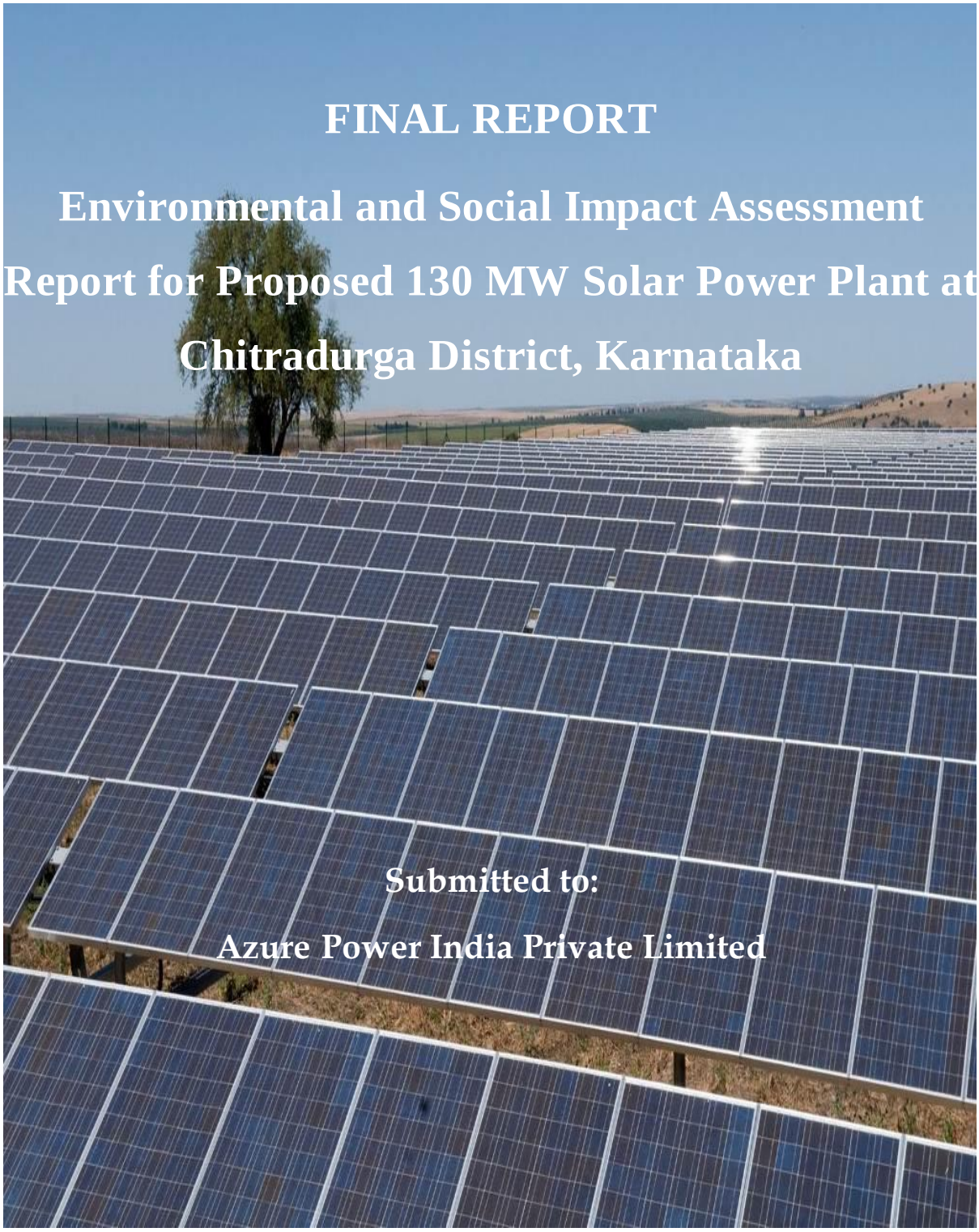
FINAL REPORT

Environmental and Social Impact Assessment Report for Proposed 130 MW Solar Power Plant at Chitradurga District, Karnataka



Submitted to:

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Disclaimer:

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

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LIST OF ABBREVIATION

APPL	Azure Photovoltaic Private Limited
APRPL	Azure Power (Raj) Private Limited
ASPL	Azure Sunrise Private Limited
ESIA	Environment and Social Impact Assessment
IFC	International Finance Corporation
ILO	International Labour Organization
KPTCL	Karnataka Power Transmission Corporation Limited
KREDL	Karnataka Renewable Energy Development Limited
KSPCB	Karnataka State Pollution Control Board
MOEFCC	Ministry of Environment, Forests and Climate Change
PS	Performance Standard
RTC	Record to Conversion

1. Executive Summary

1. Introduction

Azure Power India Pvt. Ltd is proposing the establishment of 130 MW solar power project near Gollahalli, Khandikere, Kaparahalli and Jadekunte villages in Hiriyur and Challakere taluka of Chitradurga district of Karnataka state. The entire project is sub divided into three sub projects 50 MW, 40 MW & 40 MW respectively. The project is managed by three subsidiaries named Azure Power (Raj) Private Limited ("APRPL"), Azure Photovoltaic Private Limited ("APPL") and Azure Sunrise Private Limited ("ASPL"). Azure has appointed ARCADIS to undertake an Environment & Social Impact Assessment (ESIA) study of the 130 MW solar power project at Chitradurga. The ESIA study has been carried out to identify environmental and social impacts that may arise during construction and operational phase of the solar power project, assess the impacts and proposed suitable mitigation measures to reduce the impacts. This ESIA report has been prepared on the basis of reconnaissance survey of the site, baseline environment monitoring, data analysis and consultation & discussions with relevant stakeholders of the project.

2. Project Overview

The proposed project is spread across land of four villages in Hiriyur and Challakere taluka of Chitradurga District. The proposed project is being built on private land purchased by Azure on willing to buy-willing to sell basis. The project site can be approached by National highway NH 4 from Bangalore, further connecting to Hiriyur Bellary Road that could be reached by adjoining village road. Total area for the proposed project is 576 acres which includes land for transmission line and access road .The proposed solar power project is based on Grid Interactive Technology. The system mainly consists of solar PV arrays, Power Conditioning Unit (PCU) and Transformers. Solar PV modules based on thin film technology are proposed for this plant. In the proposed project, generated electricity will be evacuated through a transmission line to the substation near Hiriