance to the applicable rules and regulations; ■ Development of the labour camp in keeping with the IFC Worker's Accommodation Guideline; ■ Provide adequate sanitation and waste management facilities including, such as safe drinking water, proper waste collection and disposal system, etc.; ■ Undertake health awareness among the local community, ■ Provide the local community an understanding of the project activities and the possible health and safety risks associated with the same as part of the engagement process; ■ Implement on-site vector control measures; ■ Access to the local community to the grievance redress mechanism for the project; ■ Implement ARPPL's policy of non-discrimination and prevent unequal distribution of project benefit.	AASPL along with Contractors engaged during construction phase	■ Physical verification; ■ Health and Safety Audits of Contractors	Monthly	AASPL Plant Head	Monthly Inspection Report	Management Time
Ecology Impacts (referred from ESIA Study (2018))										
35.	Disturbance in Wildlife Movement	Impact on wildlife. The land clearance activities for the construction activities lead to	Construction	■ Project related activities should be avoided during the night time.	EPC Contractor, Electrical Contractor and any other	■ Site Inspection; ■ Training records; ■ Visual Assessment by experts	Once during the project phase	Site HSE Officer of EPC Contractor, PMC Safety officer and electrical	Once during project phase	Cost embedded in Contractor agreement

S. No	Project Activity (ies)	Impacts/Issue	Applicable Project Phase	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines / Frequency of Monitoring	Responsibility for implementation of monitoring	Reporting Requirements	Estimated Cost/ Resources required
		removal of vegetation, habitat disturbance for resident birds and animals.		■ Removal of vegetation should be limited to the extent possible; ■ Damage to the natural topography and landscape should be minimized; ■ General awareness regarding wildlife should be enhanced through trainings, posters etc. among the staff and labourers; ■ Strict prohibition should be implemented on trapping, hunting or injuring wildlife within the subcontractors and should bring a penalty clause under contractual agreements; ■ Camp and kitchen waste should be collected and disposed in a manner that it does not attract wild animals; ■ A minimum possible number of routes should be authorized for use during construction by the labourers and staff, speed limited of the vehicles plying in these routes should be kept 15-20 km/hr to avoid road kill; ■ Strict prohibition on use of fuel wood and shrubs from nearby areas as kitchen fuel; ■ Temporary barriers should be installed on excavated areas; ■ Stage-wise re-vegetation with local species should be undertaken immediately after completion of construction work; and ■ The footprint of the construction activities should be kept to the minimum to reduce disturbance to flora and fauna.	contractors to be mobilised at site			contractors to Site Incharge		
36.	Habitat Alteration at the Solar farm site	Impact on wildlife	Construction and Operation	■ Minimise vegetation removal or trimming to the extent possible at Solar Farm site including internal access roads, pooling substation area, yards, and other ancillary facilities; ■ Strict prohibition should be implemented for cutting of trees, shrubs for kitchen fuel	EPC Contractor, Electrical Contractor and any other contractors to be mobilised at site	■ Site Inspection; ■ Training records; ■ Visual Assessment by experts	Once during the project phase	Site HSE Officer of EPC Contractor, PMC Safety officer and electrical contractors to Site In charge	Once during project phase	Cost embedded in Contractor Agreement

S. No	Project Activity (ies)	Impacts/Issue	Applicable Project Phase	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines / Frequency of Monitoring	Responsibility for implementation of monitoring	Reporting Requirements	Estimated Cost/ Resources required
				and trapping and hunting of animals and birds; ■ The soil removed during construction of roads and other related structures should be used to reclaim disturbed areas upon completion of construction activities; ■ Construction noise should be minimized by usage of acoustic enclosures and lubrication of equipment's where feasible;						

10. IMPACT SUMMARY AND CONCLUSION

10.1 Introduction

This environmental and social impact assessment has been conducted to evaluate the impacts associated with the solar power project of 250 MW capacity. The impact assessment has been conducted in compliance with the administrative framework identified herein, including relevant national legislative requirements and international guidelines/conventions.

10.2 Impacts Requiring Detailed Assessment

Following a Scoping exercise, this ESIA was focused on interactions between the Project activities and various resources/receptors that could result in significant impacts. The table below presents the outcomes of the comprehensive assessment of identified impacts as a result of the various phases of the Project.

Table 10.1: Impact Assessment Summary

Impact Description	Impact Nature	Significance of Impact	
		Without Mitigation	With Mitigation
Construction Phase			
Change in Land Use	Negative	Moderate	Moderate
Impact on Topography	Negative	Negligible to Minor	Negligible
Soil Compaction and Erosion	Negative	Minor	Negligible
Waste Generation and Soil Contamination	Negative	Minor	Negligible
Impact on Water Environment	Negative	Moderate	Minor
Impact on Air Quality	Negative	Minor	Negligible to Minor
Impact on Ambient Noise	Negative	Negligible	Negligible
Impact on Occupational Health and Safety	Negative	Minor	Negligible
Reduction of land holding and loss of agricultural income	Negative	Moderate	Minor
Impact on Local Economy	Positive		
Impact of Labour influx	Negative	Moderate	Minor
Impact on Community Health and Safety	Negative	Moderate	Minor
Impact on Ecology due to Vegetation Clearance and Construction Activity	Negative	Negligible	Negligible
Impact on Ecology due to Influx of Migrant Labour and Labour Camps	Negative	Negligible	Negligible
Operation and Maintenance Phase			
Soil Compaction and Erosion	Negative	Negligible	Negligible
Waste Generation and Soil Contamination	Negative	Negligible to Minor	Negligible
Impact on Water Environment	Negative	Moderate	Minor to Moderate
Impact on Economy and Employment	Positive		
Collision and Electrical hazards from Transmission Infrastructure	Negative	Minor	Minor
Decommissioning Phase			

Impact Description	Impact Nature	Significance of Impact	
		Without Mitigation	With Mitigation
Impact on Soil Environment	Negative	Minor	Negligible to Minor
Impact on Water Environment	Negative	Moderate	Minor
Impact on Air Quality	Negative	Minor	Negligible
Impact on Ambient Noise	Negative	Negligible to Minor	Negligible
Impact on Economy and Employment	Negative	Minor	Negligible
Cumulative Impacts			
Impact on Water Environment	Negative	Moderate	
Impact on Air Quality	Negative	Minor	
Impact on Ambient Noise	Negative	Minor	
Impact on Soil Environment	Negative	Minor	
Impact on Economy and Employment			

10.3 Conclusion

The Project is a green energy project which will generate 250 MW power through solar energy after commissioning. During the construction phase, the project and its key components such as site office building, external transmission lines, internal transmission line, etc. are likely to have minor to negligible impacts on baseline environmental parameters such as soil, noise, water, air, after suggested mitigation measures are implemented. The impact on land use (conversion from agricultural to industrial land) would have moderate impact. The E&S impacts during operation phase are likely to be minor to negligible. The social impacts from the Project are assessed to be in terms of loss of land and agricultural income and community health and safety impacts but beneficial in terms of local employment and overall local area development.

The Environmental and Social Management Plan (ESMP) describes mitigation measures for impacts specific to Project activities and also discuss implementation mechanism. To conclude, the implementation of ESMP/ Management plans will help Ayana in complying with its internal E&S requirements as well as national/state regulatory framework in addition to AIIB's ESP and ESS requirements.

APPENDIX A LIST OF DOCUMENTS REVIEWED

S. No	Name of Document
1.	Environmental and Social Impact Assessment of 250 MW Solar Power Project in Anantapuramu, Andhra Pradesh dated 20.12.2018 prepared by Opensense Labs Private Limited
2.	Environmental and Social Due Diligence (ESDD) of two greenfield 250 MW Solar PV Projects each in Andhra Pradesh, India dated 20.02.2019 prepared by ERM India Private Limited
3.	Environmental Monitoring Reports prepared by Global Lab and Consultancy Services
4.	AIIB Environmental and Social Framework
5.	Ground water brochure, Ananatapur district, Andhra Pradesh dated September 2013, prepared by Central Ground Water Board.
6.	Green Jobs update from ARPPL
7.	Existing GRM of ARPPL (part of IMS manual)

APPENDIX B DETAILED GROUND WATER MONITORING REPORT[32]

[32]The ground water monitoring report has been retrieved from the ESIA report prepared for the 250 MW solar power project in Anantapuramu, Andhra Pradesh dated 20.12.2018 prepared by OSL for Ayana.

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TC - 6060

TEST REPORT

Report Number: ULR – TC606018000000007P **Report Date:** 22.10.2018

Issued To : OpenSense Labs, 630, Lane Number 3, West End Marg, Saidulajab, **Saket, New Delhi- 110030.**		**Site Address: NP Kunta Solar power park,** Anantapuram, **Andhra Pradesh.**	
Attention	-	**Sample Receipt Condition**	Ambient – Good
TRF No	490	**Sample Quantity**	2 Litres
Sample Name	Borewell Water	**Sampled by**	Laboratory
Sample Description	Liquid	**Sampling Method**	GLCS/SOP/W/028
Sample Code	GLCS / 1235	**Date of Analysis**	06.10.2018
Sample Receipt Date	06.10.2018	**Date of Completion**	22.10.2018

Sl. No.	TEST PARAMETERS	TEST METHOD	UNIT	RESULT	IS 10500:2012 Drinking Water	
					Acceptance Limit	Permissible Limit
1	Color	IS 3025 PART 4	Hazen	< 5	5	15
2	Odor	IS 3025 PART 5	-	Agreeable	Agreeable	Agreeable
3	Taste	IS 3025 PART 7	-	Not Agreeable	Agreeable	Agreeable
4	pH	IS 3025 PART11	-	7.08	6.5 – 8.5	No Relaxation
5	Electrical Conductivity	IS 3025 PART14	µS/cm	3890	-	-
6	Turbidity	IS 3025 PART10	NTU	< 1	1	5
7	Total Dissolved Solids	IS 3025 PART16	mg/l	2528	500	2000
8	Total Alkalinity	IS 3025 PART 23	mg/l	590	200	600
9	Total Hardness as $CaCO_3$	IS 3025 PART 21	mg/l	900	200	600
10	Calcium as Ca	IS 3025 PART 40	mg/l	112	75	200
11	Magnesium as Mg	IS 3025 PART 46	mg/l	151	30	100
12	Chloride as Cl^-	IS 3025 PART 32	mg/l	485	250	1000
13	Sulphate as SO_4^-	IS 3025 PART 24	mg/l	225	200	400

For Global Lab and Consultancy Services

Prepared **Verified** **Authorised Signatory**

R. RAJESH
Technical Manager

Note: The test results are only to the sample submitted for test. Any Correction of the test report on full or part shall invalidate the report. Samples are not drawn by us unless otherwise stated. Sample will be retained for 14 days from the date of reporting except in case of regulatory samples or specifically instructed by client. Perishable samples will be discarded immediately after reporting. We do not accept only liability with regard to origin or source from which the samples are extracted. The Laboratory is not responsible for authenticity of photocopied test reports. Any holder of this report is advised that information contained here on reflects the laboratory's finding at the time of its intervention only and within the limits of client instructions. The authenticity of the test report's issued by us can be verified by submitting on E-mail request with report number and report date along with report copy.

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TC - 6060

TEST REPORT

Report Number: ULR – TC606018000000007P **Report Date:** 22.10.2018

Sl. No.	TEST PARAMETERS	TEST METHOD	UNIT	RESULT	IS 10500:2012 Drinking Water	
					Acceptance Limit	Permissible Limit
14	Iron as Fe	IS 3025 PART 53	mg/l	0.67	0.3	No Relaxation
15	Boron as B	IS 3025 PART 57	mg/l	BDL(DL:0.01)	0.5	1
16	Free Residual Chlorine as Cl_2	IS 3025 PART 26	mg/l	BDL(DL : 1)	0.2	1
17	Fluoride as F	GLCS/SOP/W/015	mg/l	1.08	1	1.5
18	Nitrate	IS 3025 PART 34	mg/l	BDL(DL:2)	45	No Relaxation
19	*Sulphide	IS 3025 PART 29	mg/l	BDL(DL:0.05)	0.05	No Relaxation
20	*Phenolic compounds	IS 3025 PART 43	mg/l	Absent	0.001	0.002
21	**E Coli	IS 1622 : 1981	Per100ml	< 2	Should be Absent	
22	**Total Coliform	IS 1622 : 1981	Per 100ml	1600	Should be Absent	

Note: * - Parameters not covered under our NABL Scope
** - Parameters subcontracted to NABL accredited Laboratory

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Prepared **Verified** **Authorised Signatory**

R. RAJESH
Technical Manager

*****End of Report*****
Page 2 of 2

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TC - 6060

TEST REPORT

Report Number: ULR – TC606018000000008P **Report Date:** 22.10.2018

Issued To : OpenSense Labs, 630, Lane Number 3, West End Marg, Saidulajab, **Saket, New Delhi- 110030.**		**Site Address: NP Kunta Solar power park,** Anantapuram, **Andhra Pradesh.**	
Attention	-	**Sample Receipt Condition**	Ambient – Good
TRF No	490	**Sample Quantity**	2 Litres
Sample Name	Borewell Water	**Sampled by**	Laboratory
Sample Description	Liquid	**Sampling Method**	GLCS/SOP/W/028
Sample Code	GLCS / 1236	**Date of Analysis**	06.10.2018
Sample Receipt Date	06.10.2018	**Date of Completion**	22.10.2018

Sl. No.	TEST PARAMETERS	TEST METHOD	UNIT	RESULT	IS 10500:2012 Drinking Water	
					Acceptance *Limit*	Permissible *Limit*
1	Color	IS 3025 PART 4	Hazen	< 5	5	15
2	Odor	IS 3025 PART 5	-	Agreeable	Agreeable	Agreeable
3	Taste	IS 3025 PART 7	-	Not Agreeable	Agreeable	Agreeable
4	pH	IS 3025 PART11	-	7.10	6.5 – 8.5	No Relaxation
5	Electrical Conductivity	IS 3025 PART14	µS/cm	1120	-	-
6	Turbidity	IS 3025 PART10	NTU	< 1	1	5
7	Total Dissolved Solids	IS 3025 PART16	mg/l	728	500	2000
8	Total Alkalinity	IS 3025 PART 23	mg/l	320	200	600
9	Total Hardness as $CaCO_3$	IS 3025 PART 21	mg/l	380	200	600
10	Calcium as Ca	IS 3025 PART 40	mg/l	40	75	200
11	Magnesium as Mg	IS 3025 PART 46	mg/l	68	30	100
12	Chloride as Cl^-	IS 3025 PART 32	mg/l	50	250	1000
13	Sulphate as SO_4^-	IS 3025 PART 24	mg/l	13	200	400

For Global Lab and Consultancy Services

Prepared **Verified** **Authorised Signatory**

R. RAJESH
Technical Manager

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TC - 6060

TEST REPORT

Report Number: ULR – TC606018000000008P **Report Date:** 22.10.2018

Sl. No.	TEST PARAMETERS	TEST METHOD	UNIT	RESULT	IS 10500:2012 Drinking Water	
					Acceptance Limit	Permissible Limit
14	Iron as Fe	IS 3025 PART 53	mg/l	0.28	0.3	No Relaxation
15	Boron as B	IS 3025 PART 57	mg/l	BDL(DL:0.01)	0.5	1
16	Free Residual Chlorine as Cl_2	IS 3025 PART 26	mg/l	BDL(DL : 1)	0.2	1
17	Fluoride as F	GLCS/SOP/W/015	mg/l	0.90	1	1.5
18	Nitrate	IS 3025 PART 34	mg/l	BDL(DL:2)	45	No Relaxation
19	*Sulphide	IS 3025 PART 29	mg/l	BDL(DL:0.05)	0.05	No Relaxation
20	*Phenolic compounds	IS 3025 PART 43	mg/l	Absent	0.001	0.002
21	**E Coli	IS 1622 : 1981	Per100ml	< 2	Should be Absent	
22	**Total Coliform	IS 1622 : 1981	Per 100ml	900	Should be Absent	

Note: * - Parameters not covered under NABL Scope
** - Parameters subcontracted to NABL accredited Laboratory

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Technical Manager

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APPENDIX C DETAILED SURFACE WATER MONITORING REPORT[33]

[33] The surface water monitoring report has been retrieved from the ESIA report prepared for the 250 MW solar power project in Anantapuramu, Andhra Pradesh dated 20.12.2018 prepared by OSL for Ayana.

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TC - 6060

TEST REPORT

Report Number: ULR – TC606018000000005P **Report Date:** 22.10.2018

Issued To : OpenSense Labs, 630, Lane Number 3, West End Marg, Saidulajab, **Saket, New Delhi- 110030.**		**Site Address: NP Kunta Solar power park,** Anantapuram, **Andhra Pradesh.**	
Attention	-	**Sample Receipt Condition**	Ambient – Good
TRF No	490	**Sample Quantity**	2 Litres
Sample Name	Surface Water	**Sampled by**	Laboratory
Sample Description	Liquid	**Sampling Method**	GLCS/SOP/W/028
Sample Code	GLCS / 1233	**Date of Analysis**	06.10.2018
Sample Receipt Date	06.10.2018	**Date of Completion**	22.10.2018

Sl. No.	TEST PARAMETERS	TEST METHOD	UNIT	RESULT	*LIMITS
1	Color	IS 3025 PART 4	Hazen	20	300
2	Odor	IS 3025 PART 5	-	Agreeable	-
3	Taste	IS 3025 PART 7	-	Not Agreeable	-
4	pH	IS 3025 PART11	-	8.03	6.05 – 8.5
5	Electrical Conductivity	IS 3025 PART14	µS/cm	990	-
6	Turbidity	IS 3025 PART10	NTU	600	-
7	Total Dissolved Solids	IS 3025 PART16	mg/l	643	1500
8	Total Alkalinity	IS 3025 PART 23	mg/l	150	-
9	Total Hardness as $CaCO_3$	IS 3025 PART 21	mg/l	140	-
10	Calcium as Ca	IS 3025 PART 40	mg/l	20	-
11	Magnesium as Mg	IS 3025 PART 46	mg/l	22	-
12	Chloride as Cl^-	IS 3025 PART 32	mg/l	80	600
13	Sulphate as SO_4^-	IS 3025 PART 24	mg/l	105	400

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R. RAJESH
Technical Manager

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E-Mail : lab@glcs.in ; **Web :** www.glcs.in
TC - 6060

TEST REPORT

Report Number: ULR – TC606018000000005P **Report Date:** 22.10.2018

Sl. No.	TEST PARAMETERS	TEST METHOD	UNIT	RESULT	*LIMITS
14	Iron as Fe	IS 3025 PART 53	mg/l	7.1	50
15	Boron as B	IS 3025 PART 57	mg/l	0.02	-
16	Free Residual Chlorine as Cl_2	IS 3025 PART 26	mg/l	BDL(DL : 1)	-
17	Fluoride as F	GLCS/SOP/W/015	mg/l	0.9	1.5
18	Nitrate as NO_3	IS 3025 PART 34	mg/l	13	50
19	**Sulphide	IS 3025 PART 29	mg/l	BDL(DL:0.05)	-
20	**Phenolic compounds	IS 3025 PART 43	mg/l	Absent	0.005
21	***E Coli	IS 1622 : 1981	Per100ml	< 2	-
22	***Total Coliform	IS 1622 : 1981	Per 100ml	280	5000

Note: *LIMITS – *Surface Water Quality Standards - IS 2296-1982 Class C*
** - Parameters not covered under our NABL Scope
*** - Parameters subcontracted to NABL accredited Laboratory

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Prepared **Verified** **Authorised Signatory**

R. RAJESH
Technical Manager

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TC - 6060

TEST REPORT

Report Number: ULR – TC606018000000006P **Report Date:** 22.10.2018

Issued To : OpenSense Labs, 630, Lane Number 3, West End Marg, Saidulajab, **Saket, New Delhi- 110030.**		**Site Address: NP Kunta Solar power park,** Anantapuram, **Andhra Pradesh.**	
Attention	-	**Sample Receipt Condition**	Ambient – Good
TRF No	490	**Sample Quantity**	2 Litres
Sample Name	Surface Water	**Sampled by**	Laboratory
Sample Description	Liquid	**Sampling Method**	GLCS/SOP/W/028
Sample Code	GLCS / 1234	**Date of Analysis**	06.10.2018
Sample Receipt Date	06.10.2018	**Date of Completion**	22.10.2018

Sl. No.	TEST PARAMETERS	TEST METHOD	UNIT	RESULT	*LIMITS
1	Color	IS 3025 PART 4	Hazen	5	300
2	Odor	IS 3025 PART 5	-	Agreeable	-
3	Taste	IS 3025 PART 7	-	Not Agreeable	-
4	pH	IS 3025 PART11	-	8.80	6.05 – 8.5
5	Electrical Conductivity	IS 3025 PART14	µS/cm	930	-
6	Turbidity	IS 3025 PART10	NTU	< 1	-
7	Total Dissolved Solids	IS 3025 PART16	mg/l	604	1500
8	Total Alkalinity	IS 3025 PART 23	mg/l	290	-
9	Total Hardness as $CaCO_3$	IS 3025 PART 21	mg/l	180	-
10	Calcium as Ca	IS 3025 PART 40	mg/l	12	-
11	Magnesium as Mg	IS 3025 PART 46	mg/l	36	-
12	Chloride as Cl^-	IS 3025 PART 32	mg/l	75	600
13	Sulphate as SO_4^-	IS 3025 PART 24	mg/l	15	400

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R. RAJESH
Technical Manager

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TC - 6060

TEST REPORT

Report Number: ULR – TC606018000000006P **Report Date:** 22.10.2018

Sl. No.	TEST PARAMETERS	TEST METHOD	UNIT	RESULT	*LIMITS
14	Iron as Fe	IS 3025 PART 53	mg/l	0.12	50
15	Boron as B	IS 3025 PART 57	mg/l	BDL(DL:0.01)	-
16	Free Residual Chlorine as Cl_2	IS 3025 PART 26	mg/l	BDL(DL : 1)	-
17	Fluoride as F	GLCS/SOP/W/015	mg/l	1.10	1.5
18	Nitrate as NO_3	IS 3025 PART 34	mg/l	7.8	50
19	**Sulphide	IS 3025 PART 29	mg/l	BDL(DL:0.05)	-
20	**Phenolic compounds	IS 3025 PART 43	mg/l	Absent	0.005
21	***E Coli	IS 1622 : 1981	Per100ml	< 2	-
22	***Total Coliform	IS 1622 : 1981	Per 100ml	220	5000

Note: *LIMITS – *Surface Water Quality Standards IS 2296-1982 Class C*
** - Parameters not covered under our NABL Scope
*** - Parameters subcontracted to NABL accredited Laboratory

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R. RAJESH
Technical Manager

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APPENDIX D DETAILED AMBIENT AIR QUALITY MONITORING REPORT[34]

[34] The ambient air quality monitoring report has been retrieved from the ESIA report prepared for the 250 MW solar power project in Anantapuramu, Andhra Pradesh dated 20.12.2018 prepared by OSL for Ayana

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TC - 6060

TEST REPORT

Report Number: ULR – TC606018000000003F **Report Date:** 22.10.2018

Issued To : OpenSense Labs, 630, Lane Number 3, West End Marg, Saidulajab, **Saket, New Delhi- 110030.**		**Site Address: NP Kunta Solar power park,** Anantapuram, **Andhra Pradesh.**	
Attention	-	**Sampling Condition**	Active
TRF No :	490	**Sampled by**	Laboratory
Sample Name	Air Quality Monitoring	**Sampling Method**	GLCS/SOP/AAQ/015
Sample Description	Ambient Air Quality	**Sample Code**	GLCS /1230
Location Name	NP Kunta village	**Date of Analysis**	11.10.2018
Sampling Hours	09.30 am – 09.30 am	**Date of Completion**	17.10.2018
Sampling Date	10.10.2018 – 11.10.2018	**Avg Temperature**	32.5 ℃
Sample Receipt Date	11.10.2018	**Avg Humidity**	51.0%

Sl. NO.	TEST PARAMETER	TEST METHOD	UNITS	RESULT	NAAQ (2009)* LIMITS
1	Sulphur dioxide as SO_2	IS 5182 Part2: 2001 (RA 2012)	$\mu g/m^3$	7.4	80
2	Nitrogen dioxide as NO_2	IS 5182 Part:6: 2006 (RA 2012)	$\mu g/m^3$	18.7	80
3	PM 10µm	IS 5182 Part23:2006 (RA 2012)	$\mu g/m^3$	48.2	100
4	PM 2.5µm	GLCS/SOP/AAQ/017	$\mu g/m^3$	24.8	60
5	Ammonia as NH_3	GLCS/SOP/AAQ/001	$\mu g/m^3$	BDL(DL:5.0)	400
6	Ozone as O_3	GLCS/SOP/AAQ/002	$\mu g/m^3$	BDL(DL:5.0)	180

Note: BDL- Below Detection Limit; **DL**- Detection Limit

* **NAAQS –** National Ambient Air Quality Standard Issued by CPCB (Central Pollution Control Board) in 2009.

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Technical Manager

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TC - 6060

TEST REPORT

Report Number: ULR – TC606018000000002F **Report Date:** 22.10.2018

Issued To : OpenSense Labs, 630, Lane Number 3, West End Marg, Saidulajab, **Saket, New Delhi- 110030.**		**Site Address: NP Kunta Solar power park,** Anantapuram, **Andhra Pradesh.**	
Attention	-	**Sampling Condition**	Active
TRF No :	490	**Sampled by**	Laboratory
Sample Name	Air Quality Monitoring	**Sampling Method**	GLCS/SOP/AAQ/015
Sample Description	Ambient Air Quality	**Sample Code**	GLCS /1229
Location Name	Near Main gate area	**Date of Analysis**	11.10.2018
Sampling Hours	09.00 am – 09.00 am	**Date of Completion**	17.10.2018
Sampling Date	10.10.2018 – 11.10.2018	**Avg Temperature**	32.5°C
Sample Receipt Date	11.10.2018	**Avg Humidity**	51.0%

Sl. NO.	TEST PARAMETER	TEST METHOD	UNITS	RESULT	NAAQ (2009)* LIMITS
1	Sulphur dioxide as SO_2	IS 5182 Part2: 2001 (RA 2012)	$\mu g/m^3$	6.2	80
2	Nitrogen dioxide as NO_2	IS 5182 Part:6: 2006 (RA 2012)	$\mu g/m^3$	17.5	80
3	PM 10µm	IS 5182 Part23:2006 (RA 2012)	$\mu g/m^3$	52.3	100
4	PM 2.5µm	GLCS/SOP/AAQ/017	$\mu g/m^3$	26.8	60
5	Ammonia as NH_3	GLCS/SOP/AAQ/001	$\mu g/m^3$	BDL(DL:5.0)	400
6	Ozone as O_3	GLCS/SOP/AAQ/002	$\mu g/m^3$	BDL(DL:5.0)	180

Note: BDL- *Below Detection Limit*; **DL-** *Detection Limit*

* **NAAQS –** National Ambient Air Quality Standard Issued by CPCB (Central Pollution Control Board) in 2009.

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APPENDIX E DETAILED AMBIENT NOISE QUALITY REPORT[35]

[35] The ambient noise quality monitoring report has been retrieved from the ESIA report prepared for the 250 MW solar power project in Anantapuramu, Andhra Pradesh dated 20.12.2018 prepared by OSL for Ayana

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TC - 6060

TEST REPORT

Report Number: ULR – TC606018000000004F **Report Date:** 22.10.2018

Issued To : OpenSense Labs, 630, Lane Number 3, West End Marg, Saidulajab, **Saket, New Delhi- 110030.**		**Site Address: NP Kunta Solar power park,** Anantapuram, ***Andhra Pradesh.***	
Attention	-	**Sampling condition**	Active
TRF No :	490	**Sampled by**	Laboratory
Sample Name	Noise Level Monitoring	**Sampling Method**	GLCS/SOP/N/014
Sample description	Sound Pressure Level	**Sample Code**	GLCS/1231-1232
Sampling Time	Every 60 minutes	**Sample Receipt Date**	11.10.2018
Sampling Date	10.10.2018 – 11.10.2018	**Date of Analysis**	11.10.2018
		Date of Completion	17.10.2018

Location Name		**Near Main gate area**			**NP Kunta village**		
S.No	**Time (Hrs)**	**Min dB(A)**	**Max dB(A)**	**Leq dB(A)**	**Min dB(A)**	**Max dB(A)**	**Leq dB(A)**
1	06:00	42.8	46.2	44.82	44.3	58.9	56.04
2	07:00	44.3	47.9	46.46	44.1	57.5	54.68
3	08:00	49.8	55.3	53.37	45.3	58.1	55.31
4	09:00	52.1	58.3	56.22	44.5	59.6	56.72
5	10:00	55.1	59.1	57.55	44.1	58.3	55.45
6	11:00	57.3	63.1	61.10	44.1	60.1	57.20
7	12:00	58.9	65.8	63.60	43.2	57.9	55.03
8	13:00	48.3	55.1	52.91	44.2	59.2	56.32
9	14:00	51.3	56.3	54.48	42.6	58.3	55.41
10	15:00	56.1	56.9	56.52	44.1	59.2	56.32

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Technical Manager

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E-Mail : lab@glcs.in ; **Web :** www.glcs.in
TC - 6060

TEST REPORT

Report Number: ULR – TC60601800000004F **Report Date:** 18.01.2018

11	16:00	58.3	63.1	61.33	44.3	58.2	55.36
12	17:00	60.2	69.2	66.70	45.3	57.2	54.46
13	18:00	62.3	65.6	64.26	44.9	58.1	55.29
14	19:00	57.3	66.2	63.72	45.2	59.6	56.74
15	20:00	51.3	58.2	56.00	45.3	59.2	56.36
16	21:00	52.9	55.1	54.14	42.3	60.1	57.16
17	22:00	51.3	54.1	52.92	36.5	49.1	46.32
18	23:00	49.2	51.2	50.31	37.2	49.6	46.83
19	00:00	48.1	51.1	49.85	38.8	46.5	44.17
20	01:00	45.3	48.2	46.99	40.2	48.7	46.26
21	02:00	44.6	46.2	45.47	41.3	48.3	46.08
22	03:00	43.6	54.1	51.46	38.3	47.3	44.80
23	04:00	40.1	43.9	42.40	40.2	48.3	45.92
24	05:00	41.3	44.2	42.99	42.2	49.3	47.06
		Day Mean dB(A)		53.8	Day Mean dB(A)		51.3
		Night Mean dB(A)		43.8	Night Mean dB(A)		42.1
Limits as per The Noise Pollution (Regulation & Control) Rules, 2010 of MoEFCC / CPCB (Industrial)					**Day Time : 75 dB (A)**		
					Night Time : 70 dB (A)		

Note: MoEFCC – Ministry of Environment Forest and Climate Change;
CPCB – Central Pollution Control Board

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Prepared **Verified** **Authorised Signatory**

*****End of Report*****

R. RAJESH
Technical Manager

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APPENDIX F APPLICABLE ENVIRONMENTAL STANDARDS

The applicable environmental standards for the proposed project have been discussed in the subsequent sections. The Central Pollution Control Board (CPCB) has specified National Ambient Air Quality Standards (NAAQS) for residential, commercial, industrial and sensitive zones. Ambient air quality will be a concern only during construction phase of the project. Noise standards notified by MoEFCC for different land uses will be followed. This appendix presents national environmental standards and environmental standards prescribed by WHO.

In case of solar farm projects as there are no specific standards, general wastewater (domestic effluent) discharge is to be followed.

Ambient Air Quality Standards

National Ambient Air Quality Standards (NAAQS)

National Ambient Air Quality Standards (NAAQ Standards), as prescribed by MoEFCC vide, *Gazette Notification dated 16th November, 2009* are given below table.

Table F1 National Ambient Air Quality Standards

Pollutant	Time Weighted Avg.	Concentration in Ambient Air	
		Industrial, Residential, Rural & Other Areas	Ecologically Sensitive Areas (notified by Central
Sulphur dioxide (SO_2) $\mu g/m^3$	Annual Average*	50	20
	24 Hours**	80	80
Oxides of Nitrogen (NO_x) $\mu g/m^3$	Annual Average*	40	30
	24 Hours**	80	80
Particulate Matter (PM 10) $\mu g/m^3$	Annual Average*	60	60
	24 Hours**	100	100
Particulate Matter (PM 2.5) $\mu g/m^3$	Annual Average*	40	40
	24 Hours**	60	60
Ozone (O_3) $\mu g/m^3$	8 Hours**	100	100
	1 Hour**	180	180
Lead (Pb) $\mu g/m^3$	Annual Average*	0.50	0.50
	24 Hours**	1.0	1.0
Carbon monoxide (CO) mg/m^3	8 Hours**	02	02
	1 Hour**	04	04
Ammonia (NH_3) $\mu g/m^3$	Annual*	100	100
	24 Hours**	400	400
Benzene (C_6H_6) $\mu g/m^3$	Annual*	05	05
Benzo(α)Pyrene-particulate phase ng/m^3	Annual*	01	01
Arsenic (As) ng/m^3	Annual*	06	06
Nickel (Ni) ng/m^3	Annual*	20	20

Note: *Annual arithmetic mean of minimum 104 measurements in a year at a particular site taken twice a week 24 hourly at uniform interval.

** 24 hourly/8 hourly/1 hourly monitored values, as applicable shall be complied with 98% of the time in a year. 2% of the time, it may exceed but not on two consecutive days of monitoring.

IFC/WB Air Emissions and Ambient Air Quality Standards

The IFC/WB General EHS guidelines on Air emissions and ambient air quality, specifies that emissions do not result in pollutant concentrations that reach or exceed relevant ambient quality guidelines and standards by applying national legislated standards, or in their absence World Health Organization (WHO) Ambient Air Quality guidelines as represented in table.

Table F2 WHO Ambient Air Quality Guidelines

Pollutant	Averaging Period	Guideline Value in □g/m3
Sulphur Dioxide	24-hour	125 (Interim target-1)
		50 (Interim target-2)
		20 (guideline)
	10 minute	500 (guideline
Nitrogen Oxide	1 year	40 (guideline)
	1 hour	200 (guideline)
Particulate Matter 10	1 year	70 (Interim target-1)
		50 (Interim target-2)
		30 (Interim target-3)
		20 (guideline)
	24 hour	150 (Interim target-1)
		100 (Interim target-2)
		75 (Interim target-3)
		50 (guideline)
Particulate Matter 2.5	1 year	35 (Interim target-1)
		25 (Interim target-2)
		15 (Interim target-3)
		10 (guideline)
	24 hour	75 (Interim target-1)
		50 (Interim target-2)
		37.5 (Interim target-3)
		25 (guideline)
Ozone	8-hour daily Maximum	160 (Interim target-1)
		100 (guideline)

Source: IFC/WB General EHS Guidelines: Air emissions and ambient air quality, 30 April 2007 **Interim target** means Interim targets are provided in recognition of the need for a staged approach to achieving the recommended guidelines.

1.2 Water Quality Standards

As per the Bureau of Indian Standards, (IS 10500: 2012) drinking water shall comply with the requirements given in below table.

Table F3 Indian Drinking Water Standard (IS 10500:2012)

S.N	Substance/ Characteristics	Requirement (Acceptable limit)	Permissible limit in absence of alternate source
1.	Colour, Hazen units, max	5	15

S.N	Substance/ Characteristics	Requirement (Acceptable limit)	Permissible limit in absence of alternate source
2.	Odour	Unobjectionable	-
3.	Taste	Agreeable	-
4.	Turbidity, NTU, max	5	5
5.	pH value	6.5 - 8.5	No Relaxation
6.	Total hardness (as $CaCO_3$) mg/l, max	200	600
7.	Iron (as Fe) mg/l, max	0.3	No relaxation
8.	Chlorides (as Cl) mg/l, max	250	1000
9.	Free residual chlorine, mg/l, min	0.2	1
10.	Dissolved solids mg/l, max	500	2000
11.	Calcium (as Ca) mg/l, max	75	200
12.	Magnesium (as Mg) mg/l, max	30	100
13.	Copper (as Cu) mg/l, max	0.05	1.5
14.	Manganese (as Mn) mg/l, max	0.1	0.3
15.	Sulphate (as SO_4) mg/l, max	200	400
16.	Nitrate (as NO_3) mg/l, max	45	No relaxation
17.	Fluoride (as F) mg/l, max	1.0	1.5
18.	Phenolic compounds (as C_6H_6OH) mg/l,	0.001	0.002
19.	Mercury (as Hg) mg/l, max	0.001	No relaxation
20.	Cadmium (as Cd) mg/l, max	0.003	No relaxation
21.	Selenium (as Se) mg/l, max	0.01	No relaxation
22.	Arsenic (as As) mg/l, max	0.01	0.05
23.	Cyanide (as CN) mg/l, max	0.05	No relaxation
24.	Lead (as Pb) mg/l, max	0.01	No relaxation
25.	Zinc (as Zn) mg/l, max	5	15
26.	Anionic detergents (as MBAS) mg/l, max	0.2	1.0
27.	Total Chromium (as Cr) mg/l, max	0.05	No relaxation
28.	Polynuclear aromatic hydrocarbons (as PAH)	0.0001	No relaxation
29.	Mineral Oil mg/l, max	0.5	No relaxation
30.	Pesticides mg/l, max	Absent	0.001
	Radioactive materials:	0.1	
32.	Total Alkalinity (as CaCO3), mg/l, max	200	600
33.	Aluminium (as Al) mg/l, max	0.03	0.2
34.	Boron, mg/l, max	0.5	1.0
35.	Ammonia (as total ammonia-N). mg/l, max	0.5	No relaxation
36.	Barium (as Ba), mg/l, max	0.7	No relaxation
37.	Chloramines (as Cl2), mg/l, max	4.0	No relaxation
38.	Silver (as Ag), mg/l, max	0.1	No relaxation
39.	Sulphide (as H2S), mg/l, max	0.05	No relaxation
40.	Molybdenum (as Mo), mg/l, max	0.07	No relaxation
41.	Nickel (as Ni), mg/l, max	0.02	No relaxation
42.	Polychlorinated biphenyls, mg/l, max	0.0005	No relaxation

S.N	Substance/ Characteristics	Requirement (Acceptable limit)	Permissible limit in absence of alternate source
43.	Trilomethanes: a) Bromoform, mg/l, max b) Dibromochloromethane, mg/l, max c) Bromodichloromethane, mg/l, max d) Chloroform, mg/l, max	 0.1 0.1 0.06 0.2	 No relaxation No relaxation No relaxation No relaxation
	Bacteriological Quality		
1.	All water intended for drinking: a) E. coli or thermotolerant coliform bacteria	Shall not be detectable in any 100 ml sample	-
2.	Treated water entering the distribution system: a) E. coli or thermotolerant coliform bacteria b) Total coliform bacteria	Shall not be detectable in any 100 ml sample; Shall not be detectable in any 100 ml sample.	-
3.	Treated water in the distribution system: a) E. coli or thermotolerant coliform bacteria b) Total coliform bacteria	Shall not be detectable in any 100 ml sample; Shall not be detectable in any 100 ml sample.	-

Designated Best Use Classification of Surface Water

The designated best use classification as prescribed by CPCB for surface water is as given in table below.

Table F4 Primary Water Quality Criteria for Designated-Best-Use-Classes

Designated-Best-Use	Class	Criteria
Drinking Water Source without conventional treatment but after disinfection	A	■ Total Coliforms Organism MPN/100ml shall be 50 or less ■ pH between 6.5 and 8.5 ■ Dissolved Oxygen 6mg/l or more ■ Biochemical Oxygen Demand 5 days 20^{O}C 2mg/l or less
Outdoor bathing (Organized)	B	■ Total Coliforms Organism MPN/100ml shall be 500 or less ■ pH between 6.5 and 8.5 ■ Dissolved Oxygen 5mg/l or more ■ Biochemical Oxygen Demand 5 days 20^{O}C 3mg/l or less
Drinking water source after conventional treatment and disinfection	C	■ Total Coliforms Organism MPN/100ml shall be 5000 or less ■ pH between 6 to 9 ■ Dissolved Oxygen 4mg/l or more ■ Biochemical Oxygen Demand 5 days 20^{O}C 3mg/l or less

Designated-Best-Use	Class	Criteria
Propagation of Wild life and Fisheries	D	■ pH between 6.5 to 8.5 ■ Dissolved Oxygen 4mg/l or more ■ Free Ammonia (as N) 1.2 mg/l or less
Irrigation, Industrial Cooling, Controlled Waste disposal	E	■ pH between 6.0 to 8.5 ■ Electrical Conductivity at 25^{O}C micro mhos/cm Max.2250 ■ Sodium absorption Ratio Max. 26 ■ Boron Max. 2mg/l
	Below-	Not Meeting A, B, C, D & E Criteria

Source: Central Pollution Control Board

IFC/WB Guidelines for Treated Sanitary Sewage Discharge

Indicative values for treated sanitary sewage discharges are given in below table. These are applicable to meet national or local standards or in the absence of national standards for sanitary wastewater discharges and where either a septic system or land is used as part of treatment system.

Table F5 Indicative Values for Treated Sanitary Wastewater Discharges

Pollutants	Units	Guideline Value
pH	pH	6-9
BOD	mg/l	30
COD	mg/l	125
Total Nitrogen	mg/l	10
Total Phosphorous	mg/l	2
Oil and grease	mg/l	10
Total suspended solids	mg/l	50
Total Coliform bacteria	MPN*/100ml	400

Source: General EHS Guidelines, World Bank Group, April 2007

**MPN = Most Probable Number*

1.3 Noise Standards

Noise standards specified by the MoEFCC vide gazette notification dated 14th February, 2000 based on the A weighted equivalent noise level (Leq) are as presented in table below:

Table F6 Ambient Noise Standards

Area Code	Category of Area	Limits in dB(A) Leq	
		Day time*	Night Time
A	Industrial Area	75	70
B	Commercial Area	65	55
C	Residential Area	55	45
D	Silence Zone**	50	40

Note:*Day time is from 6 am to 10 pm, Night time is10.00 pm to 6.00 am;**Silence zone is an area comprisingnot less than 100 meters around premises of hospitals, educational institutions, courts, religious places or anyother area which is declared as such by

the competent authority. Use of vehicle horns, loud speakers and bursting of crackers are banned in these zones. Source: Noise Pollution (Regulation and control) Rules, 2000

IFC/WB Noise Standards

As per the IFC/WB, General EHS Guidelines on noise management, noise impacts should not exceed the levels presented in below table or result in a maximum increase in background levels of 3 dB at the nearest receptor location off-site.

Table F7 Noise Level Guidelines

Receptor	One Hour LAeq (dBA)	
	Daytime 07:00 - 22:00	Night time 22:00 - 07:00
Residential; Institutional; Educational	55	45
Industrial; Commercial	70	70

Source: IFC/WB, General EHS Guidelines on noise management, 30 April, 2007

Noise Standards for Occupational Exposure

Noise standards in the work environment are specified by Occupational Safety and Health Administration (OSHA-USA) which in turn are being enforced by Government of India through model rules framed under the Factories Act.

Table F8 Standards for Occupational Noise Exposure

Total Time of Exposure per Day in Hours (Continuous or Short term Exposure)	Sound Pressure Level in dB(A)
8	90
6	92
4	95
3	97
2	100
3/2	102
1	105

Total Time of Exposure per Day in Hours (Continuous or Short term Exposure)	Sound Pressure Level in dB(A)
¾	107
½	110
¼	115
Never	>115

Note:

No exposure in excess of 115 dB(A) is to be permitted.

For any period of exposure falling in between any figure and the next higher or lower figure as indicated in column (1), the permissible level is to be determined by extrapolation on a proportionate scale.

IFC/WB Noise Limits for Various Working Environments

Noise limits for different working environments are provided in IFC/ WB EHS Guidelines are presented in below table.

Table F9 Noise Limits for Various Working Environments

Noise Limits for Various Working Environments		
Location/Activity	**Equivalent Level LAeq, 8h**	**Maximum LAmax, fast**
Heavy Industry (no demand for oral communication)	85 dB(a)	110 dB (A)
Light industry (decreasing demand for oral communication)	50-65 dB(A)	110 dB(A)
Open offices, control rooms, service counters or similar	40-50 dB(A)	-
Individual offices (no disturbing noise)	40-45 dB(A)	-
Classrooms Lecture Halls	35-40 dB(A)	-
Hospitals	30-35 dB(A)	40 dB (A)

Source: IFC/WB EHS Guidelines, 2007

APPENDIX G ECOLOGY AND BIODIVERSITY REPORT[36] (ESIA STUDY (2018))

[36] The Ecology and Biodiversity Report except for IUCN list for flora, fauna and birds has been retrieved from the ESIA report prepared for the 250 MW solar power project in Anantapuramu, Andhra Pradesh dated 20.12.2018 prepared by OSL for Ayana

Introduction

Ayana Renewable Power has been set up by CDC Group Plc. to develop significant megawatts (MWs) of renewable energy generation capacities in India and its neighboring countries in South Asia, namely Bangladesh, Nepal, Bhutan, Myanmar and Sri Lanka. In doing so, it will help meet the objective of ensuring transition to low carbon power generation, creating job opportunities in the renewable power sector and contributing towards the development of communities near locations where its power projects will be set up.

Opensense Labs (OSL) having its registered office at 630, Lane Number 3, West End Marg, Saidulajab, Saket New Delhi, 110068, has been assigned by Ayana Ananthapuramu Solar Pvt Ltd, hereafter referred as AASPL to undertake Environmental and Social Impact Assessment (ESIA) of its proposed 250 MW Solar Power Project in Ananthapuramu, Andhra Pradesh state in India.

This Ecology and Biodiversity Report has been prepared as part of referred Environmental and Social Impact Assessment of 250 MW Solar Power Project in Ananthapuramu, Andhra Pradesh state in India. A separate team was commissioned to conduct a details site visit, literature review, collection of primary and secondary data for this ecology and biodiversity study and report.

Ecology and Biodiversity

Biological Environment

An ecological survey of the study area was conducted particularly with reference to recording the existing biological resources in the study area. Ecological studies are one of the important aspects of environmental and social impact assessment with a view to conserve environmental quality and biodiversity. The present objective is to study an area 10 km radius from the proposed project site. Ecological systems show complex inter-relationships between biotic and abiotic components including dependence, competition and mutualism. Biotic components comprise of both plant and animal communities, which interact not only within and between themselves but also with the abiotic components viz. physical and chemical components of the environment. Generally, biological communities are good indicators of climatic and edaphic factors. Studies on biological aspects of ecosystems are important in environmental and social impact assessment for safety of natural flora and fauna. The biological environment includes terrestrial and aquatic ecosystems. The animal and plant communities co-exist in a well-organized manner. Their natural settings can get disturbed by any externally induced anthropological activities or by naturally occurring calamities or disaster. So, once this setting is disturbed, it sometimes is either practically impossible or may take a longer time to come back to its original state. Hence, changes in the status of flora and fauna are an elementary requirement of Environmental and social Impact Assessment studies, in view of the need for conservation of environmental quality and biodiversity. Information on flora and fauna was collected within the study area.

Objectives of Ecological and Biodiversity studies

The main objective of the survey is to collect the information about the ecology and biodiversity of the project site and its surrounding of the project site within 10 km radius. Generation of baseline data from field observations from various terrestrial and aquatic ecosystems;

- To assess the distribution of flora and fauna in and around of the project site
- Compare the data so generated with authentic past records to understand changes
- Characterize the environmental components like land, water, flora and fauna.
- To assess the impacts of the project on the immediate ecology and biodiversity

Methodology adopted for the survey

To accomplish the above objectives, a general ecological survey covering an area of 10 km radius from the proposed project boundary was done as follows:

- Reconnaissance survey for selection of sampling sites in and around the site on the basis of meteorological conditions
- Compilation of secondary data from published literature of forest division and research papers
- Primary data generation through systematic studies which was done through o Generation of primary data to understand baseline ecological status, fauna structure and important floristic elements
  - Preparing a checklist of plants observed at the site
  - Determining the bird population by taking random readings at every location.
  - Observing mammals, reptiles, amphibians, insects through their calls droppings, burrows, pugmarks and other signs.
  - Interaction with local residents.
- Collection of secondary data from forest working plan and gazetteers. The compilation of primary and secondary data for flora and fauna is appended.
- Primary data collected from project site and also surrounding villages namely

Flora

Flora within the project area and 10 km radius

The area identified for the Project lies close to NP Kunta village of Kadiri town of Anantapur district. The ecological and biodiversity study has been carried out to actual project zone and its surroundings extending up to 10 km radius is referred to as the buffer zone. The project area is a non-forest wasteland sparsely covered by a few shrubs and some small trees. Major part of the land is government land and was under dry rain-fed non-cultivation before it was acquired by the Andhra Pradesh Solar Power Corporation Pvt. Ltd. (APSPCL) for the Ananthapuramu Ultra Mega Solar Park. A solar power unit has already been established in the park by NTPC and is already in operation. Beside project under study few more are in different stages of obtaining approvals and consents. Plotting had been done and roads are laid.

Karanj (Pongamia pinnata), ber (Ziziphus nummularia), mesquite (Prosopis juliflora), lantana camara, Anisomeles indica, Calotropis procera, Calotropis gigantea, Cassia auriculata, Waltheria indica, Aristida setacea, Scilla indica, Stylosanthes hamata, Solanum xanthocarpum were common wild plants found within 10 km radius. There were some trees of Acacia Fernesiana, Acacia lecophloea, Azimza Tetracantha, neem (Azadirachta indica), tamarind (Tamarindus indica), karanj (Pongamia pinnata), siamese cassia (Cassia siamea) within the project plot. A list of plants found in the study area is given in below table.

Table G1 List of Flora in the Area

Scientific Name	Common Name	Family
Acacia auriculiformis	Australian wattle	Mimosaceae
Acacia farnesiana	Muriki thumma	Mimosaceae
Acacia leucophloea	Tella tumma	Mimosaceae

Scientific Name	Common Name	Family
Acacia nilotica	Nalla tumma	Mimosaceae
Acaia holosericea	Holosericea	Mimosaceae
Aegle marmelos	Maredu	Rutaceae
Anisomeles indica	Moga Biran	Lamiaceae
Aristida setacea	Broom Grass	Poaceae
Azadirachta indica	Vepa	Moraceae
Azima tetracantha	Tella Uppilli	Salvadoraceae
Bothriochloa pertusa	Grass	Poaceae
Breynia retusa	Chinna Purugudu	Euphorbiaceae
Breynia vitis-ideae	Nalla Purugudu	Euphorbiaceae
Calotropis gigantean	Tella Jilledu	Asclepiadaceae
Calotropis procera	Jiledu	Asclepiadaceae
Canthium parviflorum	Balasu	Rubiaceae
Cassia auriculata	Tangedu	Caesalpiniaceae
Chrysopogon fulvus	Grass	Poaceae
Cymbopogon coloratus	Grass	Poaceae
Cynodon dactylon	Grass	Poaceae
Dalbergia sisso	Seesum	Caesalpiniaceae
Eremopogon faveolatus	Grass	Poaceae
Ficus religiosa	Raavi	Moraceae
Heterophragma roxburghii	Kala Goru	Bignoniaceae
Heteropogon contortus	Grass	Poaceae
Ipomoea carnea	Rubber Mokka	Convolvulaceae
Lagerstroemia parviflora	Chennangi	Lythraceae
Lantana camara	Lantana	Verbenaceae
Leptadenia reticulate	Mukkupala Teega	Asclepiadaceae
Leucaena leucocephala	Subabul	Mimosaceae
Limonia acidissima	Velaga	Rutaceae
Mangifera indica	Mamidi	Anacardiaceae
Maytenus emerginata	Danti	Celastraceae
Millingtonia hortensis	Aakaasa malle	Bignoniaceae
Mimosa polyancistra	Thumma	Mimosaceae
Mimosa rubicaulis	Pariki kampa	Mimosaceae
Mimosops elengi	Pogada	Sapotaceae
Morinda pubescens	Togaru	Rubiaceae
Moringa oleifera	Munaga	Moringaceae

Scientific Name	Common Name	Family
Muntingia calabura	Wild cherry	Elaeocarpaceae
Opuntia dillenii	Naaga Jemudu	Cactaceae
Oroxylum indicum	Dundilam	Bignoniaceae
Parkinsonia aculeate	Jeeluga	Widespread
Peltophorum pterocarpum	Konda chinta	Caesalpiniaceae
Pergularia daemia	Dustapa teega	Asclepiadaceae
Phoenix sylvestris	Eetha	Arecaceae
Phyllanthus emblica	Usiri	Euphorbiaceae
Phyllanthus reticulatus	Pulasari / Puliseru	Euphorbiaceae
Pithecellobium dulce	Seema chinta	Mimosaceae
Plumeria alba	Tella devaganneru	Apocynaceae
Plumeria pudica	Frangipani	Apocynaceae
Plumeria rubra	Erra devaganneru	Apocynaceae
Polyalthia longifolia	Ashoka	Annonaceae
Polyalthia pendula	Asoka	Annonaceae
Pongamia pinnata	Gaanuga	Fabaceae
Prosopis juliflora	English tumma	Mimosaceae
Prosopis spicigera	Jammi chettu	Mimosaceae
Quisqualis indica	Rangoon creeper	Combretaceae
Samanea saman	Nidrabhangi	Mimosaceae
Sapindus emarginatus	Kunkundu	Sapindaceae
Scilla hyacinthina	Adavi Tellagadda	Liliaceae
Spathodea companulata	Flame of the forest	Bignoniaceae
Sterculia foetida	Adavi badam	Sterculiaceae
Stylosanthes hamate	Hamata grass	Fabaceae
Syzigium cumini	Neradu	Myrtaceae
Tabernaemontana coronaria	Nandivardhanam	Apocynaceae
Tamarindus indica	Chinta	Caesalpiniaceae
Tarenna asiatica	Kommi	Rubiaceae
Tecoma capensis	Cape Honey suckle	Bignoniaceae
Tecoma stans	Patcha turai	Bignoniaceae
Tectona grandis	Teak / Teku	Verbenaceae
Terminalia arjuna	Tella maddi	Combretaceae
Terminalia catappa	Baadam	Combretaceae
Thespecia populnea	Ganga Raavi	Malvaceae
Thevetia nerifolia	Yellow oleander	Apocynaceae

Scientific Name	Common Name	Family
Tylophora indica	Kukkapala teega	Asclepiadaceae
Vitex negundo	Vaavili / Nirgundi	Verbenaceae
Wattakaka volubilis	Tummudu teega	Asclepiadaceae
Withania somnifera	Aswagandha	Solanaceae
Wrightia tinctoria	Pala –kordusha	Apocynaceae
Ziziphus nummularia	Nela Regu	Rhamnaceae
Ziziphus mauritiana	Regu	Rhamnaceae

Table G2 Global IUCN Category of Flora

SN	Scientific Name	Common Name	Family	IUCN Status (v. 2020-1)
1	*Acacia auriculiformis*	Australian Wattle	Mimosaceae	LC
2	*Acacia farnesiana*	Muriki Thumma	Mimosaceae	LC
3	*Acacia leucophloea*	Tella Tumma	Mimosaceae	LC
4	*Acacia nilotica*	Nalla Tumma	Mimosaceae	LC
5	*Acaia holosericea*	Holosericea	Mimosaceae	NE
6	*Aegle marmelos*	Maredu	Rutaceae	NE
7	*Anisomeles indica*	Moga Biran	Lamiaceae	NE
8	*Aristida setacea*	Broom Grass	Poaceae	NE
9	*Azadirachta indica*	Vepa	Moraceae	LC
10	*Azima tetracantha*	Tella Uppilli	Salvadoraceae	NE
11	*Bothriochloa pertusa*	Grass	Poaceae	NE
12	*Breynia retusa*	Chinna Purugudu	Euphorbiaceae	LC
13	*Breynia vitis-ideae*	Nalla Purugudu	Euphorbiaceae	LC
14	*Calotropis gigantean*	Tella Jilledu	Asclepiadaceae	NE
15	*Calotropis procera*	Jiledu	Asclepiadaceae	NE
16	*Canthium parviflorum*	Balasu	Rubiaceae	NE
17	*Cassia auriculata*	Tangedu	Caesalpiniaceae	NE
18	*Chrysopogon fulvus*	Grass	Poaceae	NE
19	*Cymbopogon coloratus*	Grass	Poaceae	NE
20	*Cynodon dactylon*	Grass	Poaceae	NE
21	*Dalbergia sissoo*	Seesum	Caesalpiniaceae	NE
22	*Eremopogon faveolatus*	Grass	Poaceae	NE

SN	Scientific Name	Common Name	Family	IUCN Status (v. 2020-1)
23	*Ficus religiosa*	Raavi	Moraceae	NE
24	*Heterophragma roxburghii*	Kala Goru	Bignoniaceae	NE
25	*Heteropogon contortus*	Grass	Poaceae	NE
26	*Ipomoea carnea*	Rubber Mokka	Convolvulaceae	NE
27	*Lagerstroemia parviflora*	Chennangi	Lythraceae	NE
28	*Lantana camara*	Lantana	Verbenaceae	NE
29	*Leptadenia reticulata*	Mukkupala Teega	Asclepiadaceae	NE
30	*Leucaena leucocephala*	Subabul	Mimosaceae	NE
31	*Limonia acidissima*	Velaga	Rutaceae	NE
32	*Mangifera indica*	Mamidi	Anacardiaceae	DD
33	*Maytenus emerginata*	Danti	Celastraceae	NE
34	*Millingtonia hortensis*	Aakaasa Malle	Bignoniaceae	NE
35	*Mimosa polyancistra*	Thumma	Mimosaceae	LC
36	*Mimosa rubicaulis*	Pariki Kampa	Mimosaceae	NE
37	*Mimosops elengi*	Pogada	Sapotaceae	NE
38	*Morinda pubescens*	Togaru	Rubiaceae	NE
39	*Moringa oleifera*	Munaga	Moringaceae	NE
40	*Muntingia calabura*	Wild Cherry	Elaeocarpaceae	NE
41	*Opuntia dillenii*	Naaga Jemudu	Cactaceae	NE
42	*Oroxylum indicum*	Dundilam	Bignoniaceae	NE
43	*Parkinsonia aculeata*	Jeeluga	Widespread	LC
44	*Peltophorum pterocarpum*	Konda Chinta	Caesalpiniaceae	NE
45	*Pergularia daemia*	Dustapa Teega	Asclepiadaceae	NE
46	*Phoenix sylvestris*	Eetha	Arecaceae	NE
47	*Phyllanthus emblica*	Usiri	Euphorbiaceae	NE
48	*Phyllanthus reticulatus*	Pulasari / Puliseru	Euphorbiaceae	NE
49	*Pithecellobium dulce*	Seema Chinta	Mimosaceae	LC
50	*Plumeria alba*	Tella Devaganneru	Apocynaceae	NE
51	*Plumeria pudica*	Frangipani	Apocynaceae	LC
52	*Plumeria rubra*	Erra Devaganneru	Apocynaceae	LC
53	*Polyalthia longifolia*	Ashoka	Annonaceae	NE
54	*Polyalthia pendula*	Asoka	Annonaceae	NE

SN	Scientific Name	Common Name	Family	IUCN Status (v. 2020-1)
55	*Pongamia pinnata*	Gaanuga	Fabaceae	LC
56	*Prosopis juliflora*	English Tumma	Mimosaceae	NE
57	*Prosopis spicigera*	Jammi Chettu	Mimosaceae	NE
58	*Quisqualis indica*	Rangoon Creeper	Combretaceae	NE
59	*Samanea saman*	Nidrabhangi	Mimosaceae	LC
60	*Sapindus emarginatus*	Kunkundu	Sapindaceae	NE
61	*Scilla hyacinthina*	Adavi Tellagadda	Liliaceae	NE
62	*Spathodea companulata*	Flame Of The Forest	Bignoniaceae	NE
63	*Sterculia foetida*	Adavi Badam	Sterculiaceae	NE
64	*Stylosanthes hamate*	Hamata Grass	Fabaceae	NE
65	*Syzygium cumini*	Neradu	Myrtaceae	LC
66	*Tabernaemontana coronaria*	Nandivardhanam	Apocynaceae	NE
67	*Tamarindus indica*	Chinta	Caesalpiniaceae	LC
68	*Tarenna asiatica*	Kommi	Rubiaceae	NE
69	*Tecoma capensis*	Cape Honey Suckle	Bignoniaceae	NE
70	*Tecoma stans*	Patcha Turai	Bignoniaceae	LC
71	*Tectona grandis*	Teak / Teku	Verbenaceae	NE
72	*Terminalia arjuna*	Tella Maddi	Combretaceae	NE
73	*Terminalia catappa*	Baadam	Combretaceae	LC
74	*Thespesia populnea*	Ganga Raavi	Malvaceae	LC
75	*Thevetia neriifolia*	Yellow Oleander	Apocynaceae	NE
76	*Tylophora indica*	Kukkapala Teega	Asclepiadaceae	NE
77	*Vitex negundo*	Vaavili / Nirgundi	Verbenaceae	LC
78	*Wattakaka volubilis*	Tummudu Teega	Asclepiadaceae	NE
79	*Withania somnifera*	Aswagandha	Solanaceae	DD
80	*Wrightia tinctoria*	Pala –Kordusha	Apocynaceae	LC
81	*Ziziphus nummularia*	Nela Regu	Rhamnaceae	NE
82	*Ziziphus mauritiana*	Regu	Rhamnaceae	LC

LC	Least Concern
VU	Vulnerable
NE	Not Evaluated

Vegetation and Flora of the Study Area

Land use and land cover of the study area reveals the absence of any National Parks or Wildlife Sanctuaries or Reserve Forests or Biosphere Reserves or Important Bird Areas (IBAs) or Protected Wetlands and perennial water bodies within 10 km radius of the project. The project area or allotted plot is surrounded mainly by rocky undulations and wastelands. Two villages are present in the study area but are away from actual project plot.

There are many non-cultivable wastelands sparsely covered with thorny bushes of Maytenus emarginata, Prosopis juliflra, Acacia nilotica as well as Lantana camara, Calotropis gigantea, Calotropis procera, Cassia auriculata and others.

Sapota, mango, orange, guava and pomegranate are the major fruit trees among village lands but are largely absent from project area. Eucalyptus and teak are the main pulpwood and timber plantations. There are no rare, endangered and threatened (RET) species existing under wild conditions. Few Trees, shrubs and perennial climbers found in the study area are shown in photo plates underneath.

Figure G1 Site Photographs showing Dis-continuous Vegetation Cover

Discontinued vegetation

Fauna

There are no forests or wildlife habitats, wetlands or IBAs. As such there are no chances of occurrence of any Rare or Endangered or Endemic or Threatened (REET) species within the project plot and study area of 10 km radius. There are no Sanctuaries, National Parks, Tiger Reserve or Biosphere Reserve or Elephant Corridor or other protected areas within 10 km of radius from core zone. It is evident from the available records, reports and circumstantial evidence that the entire study area including the core and buffer zones were free from any endangered animals. Among the mammals, only squirrels, mongoose, rats, bandicoots and rabbits were seen but rarely during the survey.

Monkeys were also rare. Among the reptiles, lizards, garden lizards were very common. No snakes or monitor lizard was seen during the survey. The amphibians were also rare. A list of mammals, reptiles and amphibians either found or reported from the area is given in Table 0.2. A list of birds is given in Table 3. There were no resident birds other than crows, parrots, doves, and weaver birds, swifts, quails and mynas. It is apparent from the list that none of the species either spotted or reported is included in Schedule I of the Wildlife Protection Act.

Table G3 List of Fauna

Scientific Name	Common Name	Local Name	WPA
Mammals			
Bandicota indica	Large bandicoot rat	Pandikokku	IV
Cynopterus sphinx	Short-nosed fruit bat	Gabbilam	IV
Funambulus palmarum	Three striped squirrel	Udatha	IV
Golunda ellioti	Indian bush rat	Yeluka	IV
Herpestes edwardsii	Indian grey mongoose	Mungeesa	IV
Hystrix indica	Indian crested porcupine	Mullapandi	IV
Macaca mulatta	Rhesus Macaque	Kothi	II
Mus booduga	Common Indian field mouse	Yeluka	IV
Mus musculus	Home mouse	Yeluka	IV
Nosokia indica	Bandicoot rat	Pandikokku	IV
Pipistrellus mimus	Indian pygmy pipistrelle	Gabbilam	IV
Plecotus auritus	Long-eared bat	Gabbilam	IV
Rattus rattus	Common Indian rat	Yeluka	IV
Scotophillus heathi	Greater yellow bat	Gabbilam	IV

Scientific Name	Common Name	Local Name	WPA
Suncus etruscus	Savvy pygmy shrew	Chuchu	IV
Suncus murinus	House shrew	Chuchu	IV
Sus scrofa	Wild boar	Adavi Pandi	III
Reptiles			
Bungarus caeruleus	Common Indian Krait	Katla paamu	II
Calotes versicolor	Garden lizard	Thonda	IV
Chameleon zeylanicus	Chameleon	Oosaravelli	IV
Chrysopelea taprobanica	Tree Snake	Pasirika paamu	II
Dryphis nasutus	Whip Snake	Whip Snake	II
Echis carinatus	Saw scaled viper	Pinjari	II
Geochelone elegans	Indian star tortoise	Nakshatra taabelu	II
Hemidactylus flaviviridis	Indian wall lizard	Balli	IV
Naja naja	Cobra	Naagu paamu	II
Ptyas mucosa	Rat snake	Jerri pothu	II
Typhlops diardii	Blind Snake	Blind snake	II
Typhlops porrectus	Slender Blind Snake	Blind snake	II
Varanus bengalensis	Common Indian Monitor	Udumu	II
Vipera russseli	Russell's viper	Rakta pinjari	II
Amphibians			
Bufo melonosticatus	Common Indian Toad	Toad	IV
Hoplobatrachus tigerinus	Tiger Frog	Kappa	IV
Hyla arboria	Tree Frog	Chettu kappa	IV
Rana hexadactyla.	Green Pond Frog	Kappa	IV
Sphaerotheca breviceps	Indian Burrowing frog	Burada kappa	IV

Table G4 Global IUCN Category of Fauna

SN	Scientific Name	Common Name	Local Name	WPA 1972 Schedule	IUCN Status (v. 2020-1)
	Mammals				
1	*Bandicota indica*	Large bandicoot rat	Pandikokku	IV	LC
2	*Cynopterus sphinx*	Short-nosed fruit bat	Gabbilam	IV	LC
3	*Funambulus palmarum*	Three striped squirrel	Udatha	IV	LC
4	*Golunda ellioti*	Indian bush rat	Yeluka	IV	LC
5	*Herpestes edwardsii*	Indian grey mongoose	Mungeesa	IV	LC
6	*Hystrix indica*	Indian crested porcupine	Mullapandi	IV	LC

SN	Scientific Name	Common Name	Local Name	WPA 1972 Schedule	IUCN Status (v. 2020-1)
7	*Macaca mulatta*	Rhesus Macaque	Kothi	II	LC
8	*Mus booduga*	Common Indian field mouse	Yeluka	IV	LC
9	*Mus musculus*	Home mouse	Yeluka	IV	LC
10	*Nesokia indica*	Bandicoot rat	Pandikokku	IV	LC
11	*Pipistrellus mimus*	Indian pygmy pipistrelle	Gabbilam	IV	NE
12	*Plecotus auritus*	Long-eared bat	Gabbilam	IV	LC
13	*Rattus rattus*	Common Indian rat	Yeluka	IV	LC
14	*Scotophillus heathi*	Greater yellow bat	Gabbilam	IV	NE
15	*Suncus etruscus*	Savvy pygmy shrew	Chuchu	IV	LC
16	*Suncus murinus*	House shrew	Chuchu	IV	LC
17	*Sus scrofa*	Wild boar	Adavi Pandi	III	LC
	Reptiles				
18	*Bungarus caeruleus*	Common Indian Krait	Katla paamu	II	NE
19	*Calotes versicolor*	Garden lizard	Thonda	IV	NE
20	*Chameleon zeylanicus*	Chameleon	Oosaravelli	IV	NE
21	*Chrysopelea taprobanica*	Tree Snake	Pasirika paamu	II	NE
22	*Dryphis nasutus*	Whip Snake	Whip Snake	II	NE
23	*Echis carinatus*	Saw scaled viper	Pinjari	II	NE
24	*Geochelone elegans*	Indian star tortoise	Nakshatra taabelu	II	VU
25	*Hemidactylus flaviviridis*	Indian wall lizard	Balli	IV	NE
26	*Naja naja*	Cobra	Naagu paamu	II	NE
27	*Ptyas mucosa*	Rat snake	Jerri pothu	II	NE

SN	Scientific Name	Common Name	Local Name	WPA 1972 Schedule	IUCN Status (v. 2020-1)
28	*Typhlops diardii*	Blind Snake	Blind snake	II	NE
29	*Typhlops porrectus*	Slender Blind Snake	Blind snake	II	NE
30	*Varanus bengalensis*	Common Indian Monitor	Udumu	II	LC
31	*Vipera russeli*	Russell's viper	Rakta pinjari	II	LC
	Amphibians				
32	*Bufo melonostictus*	Common Indian Toad	Toad	IV	NE
33	*Hoplobatrachus tigerinus*	Tiger Frog	Kappa	IV	LC
34	*Hyla arboria*	Tree Frog	Chettu kappa	IV	NE
35	*Rana hexadactyla*	Green Pond Frog	Kappa	IV	NE
36	*Sphaerotheca breviceps*	Indian Burrowing frog	Burada kappa	IV	NE

LC	Least Concern
VU	Vulnerable
NE	Not Evaluated

Table G5 List of Birds

Scientific Name	Common Name	Local Name	WPA
Accipiter badius	Shikra	Accipitridae	IV
Acridotheres tristis	Common myna	Sturnidae	IV
Aegithinia tiphia	Common Iora	Irenidae	IV
Alcedo atthis	Smallblue kingfisher	Alcedinidae	IV
Athene brama	Spotted owlet	Noctuidae	IV
Bubulcus ibis	Cattle Egret	Ardeidae	IV
Centropus sinasis	Greater coucal	Phasianidae	IV
Ceryle rudis	Lesser pied Kingfisher	Alcedinidae	IV
Columba livia	Blue rock pigeon	Columbidae	IV
Coracias benghalensis	Indian roller	Coraciidae	IV
Corvus splendens	House crow	Corvidae	V
Dendrocitta vagabunda	Indian tree pie	Corvidae	IV
Dendrocygna javanica	Lesser whistling-duck	Anatidae	IV

Scientific Name	Common Name	Local Name	WPA
Dicaeum erythrorhynchos	Tickell's flower pecker	Dicaeidae	IV
Dicrurus macrocercus	Black drongo	Dicruridae	IV
Egretta garzetta	Little egret	Ardeidae	IV
Elanus caeruleus	Black-shouldered kite	Accipitridae	IV
Eudynamys scolopace	Asian koel	Cuculidae	IV
Halcyon smyrnensis	White-Breasted King fisher	Alcedinidae	IV
Hierococcyx varius	Brain fever bird	Ardeidae	IV
Himantopus himantopus	Black-winged stilt	Recurvirostridae	IV
Hydrophasianus chrugus	Pheasant tailed Jacana	Jacanidae	IV
Lanius excubitor	Great grey shrike	Daniidae	IV
Ixobrychus cinnamomeus	Chestnut bittern	Ardeidae	IV
Megalaima haemacephala	Copper smith Barbet	Capitonidae	IV
Merops orientalis	Small Bee eater	Meropidae	IV
Milvus migrans	Black kite	Accipitridae	IV
Motacilla alba	White wagtail	Motacillidae	IV
Motacilla flava	Yellow wagtail	Motacillidae	IV
Motacilla maderaspatensis	Large pied wagtail	Motacillidae	IV
Nectarinia asiatica	Purple sunbird	Nectariniidae	IV
Nectarinia zeylonica	Purple-rumped sunbird	Nectariniidae	IV
Oriolus oriolus	Eurasian golden oriole	Oriolidae	IV
Passer domesticus	House sparrow	Passeridae	IV
Perirocotus cinnomomeus	Small Minivet	Phasianidae	IV
Phalacrocorax carbo	Large Cormorant	Phalacrocoracida e	IV
Phalacrocorax niger	Little cormorant	Phalacrocoracida e	IV
Porphyrio porphyrio	Purple moorhen	Rallidae	IV
Prinia inornata	Plain prinia	Cisticolidae	IV
Prinia socialis	Ashy prinia	Cisticolidae	IV
Psittacula cyanocephala	Blossom headed Parakeet	Psittacidae	IV
Psittacula krameri	Rose-Ringed Parakeet	Psittacidae	IV
Pycnonotus cafer	Red-vented bulbul	Pycnonotidae	IV
Saxicolodies fulicata	Indian robin	Turdinae	IV
Streptopelia chinensis	Spotted dove	Columbidae	IV
Streptopelia decaocto	Eurasian Collared-Dove	Columbidae	IV

Scientific Name	Common Name	Local Name	WPA
Streptopelia Senegalensis	Little brown dove	Columbidae	IV
Streptopelia tranquebarica	Red Collared-Dove	Columbidae	IV
Sturnus pagodarum	Brahminy starling	Sturnidae	IV
Turdoides caudatus	Common babbler	Timalinae	IV
Upupa epops	Common hoopoe	Upupidae	IV
Vanellus indicus	Red-wattled lapwing	Charadriidae	IV

Table G6 Global IUCN Category of Bird

SN	Scientific Name	Common Name	Family	WPA 1972 Schedule	IUCN Status (v. 2020-1)
1	*Accipiter badius*	Shikra	Accipitridae	I	LC
2	*Acridotheres tristis*	Common Myna	Sturnidae	IV	LC
3	*Aegithina tiphia*	Common Iora	Irenidae	IV	LC
4	*Alcedo atthis*	Small Blue Kingfisher	Alcedinidae	IV	LC
5	*Athene brama*	Spotted Owlet	Noctuidae	IV	LC
6	*Bubulcus ibis*	Cattle Egret	Ardeidae	IV	LC
7	*Centropus sinasis*	Greater Coucal	Phasianidae	IV	LC
8	*Ceryle rudis*	Lesser Pied Kingfisher	Alcedinidae	IV	LC
9	*Columba livia*	Blue Rock Pigeon	Columbidae	IV	LC
10	*Coracias benghalensis*	Indian Roller	Coraciidae	IV	LC
11	*Corvus splendens*	House Crow	Corvidae	V	LC
12	*Dendrocitta vagabunda*	Indian Tree Pie	Corvidae	IV	LC
13	*Dendrocygna javanica*	Lesser Whistling-Duck	Anatidae	IV	LC
14	*Dicaeum erythrorhynchos*	Tickell's Flower Pecker	Dicaeidae	IV	LC
15	*Dicrurus macrocercus*	Black Drongo	Dicruridae	IV	LC
16	*Egretta garzetta*	Little Egret	Ardeidae	IV	LC
17	*Elanus caeruleus*	Black-Shouldered Kite	Accipitridae	I	LC
18	*Eudynamys scolopace*	Asian Koel	Cuculidae	IV	LC

SN	Scientific Name	Common Name	Family	WPA 1972 Schedule	IUCN Status (v. 2020-1)
19	*Halcyon smyrnensis*	White-breasted Kingfisher	Alcedinidae	IV	LC
20	*Hierococcyx varius*	Brain Fever Bird	Ardeidae	IV	LC
21	*Himantopus himantopus*	Black-winged Stilt	Recurvirostridae	IV	LC
22	*Hydrophasianus chrurgus*	Pheasant Tailed Jacana	Jacanidae	IV	LC
23	*Lanius excubitor*	Great Grey Shrike	Daniidae	IV	LC
24	*Ixobrychus cinnamomeus*	Chestnut Bittern	Ardeidae	IV	LC
25	*Megalaima haemacephala*	Copper Smith Barbet	Capitonidae	IV	LC
26	*Merops orientalis*	Small Bee Eater	Meropidae	IV	LC
27	*Milvus migrans*	Black Kite	Accipitridae	I	LC
28	*Motacilla alba*	White Wagtail	Motacillidae	IV	LC
29	*Motacilla flava*	Yellow Wagtail	Motacillidae	IV	LC
30	*Motacilla maderaspatensis*	Large Pied Wagtail	Motacillidae	IV	LC
31	*Nectarinia asiatica*	Purple Sunbird	Nectariniidae	IV	LC
32	*Nectarinia zeylonica*	Purple-rumped Sunbird	Nectariniidae	IV	LC
33	*Oriolus oriolus*	Eurasian Golden Oriole	Oriolidae	IV	LC
34	*Passer domesticus*	House Sparrow	Passeridae	IV	LC
35	*Perirocotus cinnomomeus*	Small Minivet	Phasianidae	IV	LC
36	*Phalacrocorax carbo*	Large Cormorant	Phalacrocoracidae	IV	LC
37	*Phalacrocorax niger*	Little Cormorant	Phalacrocoracidae	IV	LC
38	*Porphyrio porphyrio*	Purple Moorhen	Rallidae	IV	LC
39	*Prinia inornata*	Plain Prinia	Cisticolidae	IV	LC

SN	Scientific Name	Common Name	Family	WPA 1972 Schedule	IUCN Status (v. 2020-1)
40	*Prinia socialis*	Ashy Prinia	Cisticolidae	IV	LC
41	*Psittacula cyanocephala*	Blossom-headed Parakeet	Psittacidae	IV	LC
42	*Psittacula krameri*	Rose-ringed Parakeet	Psittacidae	IV	LC
43	*Pycnonotus cafer*	Red-vented Bulbul	Pycnonotidae	IV	LC
44	*Saxicolodies fulicata*	Indian Robin	Turdinae	IV	LC
45	*Streptopelia chinensis*	Spotted Dove	Columbidae	IV	LC
46	*Streptopelia decaocto*	Eurasian Collared Dove	Columbidae	IV	LC
47	*Streptopelia Senegalensis*	Little Brown Dove	Columbidae	IV	LC
48	*Streptopelia tranquebarica*	Red Collared Dove	Columbidae	IV	LC
49	*Sturnus pagodarum*	Brahminy Starling	Sturnidae	IV	LC
50	*Turdoides caudatus*	Common Babbler	Timalinae	IV	LC
51	*Upupa epops*	Common Hoopoe	Upupidae	IV	LC
52	*Vanellus indicus*	Red-wattled Lapwing	Charadriidae	IV	LC

LC: Least Concern

Aquatic Flora and Fauna

There are several small village / irrigation tanks no perennial water bodies in the study area. All the tanks have become fully dry and there are no aquatic plants or aquatic fauna in the study area.

Plants of Conservation Value

There was no plant species observed within project & study area with conservation value.

Wildlife Sanctuaries/ National Parks/ Reserve Forest Areas

There are no ecologically sensitive areas such as the Wildlife Sanctuaries, National Parks, Biosphere Reserves, Important Bird Areas (IBAs), Wetlands or any other protected area either in the project site or in the study area. There are no reserve forests also.

APPENDIX H DETAILS OF STAKEHOLDER CONSULTATIONS UNDERTAKEN DURING 2018 ESIA PREPARATION

Details of Stakeholder Consultation undertaken during 2018 ESIA

S.No	Stakeholder type	Place/Village	Date
1	Project proponent	Ayana team at Project Site	10.09.2018 11.09.2018
2	Community	Social workers and members from the community	10.09.2018 11.09.2018
3	Land Owners	NP Kunta	10.09.2018 11.09.2018
4	SPDD	APSPCL	10.09.2018 11.09.2018

Details of Stakeholder Interactions undertaken during 2018 ESIA

Stakeholder	Details of interactions
APSPCL representatives	At the time of site visit and reconnaissance survey, OSL team met the representatives of APSPCL who the "developers" of this project are situated at site and had informal discussions with them. From the discussion it was learnt that Land development official of APSPCL who is responsible for procurement of revenue, assigned and patta land, and for coordinating with Government Department for allotment of land and ensuring all procedural requirements for land acquisition on day to day basis. The officer informed that land for solar power park is identified and compensation value for the land is deposited with district administration. 99% land belongs to the government and approximately 1 % of total land is patta land or private land. The officer informed that the community expects job in the solar power park.
Local Inhabitants/Villagers	Responses of few members from the N.P Kunta village are as follows: Personal Interactions/ Focused group discussion was held with villagers of NP Kunta from 10/09/2018 to 11/09/2018. Some of the key responses noted during the meeting are detailed below: Villagers are very much aware of the proposed solar power plant and feel that it will contribute to the socio-economic development of the region. Villagers of NP Kunta village are well informed about the prospects of the project by AASPL officials. Villagers used to cultivate groundnut in the fields 4 years prior to giving away lands to the project. Due to drought conditions in the area, their fields were barren, and no activity was taking place in the last 4 years.

Stakeholder	Details of interactions
	Irregular rains in the region in the past 6 years. Villagers from NP Kunta were informed that one of the family members would be given employment after the completion of proposed project. The main perception and notion of the local population of the project area is “due to the installation of solar power plant there will be increase in employment opportunities, there will be an increase in their income and their standards of living will increase. On the whole, as the area identified for the installation of solar power plant is mostly barren land, undulating and rocky land with only sparsely and scattered patches of dry vegetation clumps with no houses or homestead/hamlets in close proximity to each other. There will be no major (negative) impact due to the installation of solar power plant. Some of the villagers also could not express their actual opinion over the upcoming project but hoped for something positive and fruitful. Ground water is available at a depth of more than 300 ft below ground level. Drinking water pipeline from Satya Sai Drinking water scheme is the main source of drinking water. Few members from the community were concerned over payment of land compensation. Members of community informed that they do not have ownership of the land (no documents) however they were enjoying rights over the land and are claiming compensation for the land.
Other	Personal consultation/interaction was also conducted with other stakeholders like social workers/NGO. The questions covered their general perception on the upcoming solar power project, availability of water, access to healthcare and education and other essential amenities/ commodities with general societal set up. Some of the key responses are enumerated below: Population interacted/interviewed were observed to be supportive to the project but they were not fully aware of the same. They felt that the land being allotted for the project was not of any significant use due to the barren, undulating, rocky infertile and general lack of irrigation facilities; Expectation of better engagement of local community, employment opportunities and financial benefit to local people with the upcoming project The Solar power plant would give enough recognition to the drought affected region of Anantapur district.

Details of Consultations undertaken in 2020

Stakeholder Group	Details of consultations
Assigned Land sellers for AASPL plant	5 land sellers were arranged by Ayana representative for consultations, who hail from village Diguvatipalle and had assigned land in N P Kunta village; As per the consultations, Tehsildar and MRO approached assigned land sellers for the purchase of land identified for the park in around 2015-16; The Passbook possessed by assigned land owner states land ownership details- 2.17 acres land was sold by the consulted Assigned land owner. Their land was last cultivated in 2016 for groundnut and pulses; however the yield is diminished due to no or less rainfall for many years; hence the sale. Compensation offered for 2.17 acres land was approx. 4.5 lacs. Around 30 Assigned land owners in his village sold land for the project and nearly all Assigned land sellers from this village were paid at the same rate. Stakeholder consultation as part of SIA and public hearing were reportedly conducted as part of SIA in 2015-16 Some objections were raised by community due to less payments but no increments in payments after objections in Public hearing. The Assigned land owner is currently cultivating10 acres land in some other village, on an encroachment of Government land. A member of his family is working with EPC contractors for Ayana Plant.
Mandal Revenue Officer, N P Kunta	The solar park is set up on 3 types of land – Government, Private and Assigned land; Assigned Land was given to landless people for livelihoods by state Government. For the Solar Park, approx. 2 lac per acre was given to assigned land owners as compensation. Assigned land- 130 owners- for Ayana (700-800 for the entire 1500 park) – all compensation process completed. Proceedings for Assigned land procurement were conducted under AP Land Acquisition Act For Government land, Land survey was undertaken by NREDCAP and it took possession after review by revenue department. The land possession was finally handed over to APSPCL Private land was directly purchased by APSPCL through sub-registrar's office. There were about 18-20 private land owners for AASPL Plant. Market price of INR 2.5- 3.25 lac per acre was given to private land sellers.

Stakeholder Group	Details of consultations
	Land compensation is 100% completed for entire Solar Park. Given to land owner- RFCTLARR for assigned land APSPCL- fund is paid by Ayana and other such companies The process of land procurement for park lasted for 1.5 years from 2015 – 2017. Possession to Ayana given in 2018. Fencing of AASPL plot for approx. 10 km boundary completed in 2019. There was agitation by 7-8 users of government land, who were identified as encroachers in 2018-19. Government has paid INR 1 lakh as compensation for each claimant and there are no pending litigations now.

APPENDIX I ARPPL'S STAKEHOLDER ENGAGEMENT PROCEDURE

MANAGEMENT PROCEDURE

FOR

GRIEVANCES REDRESSAL, STAKEHOLDER ENGAGEMENT & CONSULTATION

0	15.11.2018	Issued as per ISO 9001:2015, ISO 14001:2015 & ISO 45001-2018 requirements and IFC Principle Standards.	NK	MR	MD
Rev.	**Date**	**Description**	**Prpd.**	**Chkd.**	**Appd.**

CONTENTS

REVISION HISTORY

Rev.	Date	Description	Prpd.	Chkd.	Appd.
0	15.11.18	Issued as per ISO 9001:2015, ISO 14001:2015 & ISO 45001-2018 requirements and IFC Principle Standards.	NK	MR	MD
1	01-03-19	Reviewed and revised for IFC- A good practice handbook for companies doing business in emerging market Stakeholder Engagement	NK	MR	MD

1 PURPOSE

The purpose of this procedure is to provide a management strategy for eliminating or minimizing adverse impact on project affecting host community & stakeholders and vise-versa through-out the lifecycle of the project.

Ayana is into business of renewable energy (Utility Solar and Wind) which are considered to have minimal adverse impact on environment and social aspect especially in terms of pollution which are major cause of community grievance. Renewable Power projects generally are considered as "B" Category project (*Projects with potential limited adverse social or environmental impacts that are few, generally site-specific, largely reversible and readily addressed through mitigation measures*) and are exempted under various environment and social laws in India for example, from obtaining Environment Clearance from MOEF & CC, Government of India, Consent from pollution control board, requirement of Public hearing etc., however Ayana will follow law of land when it will be planning , executing and operating its asset out of India.

With an understanding that when consultation activities are primarily driven by rules and requirements, they tend to become a one -time set of public meetings, typically around the environmental and social assessment process. Such consultation rarely extends in any meaningful way beyond the project planning phase.

Ayana's Grievance redressal and Stakeholder (Community) engagement & consultation procedure is designed as a means of describing a broader, more inclusive and continuous process between Ayana, it's SPVs and those stakeholders who are potentially impacted with range of activities and approaches and span of the entire life of the project.

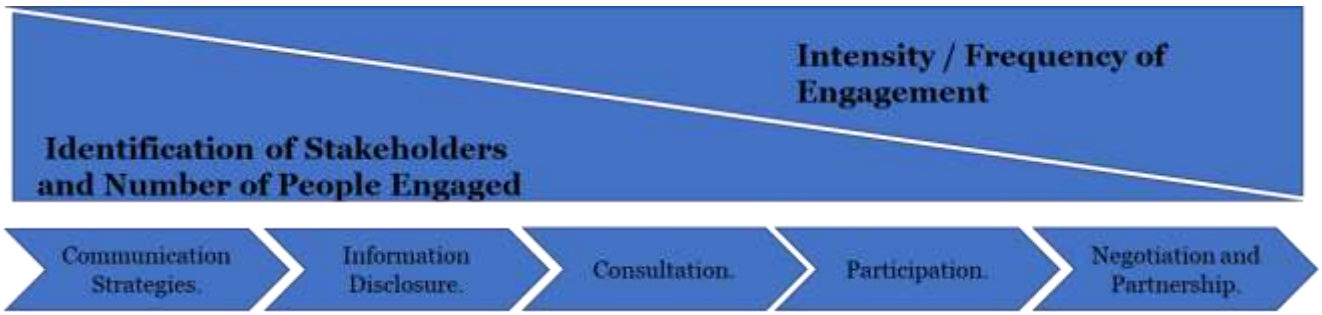


Fig. Ayana's Spectrum of Stakeholder engagement, Community consultation and Grievance redressal.

Ayana's environmental and social risk are limited and few on the surrounding population hence Ayana has focused more on Information disclosure and communication factor of spectrum.

2 SCOPE

This procedure is applicable for complete life cycle of ARPPL and its SPV projects (covering planning, execution, operation, expansion, decommissioning and closure of project). ESIA Study is integral part of planning stage.

3 RESPONSIBILITY AND AUTHORITY

3.1 MD & CEO or his nominee is responsible for effective implementation of this plan during lifecycle of the project with support of designated vertical heads or his representative. He/ She shall be acting as head of Grievance management cell and deploy grievance investigation and management team appropriately.

3.2 Project Execution team and QHSE & CDP team are responsible for Stakeholder consultation and engagement recording the grievance and addressing it at appropriate level, (Head Office, Grievance cell)

3.3 Head QHSE & CDP is responsible for reviewing the management procedure for Grievance, Community Engagement and consultation management system, its effective implementation and advice MD & CEO on continual improvement in the process

4 REFERENCE

QHSE Manual, ARP-IMSM-01	(Clause 4.1)
IFC-Performance Standard 1:	Assessment and Management of Social and Environmental Risks and Impacts, Indigenous People, Cultural Heritage,
IFC-Performance Standard 1:	Addressing Community Health, Safety and Security.
IFC-Good Practice Note:	Addressing Grievance from project affected community –Guidance for Project and companies on designing Grievance Mechanism.
IFC- A good practice handbook for companies doing business in emerging market	Stakeholder Engagement

5 DEFINITIONS

ARP/ARPPL	Ayana Renewable Power Private Limited
IMS	Integrated management system including Quality Management Systems (QMS), Environment Management Systems (EMS) and Occupational health and safety Management Systems (OH&S)
MD	Managing Director
QHSE	Quality, Health, Safety & Environment
Workers	Workers employed by ARPPL, as well as workers directly contracted by ARPPL, carrying out work related activities that are under the control of ARPPL
Stakeholders	Stakeholders are persons or groups who are directly or indirectly affected by a project, as well as those who may have interests in a project and/or the ability to influence its outcome, either positively or negatively. Stakeholders may include locally affected communities or individuals and their formal and informal representatives, national or local government authorities, politicians, religious leaders, civil society organizations and groups with special interests, the academic community, or other businesses.
Affected Stakeholders/Community	Stakeholders who are subjected to actual or potential project-related risk and/ or adverse impacts on their physical environment, health, or livelihood and who are often located in the project's near geographical proximity, particularly those contagious to the existing or the proposed project facility.
Other Stakeholders	Stakeholders that are not located in the project's geographical area of influence and have an interest in a project and/or have ability to influence its outcome.
ESIA	Environmental and social impact assessment

6 Procedure

The plan is applicable for complete life cycle of Ayana's and its SPVs projects (planning, execution, operation, expansion, decommissioning and closure of project). ESIA Study is integral part of planning stage.

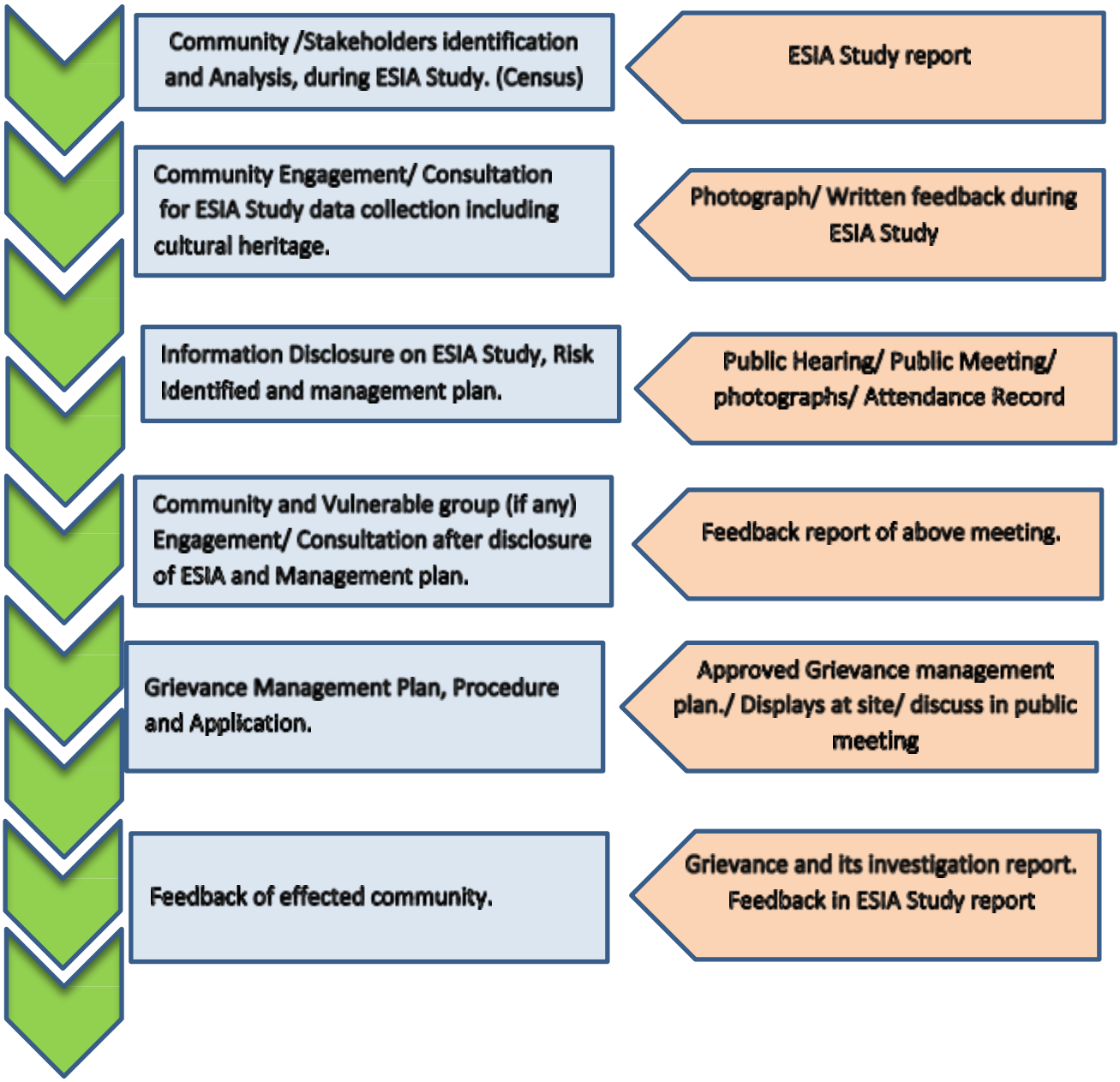


Fig: Community engagement mechanism flow chart

6.1 Ayana's Management plan for Grievance redressal, Stakeholder engagement and Consultation

This plan will be guideline for Grievance redressal, stakeholder engagement and consultation throughout the Ayana's and its SPVs project cycle. The plan makes it clear that "broad community support is a collection of expressions by the affected communities, through individuals, and /or their recognized representative, in support of the project and in integral part of project life cycle.

6.2 Stakeholders identification and analysis

Stakeholder Identification, Prioritization and assessing their interest and concerns: -

Stakeholders (eg. Government bodies, NGOs, Local communities, Indigenous people, contractors, local elected leader, religious leaders, school teachers, and other stakeholders) identification and analysis will be done by Ayana during initial phase of the project which can be while commissioning of ESIA Study. Ayana will identify stakeholders who are directly or indirectly affected by the project activity (project life cycle), their disaggregation in terms of different level of vulnerability to adverse project impacts and their expectation. Ayana will document this in **"List of Interested parties – ARP-IMSM-01-A2"**. The ESIA study can be a medium for this and will also look at communities and individual that will benefit from the project.

Ayana will consider following while stake holder identification: -

- Who will be adversely affected by potential environmental and social impacts in the project area of influence?
- Who are most vulnerable among the potentially impacted and are special engagement efforts necessary?
- At which stage of project development will stakeholders be most affected (eg. Procurement, construction, operation, decommissioning.
- What are the various interests of the project stakeholders and what influence might have on the project?
- Which stakeholder might help to enhance the project design or reduce project cost?
- Which stakeholder can best assist with the early scoping of issues and impacts?
- Who strongly supports or opposes the change that the project brings and why?
- Whose opposition could be detrimental to success of the project?
- Who is critical to be engage with first and why?
- What is optimal sequence of engagement?

This will be supported by cultural and Socio- economic information captured in project specific ESDD and ESIA.

The cultural and socio-economic dimension of the project area may include information on,

- Population Numbers.
- Demographic characteristics of local population.
- Status of women, economic livelihood (permanent seasonal, migrant labour, unemployment) , land, natural resources, cultural heritage etc.
- Social organization and power dynamics.
- Level of Literacy and health care.
- Ability to access technical information.
- Cultural values and perceptions.

Ayana will identify risks and impacts on communities who may be directly and indirectly affected by the project within projects' area of influence, as well as the nature and degree of the expected direct, indirect and cumulative social and cultural (including cultural heritage), and environmental impact on them. This will be captured in **"Register for Environmental and Social Aspect Identification and Impact Assessment (Aspects & Impact Register)- ARP-IMSP-23-F1-R0".** This will be captured during initial stage of the project and may be included within scope of ESIA study.

As project is a dynamic process, stakeholder and their expectation may change with time, hence stakeholder identification and understanding their expectation is a continuous process which will be reviewed and revised during life cycle of the project. A list of Stakeholder/ Interested parties will be prepared for all Ayana project.

6.3 Community Engagement/Consultation

A process of consultation that will be ongoing during project life cycle for example planning, construction, operation & maintenance and decommissioning. This can be done separately or be part of ESIA, Land acquisition process, Due diligence, etc. such that,

a. Affected communities have been engaged in

1. Identifying potential impacts and risks.

2. Assessing the consequences on these impacts and risks on for their lives; and

3. Providing inputs onto the proposed mitigation measures the sharing of development benefits and opportunities and implementation issue; and that

b. New impacts and risk that have come to light during the planning and assessment process have also been constituted upon.

c. The Consultation and Communication will be done in Language understood by the community (English, Hindi and Local Language of the community).

6.4 Information Disclosure

Disclosure is a formal-sounding term for making information accessible to interested and affected parties. Communicating such information in a manner that is understandable to stakeholders is an important first and ongoing process of stakeholder engagement. All other activities, from consultation and informed participation to negotiation and resolution of grievance, will be more constructive if stakeholder, including affected communities, have accurate and timely information about the project , it's impacts, and other aspects that may have an effect on them.
Ayana will ensure that stakeholders are aware of the project and if they are not Ayana will ensure timely disclosure of project information to all project affected Stakeholders, communities including indigenous communities about the purpose, nature and scale of project; the duration of proposed project activities; and expected risks, impact and development benefits that directly affects them or cultural heritage if any in the area. Disclosure will be in a form that is understandable and meaning full. This may be done through discussion with group of members from the community, project information on Ayana's web site, Public meeting or distribution of booklets, directly or through its representative.

Following will be considered in Information disclosure: -

- Being Transparent,
- Disclosing Early,
- Disclose objective and meaningful information," Talk as it is".
- Ensure the accessibility of the information.
- Weigh the risk and the benefits.

There will be situations in which disclosing certain type of information at sensitive stages in the project cycle might entail risks. It is understood, for example, that in the very early stages of project development, reveling Ayana's involvement to its competitors about what Ayana intends to do could pose serious business risks. Such factors will need to be considered in deciding what to disclose and when. Other reasons for non-disclosure might include; commercial and confidentialities and proprietary information, information of a personal privacy, safety or individual security nature; or situation where releasing information very early in the development of a project might unnecessarily raise public expectation, cause speculative behavior, or create unnecessary fears.

However, consideration for non-disclosure need to be weighed against the need for stakeholder group to be informed in order to protect their interests.

- Managing information on sensitive and controversial issues.

  There are certain stakeholder issues, such as land acquisition and resettlement for example, that may be particularly sensitive and thus carry risks to Ayana if information about them is not communicated and managed effectively. In these cases, it may be better to release information about the issues at the same time as conducting face to face consultation. In this way any mis-information and immediate reactions of the affected parties can be addressed right away with the facts.

  In preparing information to support stakeholder consultation on controversial issues, Ayana will employ following measures.

  - Tailor the information to different affected stakeholder.
  - Present the fact and be as transparent as possible.
  - Explain the uncertainties and the limits of these uncertainties.
  - What input will be needed from the stakeholder and how it will be used in the decision- making process.
  - Explain what stakeholder can do and whom they can contact to get more information.

6.5 Consultation and Participation of stakeholders.

Consultation will be a two -way process of dialogues between Ayana and its stakeholders. Ayana's stakeholder consultation is about initiating and sustaining constructive external relationship over times.

Ayana will consult stakeholders with focus on following: -

- Targeted at those most likely to be affected by the project
- Informed as a result of relevant information being disseminated in advance.
- Meaningful to those consulted.
- Two ways so that both sides have the opportunity to exchange views and information.
- Gender inclusive on best effort basis as men and women often have different views.
- Localized to reflect appropriate timeframe, contest and local language.
- Free from manipulation.
- Documented to keep track of who has been consulted and key issues raised.
- If required reported back in a timely way to those consulted with clarification of next steps.

Consultation and participation of stakeholders shall be sufficiently early in the project planning process and during operation and entire life cycle of the project.

1. To allow time for project information to be interpreted and comments and recommendations formulated and discussed.
2. For the constitution to have a meaningful influence on the broad project design options (e.g. shifting cultural heritage, shifting location, routing, sequencing

and scheduling).

3. For the consultation to have a meaningful influence on the choice and design of mitigation measures, the sharing of development benefits and opportunities and project implementation.
4. For designing a meaningful community development plan to meet stakeholder's expectation

Consultation with stakeholders and individuals or group particularly vulnerable to project operation and potential adverse impacts and risks ; based on adequate and relevant disclosure of project information and using method of communication that are inclusive (i.e. accommodating various level of vulnerability), culturally appropriate, and adapted to the communities' language needs and decision making, such that members of these communities fully understand how the project will affect their life.

AYANA will manage to receive feedback from communities during consultation and participation process.

6.6 Negotiation and Partnership (Grievance redressal Mechanism, procedure and application).

Spectrum of Negotiation and Partnership includes,

- Grievance Management,
- Stakeholder Involvement,
- Reporting to stakeholders and
- Ayana's Management function and its roles and responsibilities.

Negotiation and Partnership broadly covered by Grievance redressal mechanism. An effective grievance management procedure, which will be fully functional (defined in the procedure ahead) throughout the suitable process involved in life cycle of the project; and to receive and address the affected communities concerns if any over Ayana's social and environmental performance.

The mechanism will be culturally appropriate, readily accessible to all segments of the affected communities and available to affected communities at no cost and without retribution.

6.7 Addressing Grievance form project affected community

- **What Is a Grievance?**

IFC Good Practice Note on Addressing Grievance from project affected community defines a grievance as a concern or complaint raised by an individual or a group within communities affected by company operations. Both concerns and complaints can result from either real or perceived impacts of a company's operations and may be filed in the same manner and handled with the same procedure. The difference between responses to

a concern or to a complaint may be in the specific approaches and the amount of time needed to resolve it.

The term "grievance" implies that there *may be a* problem. In practice, however, the nature of feedback that communities may want to bring to a company's attention will vary, since communities often find it appropriate to use the same channels to communicate not only grievances but also questions, requests for information, and suggestions. Communities may even use these channels to convey what they think the company is doing well.

Companies should keep in mind that unanswered questions or ignored requests for information have the potential to become problems and should, therefore, be addressed promptly. It is good practice to respond to community feedback through the relevant pillars of community engagement, such as disclosure, consultation, and participation in project monitoring. For example, a question about specific benefits the project provides or intends to provide to women in the community can be forwarded to a community liaison or a staff member who specifically deals with gender matters, if such person has been appointed by the project. The person(s) who asked this question are then notified as to who will respond and by when

- **What Is a Project-Level Grievance Mechanism?**

A project-level grievance mechanism for affected communities is a process for receiving, evaluating, and addressing project-related grievances from affected communities at the level of the company, or project. In the context of relatively large projects, this mechanism may also address grievances against contractors and subcontractors. Project-level grievance mechanisms offer companies and affected communities an alternative to external dispute resolution processes (legal or administrative systems or other public or civic mechanisms). These grievance mechanisms differ from other forms of dispute resolution in that they offer the advantage of a locally based, simplified, and mutually beneficial way to settle issues within the framework of the company–community relationship, while recognizing the right of complainants to take their grievances to a formal dispute body or other external dispute-resolution mechanisms. It should be noted, however, that complex issues that arise from high environmental and social impacts are seldom resolved in a relatively simple way. In such cases, projects should anticipate involvement of various third parties in the resolution process to achieve solutions with affected communities. These include, but are not limited to, various national and international mediation bodies, independent mediators and facilitators with sector- and country-specific expertise, and independent accountability mechanisms of public sector financiers.

- **Who Will Use a Project-Level Grievance Mechanism?**

This project's grievance mechanism is specifically designed with a focus on local communities affected by the project. The task of understanding who will be potentially affected by project operations, and who will therefore use the company grievance mechanism to raise complaints will be ensured during the phase of the Social and Environmental Assessment. Early and strategic interaction with communities will help ensure that the grievance mechanism is culturally acceptable to all affected groups within communities, integrates traditional mechanisms for raising and resolving issues, and reasonably addresses accessibility and other barriers that may prevent communities from raising their concerns.

The focus of the grievance mechanism on the needs of affected communities is substantiated by the fact that they are directly, and in some cases significantly, affected by project operations but often lack viable options or capacity for raising their concerns through formal structures such as the courts. This is especially true for disadvantaged groups within communities. This company grievance mechanism provides a readily accessible means for communities to address issues involving them and the company—directly, rapidly, and at no cost to complainants.

For a grievance mechanism to be effective, all project stakeholders need to understand and support its purpose. Affected communities will be made aware of and understand the grievance mechanism's benefits to them.

Other stakeholder (other than the affected community) will be made to understand why the grievance mechanism is not open to them or their issues and concerns (such as commercial or political disputes) and be informed of the avenues available to them to raise their complaints

- **How Does a Grievance Mechanism Benefit Companies and Communities?**

The company's grievance mechanism and its overall community engagement strategy are linked and is mutually reinforcing. A transparent and legitimate process that is the product of a joint effort between the company and the community enhances their relationship, improves communication, and increases trust.

The grievance management plan will ensure participation of all affected groups and enjoy their support, the process is able to address concerns effectively and in a manner that is mutually beneficial to companies and communities. The grievance management processes can benefit both the company and communities by increasing the likelihood of resolving minor disputes quickly, inexpensively, and fairly— with solutions that reasonably satisfy both sides. Grievance mechanisms can also help identify and resolve issues before they are elevated to formal dispute resolution methods, including the courts.

Recognizing and dealing with affected communities' issues early can benefit the company by reducing operational and reputational risks that may result from leaving such issues unresolved. These risks can have a significant and direct business impact. Protests, road and bridge blockages, violence, suspension of operation and plant closures are just a few examples of how the unsatisfactory handling of community concerns can directly affect a business's bottom line. The grievance mechanism also gives the company access to important information about the project's external environment, and can help

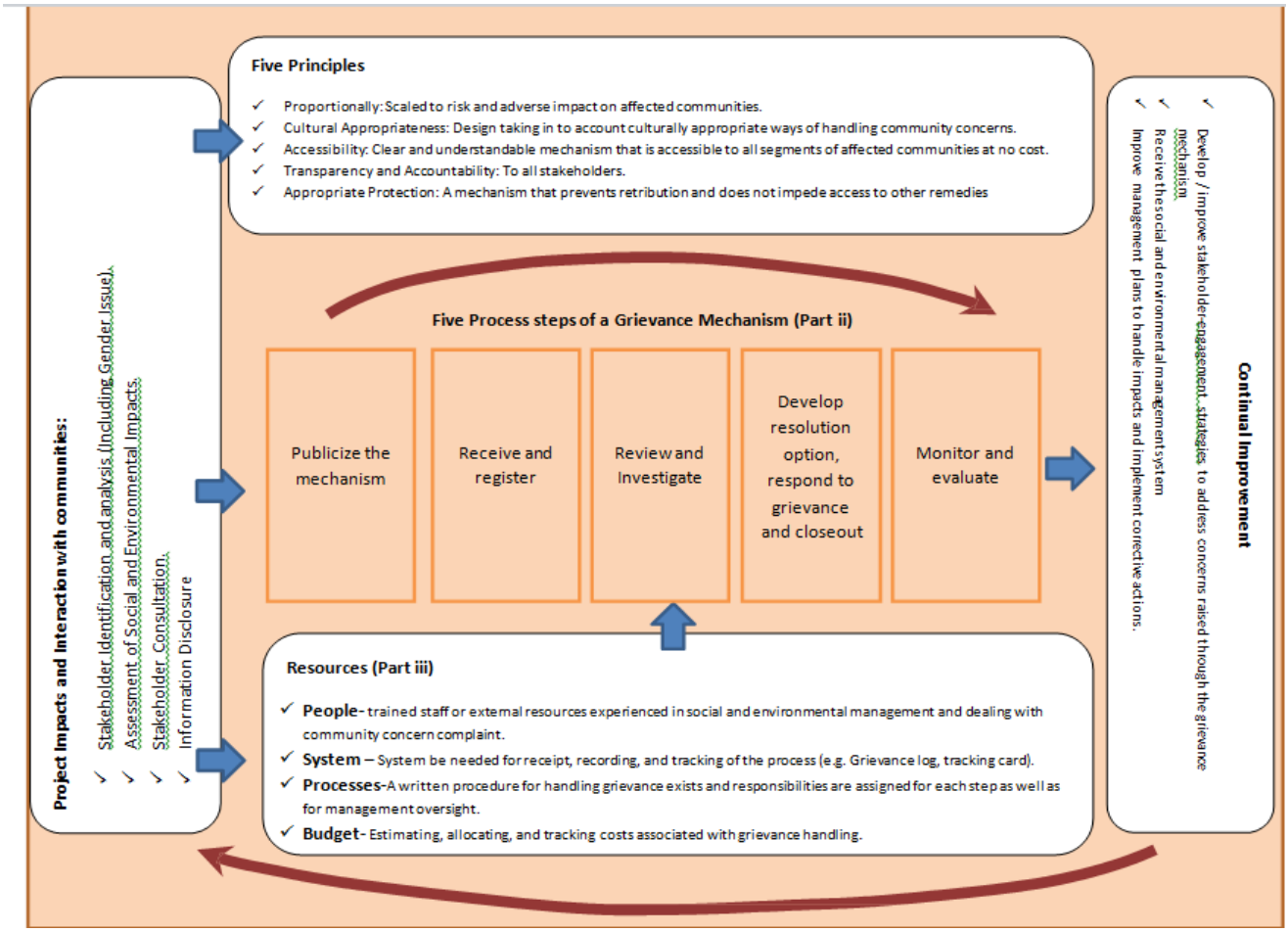
the business identifies and corrects weaknesses in its management systems or production processes. For companies as well as communities, escalation of conflict to courts and other formal tribunals can be lengthy and costly and will not necessarily deliver satisfactory results for either party. For companies, the negative publicity can cause even greater damage. By creating a project-level structure, the company can address the source of the problem more efficiently.

For example:

- Project-level mechanisms offer locally tailored solutions and, unlike many government mechanisms, can cater to local needs and incorporate provisions to accommodate different groups within communities—especially the disadvantaged (such as women, minorities, marginalized groups).

- Where government mechanisms are slow, ineffective, and costly, communities may welcome an opportunity to voice their complaints and receive free, locally based, speedy, and satisfactory resolution.

Fig: Five Principals



6.8 Proportionality: A mechanism scaled to risk and adverse impact on affected communities

To scale a grievance mechanism to risk and adverse impact on affected communities, AYANA will primarily use the results of their social and environmental assessment to understand who will be affected and what the impacts on them are likely to be. This analysis will help determine the necessary complexity of the grievance mechanism design features as well as the nature and amount of resources needed for implementation.

AYANA operating solar and Wind power plants is considered as a project with No or Minimal impacts to Medium Impacts on communities, i.e. the adverse impacts of these projects are limited, site-specific, reversible and readily addressed by mitigation.

AYANA Projects DO NOT POSSES potential significant adverse impacts that are diverse, irreversible, or unprecedented, and that pose risks to communities, which requires a more extensive and far-reaching grievance mechanism.

6.9 Grievances commonly anticipated for AYANA projects are

- Flaw in constitutional Process
- Road and Traffic.
- Access to land and land acquisition.
- Access to Natural Resources.
- Access to project Benefits (e.g. No or insufficient jobs created for local communities.
- Security.
- Influx and In-migration of workers.

6.10 Cultural Appropriateness: Designed to consider culturally appropriate ways of handling community concerns

AYANA's grievance mechanism is designed to consider specific cultural attributes as well as traditional mechanisms for raising and resolving issues—to ensure that the concerns of significantly different groups and subgroups are received and addressed. To achieve this, AYANA will:

- Seek input on culturally acceptable ways to address grievances from significantly different groups within affected communities, including different ethnic or cultural groups within the Ayana's/ project-affected area;
- understand cultural attributes, customs, and traditions that may influence or impede their ability to express their grievances, including differences in the roles and responsibilities of subgroups (especially women) and cultural sensitivities; and
- Agree on the best way to access grievance mechanisms, taking into consideration

the ways communities express and deal with grievances.

6.11 Cultural Attributes and Grievance Mechanisms

AREA	KEY STRATEGIES
Societies with Segregation of Roles and Responsibilities	In different societies there may be political, religious, or social biases, giving some groups power and preferential treatment over others. Where institutionalized forms of segregation exist, ensure equal access to grievance mechanisms by all subgroups to avoid the perception of bias. In particular, where the roles and responsibilities of subgroups inhibit their access to and potential use of proposed grievance mechanisms, ensure that the design of the mechanism allows for their participation (e.g., additional effort is made to establish access points and venues for these subgroups). If contact points for collecting grievances are members of the local community engaged or hired by the company, it is important that those individuals be respected by the community, and that selection not be biased in favor of a particular subgroup or ethnic group. Where this is not feasible, contact persons should be designated from each such subgroup or ethnic group within the community.
Women's Access and Participation in the Grievance Process	Established forms of gender segregation and defined roles and responsibilities may affect women's access to and use of a grievance Mechanism. Women may also be inhibited or hindered from complaining About specific incidents (e.g., harassment, inequality in getting employment). In some communities, women may have lower literacy rates than men and be less familiar with formal processes. AYANA will ensure that consultation on design of the mechanism provides for inclusion and participation of women, and that its implementation facilitates women's access. AYANA will ensure that staffing of the company grievance mechanism includes female staff, who are aware of and sensitive to the role of women in local society and the issues they face. Train personnel in the handling of gender sensitive issues. If third parties are involved in the implementation of the mechanism, their representatives will also include women. AYANA will seek the advice of a gender expert to identify potential gender issues and to ensure that the design of the mechanism is responsive to gender.
Hierarchical Societies	Hierarchical societies with established leadership and representation roles may inhibit full and active participation of all affected individuals. To ensure development of an appropriate mechanism, objectives of the grievance mechanism will be discussed with key community leaders, and seek their support and input upfront. At the same time, it will be determined whether community leaders represent the interests of all community groups, including

	disadvantaged and marginalized groups. If they do not, additional efforts will be made to reach out to these groups.
Indigenous Peoples (IPs)	Grievance mechanisms will make a clear distinction between procedures used for mainstream local population and those for indigenous peoples. IPs have unique attributes, including language, culture, and political, economic, and social institutions. They are also more sensitive to issues such as alienation of customary land rights, claims to natural resources, and impacts on cultural property. In addition, IPs may be politically marginalized and unfamiliar with (or do not trust) engagement processes used by the mainstream society. AYANA will Identify the established forms of representation and contact that exist between IP communities and government, community leaders, and civil society, and determine what mechanisms exist to promote transparent, respectful dialogue with IP groups.

6.12 Accessibility

A clear and understandable mechanism that is accessible to all segments of the affected communities at no cost. AYANA will clearly communicate/ publish information about the grievance process and how mechanism works, Options of simple, convenient culturally appropriate and at no cost to complainant (phone and internet usage charges exempted for filing/registering grievance will be at complainant cost) will be displayed at prominent location. (Refer –Publishing, Grievance reporting).

6.13 Transparency and Accountability to All Stakeholders

All complainants want to be sure that they are being heard, taken seriously, and treated fairly. They expect consistency and predictability in the process. Institutionalizing grievance systems creates an expectation that the project will be responsive to the needs and concerns of the community—and an obligation for the company to meet this expectation. AYANA's grievance mechanism will provide a way for the community to hold the company accountable; to be sure it takes community inputs seriously, deals with them through a clear and transparent process, follows through with actions, and communicates

with the community. The grievance mechanism is made transparent where members of the affected community will be informed:

1) Who in the organization is responsible for handling complaints and communicating outcomes, and who is in charge of the mechanism oversight;
2) Sufficient information on how to access development; and
3) Input of community is considered into its (Grievance management) development;

6.14 Appropriate Protection

A mechanism that prevents retribution and does not impede access to other remedies

Even if AYANA offers a well-designed and well-communicated grievance mechanism, affected communities may still choose to rely on a dispute resolution mechanism that they are more familiar with, and that they trust. Project-level mechanisms will not negatively impact opportunities for complainants to seek recourse through other available mechanisms, including the courts. Apart from litigation, options to seek resolution exist at community, national, industry, regional, and international levels. The community will be fully informed of avenues to escalate their complaints or grievances, and of their rights to use alternative remedies if they choose to do so without turning to a project-level mechanism first or if they are not satisfied with the response of the project to their complaints. In this context, the project grievance mechanism can be considered as "first level," while external mechanisms outside of the legal system are "second level." The most formalized mechanisms, such as courts, would be a "third level."

6.15 Feedback to affected communities

After receiving the grievance via, email, website, telephone, letters or verbal communication at site, the grievance will be registered and documented. A grievance investigation committee will be formed for investigating the grievance and ensuring corrective and preventive action plan. The action taken or not taken if not feasible will be communicated to concern. It will be ensured that solution to grievance is permanent and not temporary.

6.16 Publicity

Below mentioned note will be publicized at prominent location (e.g. Entry gate at all operational project site, developing site and identified site for project development).

Receive, Register and Review: Grievance receiving, Registration/Recording and review process is described below

The concepts of social risk management and social license to operate have become an integral part of doing business in emerging markets. These dimensions of a company's social and environmental strategy can be achieved with effective stakeholder engagement, based on active participation of and feedback from groups affected by the company's operations. A mechanism to address affected communities' concerns and complaints—a community consultation and grievance management—is an important pillar of the stakeholder engagement process, since it creates opportunities for companies and communities to identify problems and discover solutions together.

Who will use a Project-level Grievance mechanism?

The focus of the grievance mechanism on the needs of affected communities is substantiated by the fact that they can be / may be directly, and in some cases significantly, affected by project operations but often lack viable options or capacity for raising their concerns through formal structures. This is especially true for disadvantaged groups within communities. This company grievance mechanism provides a readily accessible means for communities to

address issues involving them and the company—directly, rapidly, and at no cost to complainants. (Telephone and Internet usage charges shall be paid by complainant while registering the complaint/ grievance)

Other stakeholder (other than the affected community) will be made to understand why the grievance mechanism is not open to them or their issues and concerns (such as commercial or political disputes) and be informed of the avenues available to them to raise their complaints.

Where to Register Your Grievance / Suggestion?

- Company Website. www.ayanapower.com
- Email: grievance@ayanapower.com
- Grievance cell Phone Number
- +91 080-48511001, on all working-days 10:00 am to 5:00pm (Monday to Friday)

Write to Postal Address :
Grievance cell
3rd Floor, Sheraton Grand Hotel,
Brigade Gateway, 26/1, Dr. Rajkumar Road, Malleswaram (West),
Bangalore-560055, Karnataka

- Can get Grievance reporting form at all site office- Hand over to AYANAs' Site Manager

6.17 Ayana's management function and roles and responsibilities

People:

Staff selection for handling (Investigating and development of action plan) will be done based on their educational and professional background. External resources based on their experience in social and environmental management dealing with community concerns/complaints may also be out-sourced. MD & CEO will be responsible for selection and assigning the task or formation of Grievance management cell.

System:

The Grievance /Complaint/ Suggestion will be collected based on above (Grievance Reporting) mechanism i.e. Via, website, emails, post and telephone. The same will be recorded and tracked on a excel sheet (spread sheet). Grievance reporting forms will be printed and distributed at site for recording and registration of Grievance/ Suggestion/Complaints.

Budget:-

Based on nature of Grievance the grievance management cell will recommend the budget to MD &CEO ,MD & CEO will be responsible for allocating the budget for management of Grievance**.**

6.18 Grievance Management cell, Members and their Role and Responsibility.

Name and Designation	Role and Responsibility
MD & CEO	Chairman of Grievance Management cell. Review of Grievance management and Grievance cell functioning. Budget Allocation.
AYANA PROJECT EXECUTION HEAD	Effective implementation of Community consultation and Grievance management plan. Conducting monthly meeting and review of registered Grievance and action status.
VP & Head Projects	Ensure compliance of recommendation and close out of action on time. Ensure Grievance are effectively registered at project level and communicated to Grievance cell at Head Office.
VP QHSE & CDP	Review of Community consultation and Grievance management plan, Auditing and Advising continual improvement of system.
Chief compliance officer	Grievance registration and tracking status at HO
Legal Head	Advising legal concerns related to registered grievance and its implication.
Head HR	Lead women's grievance investigation. Identification of Training need and arranging training session for Grievance management cell team.
Head Operation and Maintenance	Ensure compliance of recommendation and close out of action on time. Ensure Grievance are effectively registered at project level and communicated to Grievance cell at Head Office.
Site Managers	Ensure compliance of recommendation and close out of action on time. Ensure Grievance are effectively registered at project level and communicated to Grievance cell at Head Office.

7 DOCUMENTATION

Evidence of addressing grievances will be maintained by Ayana's chief compliance officer.

8 ATTACHMENTS

DOCUMENT NUMBER	DOCUMENT TITLE
ARP-IMSM-01-A2	List of Interested parties
ARP-IMSP-23-F1-R0	"Register for Environmental and Social Aspect Identification and Impact Assessment (Aspects & Impact Register)

APPENDIX J AYANA'S SKILL DEVELOPMENT PROGRAM -- GREEN JOBS

PILOT PROJECT ON SKILL DEVELOPMENT & LIVELIHOOD GENERATION IN GREEN JOBS

Department for International Development

CDC 70 Investment works 1948-2018

SEWA Self Employed Women's Association

AYANA RENEWABLE POWER PRIVATE LIMITED

XYNTEO

April- August 2019

DFID , SEWA Bharat, CDC, Ayana, SEED CSR, Xynteo

About the Project

Project Objective:

- Promote gender equality and empower women to share and shoulder equal opportunities with men.

- To create opportunities for community to acquire right set of skill enabling them to have access to job opportunities upcoming in geographical area of their presence and entrepreneurship reducing migration and improving livelihood ,with focus on women, youth and disadvantaged groups.

Milestones

Sl No	Milestones	Scheduled	Completed
1	Project proposal initiated		April 2018
2	Accountable grant agreement signed between DFID and SEWA		10-08-2018
3	Agencies interested as ATP , Kwatt ,Green Urja, SEED and ICA. SEED selected as ATP jointly by SEWA, DFID , Ayana and CDC.		
4	DD conducted on SEED by DFID,SEWA and Ayana before MOU was signed between SEWA and SEED		
5	Draft MOU prepared for selected ATP (SEED) by Ayana and SEWA		23-11-18
6	MOU Signed between SEWA and SEED		1-12-18.
7	Fund released by CDC for setting up training centre.		
8	Centre set-up	15-12-2018	31-02-2019
9	Manpower hiring (Project Management & Trainers)	15-12-2018	15-01-2019
10	Curriculum and module designing	15-12-2018	31-01-2019
11	Mobilization of youth, counselling & enrolment	15-12-2018	15-01-2019
12	Training of Youth	15-01-19	15-05-2019
13	Guest Lecture / industry specialists and sessions	15-03-2019	15-05-2019
14	Assessment and certification	15-04-2019	24-05-2019
15	Placement	15-04-2019	On Going, 72 Placed.
16	Post placement follow-up		On Going

Key Activities, Challenges and Management

Setting up of Training Centre, with 4 classrooms, 1 for each job role with practical classroom area

Selecting 4 job roles in collaboration with sector expert Ayana and Green Jobs Sector Skill Council

Key Challenges

Rural Area with low availability of infrastructure as defined by Green Job Sector Council (GJSC).

Availability of Trainers having command over local language and right set of skill for short duration of project.

Eligibility criteria by GJSC especially for women.

Management

Had plan "B" which was setting up training centre using portable cabins on rent, however team were able to identify a new constructed house and with few modification were able to sign a contract with owner for setting up training centre.

Qualified trainers were identified from the state and were deployed in the training centre with efforts from human resource department of SEED CSR. Translating curriculum to Telegu (Local Language).

Policy Influence with Sector Skill Council , Negotiated to change eligibility criteria on order to remove barriers of entry for women, for example

- Original eligibility: 12th standard + ITI/diploma ; New eligibility: 12th standard (science)
- Original Age criteria: 18-35 years; New age criteria: 18-35+ years

Pictures , Setting up training centre.

Mobilization

Key Challenges

- “Trust”, people believed that they will not be provided with job opportunities and companies prefer migrants to complete job.
- “ Mindset” People from local communities had strong believe that women can not work in solar power park hence should not join training.
- “Culture” ‘ Women should not work with unknown men and “Women can’t do technical jobs”
- Loss of earning if one joins training program.
- Adverse social norms, Household and childcare responsibilities, Lack of decision-making power.
- Mobility restrictions, Access” to training centre, distance, public transport not available at regular intervals and timng not reliable, gatekeepers of decision-making disallow women to move freely, Some women fear travelling alone
- Family engagement, Direct engagement with parents, husbands, brothers of potential women trainees.
- Fear of co-ed classrooms from family members as well as female trainees
- Conservative families, Restrictions on youth, especially women.

Managing Mobilization challenges

- Leveraging local leaders like ASHA workers, panchayat, local Police etc.
- Created local volunteers to multiply impact and grassroot engagement & mobilization, Door to door, auto rickshaw announcements for community interactions.
- Expanded geographical reach .
- Incentivized enrolled students , Stipend of Rs. 2000 to compensate for the loss of income (partly).
- Local informal meetings , held informal meetings within communities to bring together potential participants and answer queries, distribute pamphlets.
- Special emphasis on counselling to ensure that women participate, addressing co-ed classrooms, separate- washrooms, 'Akka' and 'Anna' (sister and brother) in classrooms, and clear warning regarding inappropriate behaviour for safe learning environment
- Reached out to over 800 people, engaged 350 interested candidates.
- Regular Health Awareness and Financial Literacy workshop sessions.
- Created local volunteers to multiply impact.
- Celebration of days like Women's Day to create awareness.
- Participation of leaders from solar power companies , ensuring job opportunities will be provided and Open Q&A Session.

Managing Mobilization challenges

Transport Facility to Training Centre

- 22 students utilised our transport-facility; 12 of whom were women.
- Held meetings with Sarpanch to take the issue forward to state transport body
- Negotiations with drivers to ensure that buses are on time
- Family engagement and counselling to break gender stereotypes.

Launch Event & Private Sector Engagement

- Bringing together all stakeholders on one platform
- Meet and Greet with potential employers
- Clarification of doubts of trainees by employers

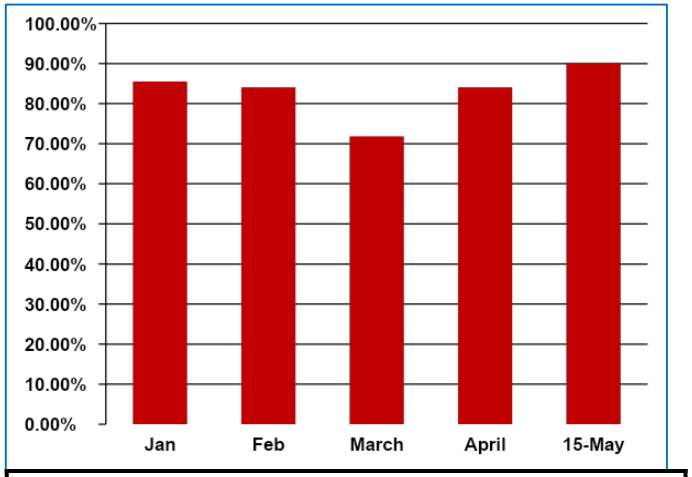
Parents-Teachers Meeting & Reward Ceremony

- Parent engagement, Organizing meetings and centre visits with families
- Motivation for high performance, Swathi and Nirmala as role models
- Reach goal of full-attendance
- Reward: Water-bottle & Sun Protection

Training , Evaluation and Placement.

Particular	No.
No. of enrolled students	315
No. of enrolled women	106
No. of drop-outs	132
No. of regular students	183

- Conducted 7 Exposure visits: To Solar Parks for practical exposure
- Conducted 11 Guest sessions: By local police, Project Managers, etc.
- Monthly Assessments to track progress, Average Attendance 83.09%.
- Tracking Monthly Attendance to ensure retention



Monthly Attendance Averages

Improper mode of transportation and lack of Motivation were 2 main reason for drop in March Attendance

Training and Evaluation

Udichi, affiliated with NSDC Skills Assessment Agency established under Skill India evaluated students.

Student Details	No.
No. of enrolled students	315
No. of enrolled women	106
No. of drop-outs	132
No. of regular students	183

Students qualified 91.80% (46.4 % Women, 53.5 % Men)

Evaluation Result			Total	
Grade	Female	Male		
A	18	15	33	19.6%
B	32	43	75	44.6 %
C	25	28	53	31.6 %
D	3	4	7	4.2%
Total	78	90	168	

Placement Data

Placement Details
Students Enrolled -183
Students Qualified - 168
Placement Drives at the Training Centre.
18 leads from 9 companies
30+ Pre-placement offers
Students Placed as on Date – 72 (43% of qualified students)
93% Male (67 /72) and 7% Women (5/ 72) Placed
Average Salary Rs. 11,900, Median Salary Rs. 12,000
67 out of 72 Jobs are in Solar Power Park
2 Women placed at local school as teacher , 1 placed as sales executive wit a solar company and 2 with Tata Power Solar.

Roadblocks and Efforts taken:

- Lack of confidence, especially for women
  - Women did not feel confident to appear for interviews
  - English language was also a barrier

- Motivation sessions for confidence building
- Mock interviews
- One-on-one Resume feedback
- Special focus on English in class

Roadblocks and Efforts taken:

Digital literacy

- Trainees did not keep in touch post training, as many of them, especially women, did not have phones/internet facility

- Training on digital literacy, created awareness on use of WhatsApp
- Created WhatsApp groups to share experiences/concerns from their job, communicate about vacancies, etc.

Protests against Solar park

- Land compensation was not given to the farmers, which is why they protested to stop all work at solar parks

- Engagement with the community to stop violence
- Highlighting the fact that this park has created many job opportunities

Delayed timelines of plants

- Timelines of training was set in a way that it matched the timelines of commissioning

- Negotiate with companies to give 'Conditional offers'
- Create other opportunities within 100 KM radius like Pavagada, Ananthpur

Women Placements

Reality Check: Companies bias against interviewing women trainees

Deeper Issue: Stigma attached to women placements as it was unheard of

Negotiations and efforts: Local level & National level

Women Placements: Negotiations

National-level

- Identified Tata Power Solar through Ayana as our partner in creating an example of placing women
- Met with Dr. Arul (COO) and Mr. Murali (Head, Sustainability) for negotiations

- **Result:**

1. Tata Power Solar **selected 2 women candidates**
2. **Restructured their shifts-timings** to accommodate women in day shifts
3. Permitted SEWA to induct ALL their employees on **POSH** act
4. Agreed to give accommodation and transport for women trainees who would relocate to other cities

Local-level

- Publish the success story of Aparna, as first woman to work in a Solar park in local newspaper
- E-mailed offer letters of 2 women trainees to the local HRs

- **Future Strategy:**

1. Employer Awareness session by Tata Power Solar Head HR
2. Show evidence of how making solar-space gender inclusive can increase productivity
3. Women trainees to meet local HRs to share their experience at the field once they start working

Roadblocks and Efforts: Women's placement

- Preconceived notion that women will not be able work at solar park
  - Resistance from employers (HRs) that women will not be able to do physical work
- Night shift
  - Security and travel conditions not yet conducive for women to take night-shifts
- Female toilets
  - Currently, no female-toilets exist at the park
- Transport
  - Women do not own bikes/two-wheelers, so cannot travel to the park on their own
  - Internal commute on the solar park site is also a challenge

- Made HRs meet the women trainees who when asked showed readiness to work at the solar park
- Presented the challenges to Tata Power Solar through Ayana
- Tata Power Solar has accepted the request to build female-toilets at the Solar Park
- Made groups so that women can travel together

15 - June - 2019
N P kunta

గౌరవనీయులైన సర్పంచ్ గారికి,

సార్! మా యొక్క విన్నపం వినండి!
మేము సోలార్ లో జాబ్ చేస్తున్నాము. మేము
N P కుంట నుండి సోలార్ కి వెళ్ళడానికి దూరము
ఎక్కువ ఉన్నందువల్ల మేము సమయానికి కంపెనీకి
వెళ్ళలేకపోతున్నాము కావున మాకు సహాయానికి
Bus సౌకర్యం ఏర్పాటుచేయవలసినదిగా కోరుచున్నాము

ధన్యవాదములు

ఇట్లు

మీ విధేయులు

SEWA BHARAT Team
SEED/CSR TEAM

Office address

Door no : 00 .
Pedahalli Road,
N P kunta (V) (M)
Kadiri (T)
-Anantapur (dist)
-Andhrapradesh.
PIN Code: 515 521

Letter to Sarpanch from trainees: To get bus routes and timings changed

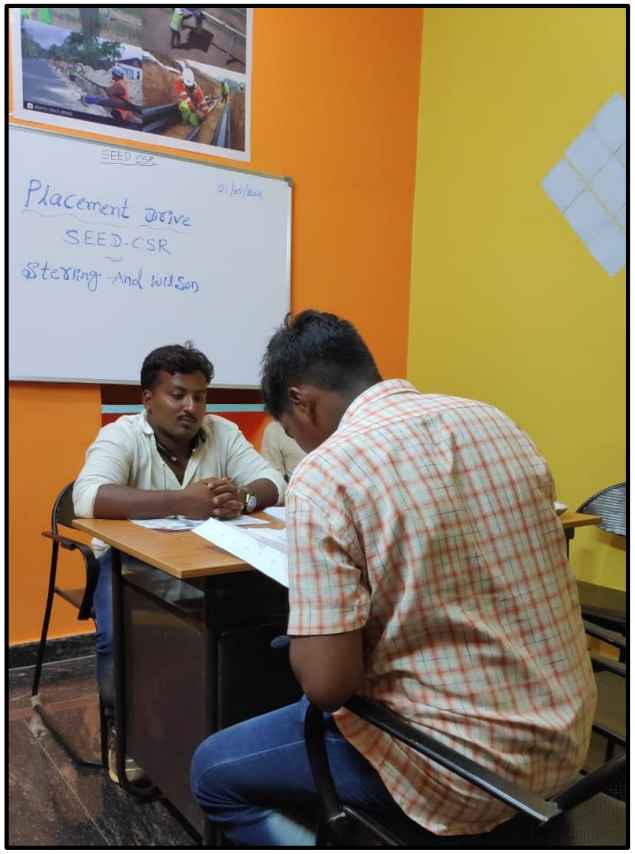
సోలార్ టాటా పవర్‌లో
ఇద్దరు ఇంజనీర్ల ఎంపిక

అపర్ణ, శివపార్వతి

నంబులపూలకుంట ,జూలై 18 : మండల కేంద్రానికి సమీపంలోని 1000 మెగావాట్ల సౌర విద్యుత్ ఉత్పత్తిలో భాగంగా టాటా పవర్ కంపెనీలో ఇరువురు మహిళలు అపర్ణ, శివపార్వతిలను క్వాలిటీ ఇంజనీర్లుగా ఎంపిక చేసినట్లు సేవాభారత్ అండ్ సీడ్స్ ప్రాజెక్టు స్వాతి పేర్కొన్నారు. మండల కేంద్రంలో జనవరి నుంచి 200 మందికి సేవాభారత్ సీడ్స్ ఆధ్వర్యంలో శిక్షణ ఇస్తున్నామన్నారు. శిక్షణలో మండలంలోని సోలార్‌లో నిరుద్యోగులకు ఉపాధి ఉద్యోగ అవకాశాలు కల్పించామన్నారు. ప్రధాన మంత్రి నరేంద్రమోదీ ఉమెన్ ఎన్‌పవర్‌మెంట్ ఆధారంగా సోలార్ టాటా కంపెనీలో మహిళలకు ఉద్యోగాలు కల్పించాలని ఆదేశించారన్నారు. ఇరువురు మహిళలకు క్వాలిటీ ఇంజనీర్లుగా ఎంపిక చేసినట్లు తెలిపారు. మండల కేంద్రానికి చెందిన అపర్ణ క్వాలిటీ సివిల్ ఇంజనీర్‌గా, బీ కొత్తపల్లికి చెందిన శివపార్వతి ఎలక్ట్రికల్ క్వాలిటీ ఇంజనీర్లుగా ఎంపికయ్యారన్నారు.

Newspaper article covering the story of Aparna and Siva Parvathi as first women to get jobs at the Solar Park

Placement Efforts:



Placement Drive: Sterling & Wilson

Mock Interviews and one-on-one Resume feedback

Aseefa's Personal Interview with Ayana Project Msanager, Mr. Paneer Selvem and Tata Power Solar

Women Trainees interviewing for the role of Teacher Trainers

Strategy: Moving Forward

- **Post-placement support** to document progress and concerns
- **Closing Certification Ceremony:** Celebration of successful completion of training programme
- **Shadow women employees** who start working at the solar park
- Make efforts to **remove stigma attached with women at solar park** through awareness sessions, interactive session with Tata Power Solar HRs, media engagement

Exit Strategy: Touch-points

- **Participatory:** Meeting with trainees
- **Data handover:** Andhra Pradesh Solar Power Corporation Pvt Ltd (APSPCL) + Company HRs
- **Calling:** 6 months post exit

V. Aparna, 22, NP Kunta

Aparna lives in NP Kunta with her parents, who are both farmers. As the income through farming is low in the drought stricken region, Aparna was determined to explore an alternate livelihood opportunity. She pursued her engineering with this goal, but was not able to get a job.

She joined SEWA's training programme with very low expectations. She had lost confidence that she should ever be able to work as an engineer. However, she felt inspired by the quality of training, and the fact that the local people could take advantage of it without traveling to Bangalore or Hyderabad. She soon got her drive back.

Today, she is the first female employee at the solar park.

Her family and friends supported her during the training, which was a big contributor to her success. She cannot believe that she has made history, and that so many women look up to her. "I want to create more opportunities for women in the solar industry."

Aparna, happy as ever, post her interview with the local newspaper on being the first woman to work at the Solar Park.

Ravi, 28, NP Kunta

Ravi, now earning Rs. 13000 per month, supporting his father

Ravi lives with father who can no longer work because of his old age. Ravi was the first person to join our training as a volunteer, who would accompany SEWA during mobilization. Being a single child with most friends having migrated, he found family in our team.

At the training too, he made many friends. He says that he is willing to pay for such trainings in future. “Colleges should learn from this training programme how to give practical and application-based education.

Ravi is also the first trainee to take up a job outside NP Kunta--about 100 kilometers away in Pavagada. He knew that he could not wait till the plants are commissioned, as he wanted to gain experience as soon as possible. Leaving his father alone has been a hard decision, but he knows that he will come back soon, with more skills!

Suggestions/Questions:

మాట్లాడుతున్న శిక్షణ అధికారి

అర్హత మేరకే ఉద్యోగం

నంబులపూలకుంట, న్యూస్‌టుడే: ఎస్సీకుంటలో ప్రభుత్వం ఏర్పాటు చేసిన సౌర విద్యుత్తు కేంద్రంలో అర్హత మేరకు ఉద్యోగ అవకాశం కల్పిస్తామని సేవాభారత్ స్వచ్ఛంద సేవా సంస్థ ప్రతినిధి రియా తెలిపారు. మంగళవారం మండల పరిషత్ కార్యాలయంలో నిరు

Communications & Visibility

APPENDIX K ENVIRONMENTAL AND SOCIAL MONITORING REPORT TEMPLATE

Environmental and Social Monitoring Report

{Red text serves as guide for report preparation, please delete when report is finalized.}

TITLE PAGE

TABLE OF CONTENTS

LIST OF ABBREVIATIONS *{All abbreviations in the report test should be listed here}*

EXECUTIVE SUMMARY
{a summary of the project's status and environmental and social (ES) compliance during the reporting period}

1. Introduction

1.1 Brief Project Description *{Include maps showing site location and vicinity if needed}*

1.2 Land Acquisition Progress

Name of the Place	Govt Land Required	Govt Land Obtained	Private Land Required	Private Land Acquired
Total				

{A brief description of the status of land acquired, procedure of land acquisition and any major bottleneck}

1.3 Summary of Resettlement & Compensation

Total Land Required	Total Land Acquired	Balance land to be acquired	Total number of PAPs Land sellers	Physically displaced	Commercially displaced

{A brief description of the status of land acquired, number of PAPs involved, number of PAPs already compensated. If a RP has been prepared for the project, please provide progress on the implementation of the RP in section 6}

1.4 Project Progress Status and Implementation Schedule

{Describe the project milestones during the reporting period and highlight any change from original scope, alignment, methodology, and/or schedule.}

{The project Gantt chart may be included}

{Include a simplified table like the sample below}

Project Component • Stage	Commencement Date	Target Date {and Revised	Progress Status	Percent Completed	Remarks

		Target Date if delayed}	{not yet started; ongoing; completed}		
Elevated Component	*Example for reporting period Jan-June 2020*				
• Contract Award		31 Jan 2019	Completed	100%	Contract Awarded to XYZ Contractor
• Construction (e.g. civil works, installation of equipment, …) • •	1 Apr 2019	31 Mar 2022 (original target completion was 31 Dec 2021)	On-going	15%	There was a delay in the delivery of equipment…

2. Compliance with Applicable Regulations/Standards

{Include the applicable ES Regulations/Standards following the sample table below}

Regulations/Standards	Compliance Requirements under the Regulation e.g. clearance/permit/consents etc.	Compliance Status *{complied; not complied; n/a at current stage of the project}*	Remarks {*provide details to show how compliance was achieved; or explain the corrective action done if there was non-compliance}*

3. Compliance with Environmental and Social Covenants from the AIIB Loan Agreement

{Include Loan Agreement covenants on environment and social following the sample table below}

Schedule #, Para. #	Covenant	Compliance Status *{complied; not complied; n/a at current stage of the project}*	Remarks *{provide details to show how compliance was achieved; or explain the corrective action done if there was non-compliance}*

4. Compliance with the Civil Work Contracts

{Include EHS and Labor Clauses following the sample table below}

Schedule #, Para. #	EHS and Labor Clauses	Compliance Status *{complied; not complied; n/a at current stage of the project}*	Remarks *{provide details to show how compliance was achieved; or explain the corrective action done if there was non-compliance}*
	GCC Sub-Clause Health and Safety		

5. Compliance with Environmental and Social Management Plan

{With reference to the ESMP and its cost, include a table with the compliance status during the reporting period, with remarks to show how compliance was achieved or not}

6. Compliance with Resettlement Plan

{With reference to the RP and its budget, include a table with the compliance status during the reporting period, with remarks to show how compliance was achieved or not}

7. Compliance with Gender Action Plan

{With reference to the GAP and its budget, include a table with the compliance status during the reporting period, with remarks to show how compliance was achieved or not}

8. Compliance with Indigenous People[37]'s Plan (If Any)

{With reference to the IPP, include a table with the compliance status during the reporting period, with remarks to show how compliance was achieved or not}

9. Summary of Monitoring Results

9.1 Environmental and Social Monitoring

{With reference to the Environmental and Social Monitoring Plan (ESMoP) (if any) of the project, include a table to summarize the results of the monitoring done during the reporting period, covering all monitoring elements in the ESMoP. Please summarize the inspections of implementation status, the analysis results, to suggest corrective actions in section 12. Please indicate the environmental elements monitoring locations, date, time (or duration as applicable), parameters measured, the standards, tests and limits used, and provide the corrective action plan in section 12 if there was any exceedance to the standards}

9.2 Capacity Building Monitoring

{With reference to the ES instruments of the project, include the trainings/drills conducted during the reporting period following the table below. Include as appendices the training/drill agenda, attendance sheets, and photos}

[37] In case of India, it should be Scheduled Tribe; in case of People's Republic of China, it should be Ethnic Minority.

Trainings/Drills/ Inspections	Number and Position of Participant/s	Location/s and Date/s	Remarks
Example: Fire Drill	50 Laborers	15 Aug 2020	Participants safely evacuated the site…
PIU capacity building	3 staff	15 Aug 2020	Monitoring data review

9.3 Health and Safety Monitoring

{If there was any accident, near-miss, illness, or other incidents during the reporting period (or previously reported accident with ongoing rectification), provide the corrective action done following the table below. Include as appendices the work safety checklists, incident reports, and other relevant supporting documents}

Health and Safety	Number and Position of Person/s Involved	Location/s and Date/s of Incident	Description of Incident	Root Cause Analysis	Corrective Action
Fatality					
Non-fatal Injury					
Near-miss					
Illness					
Other Incidents					

9.4 Highlighted Actions

Items	Description
Vulnerable Groups	
Differently Abled	
Climate	
Others	

10. Stakeholder Engagement

{Summarize the stakeholder engagement activities and the results of the consultations conducted during the reporting period; assess if they conform to the Stakeholder Engagement Plan (SEP, if any); update the SEP for next stages if needed}

11. Implementation of Grievance Redress Mechanism and Complaints Received

{Include a description of the GRM, provide a flowchart and list of grievance redress committee members}

{If there was any grievance or complaint during the reporting period (or previously reported complaint with ongoing rectification), provide remarks following the table below}

Complainant/s (Worker or PAP)	Location/s and Date/s of Complaint	Description of Grievance/Complaint	Timeline*	Remarks (Resolution Status)

*As specified in the GRM arrangement of ES instruments

12. Corrective Action Plan

{Based on all the analysis above, prepare a time-bound corrective action plan if there was non-compliance or unanticipated ES impacts, and check the implementation status in the subsequent phase monitoring}

13. Conclusion and Recommendations

{Limit the conclusion to ES highlights or issues resolution during the reporting period, and the recommendations or actions to be done in the next period}

APPENDICES

Photographs *{Include photographs of the project site taken during the reporting period. For each photo, provide a caption with description, location and date}*

Supporting Documents *{Laboratory results, meeting agenda and attendance, minutes, checklists, etc.}*

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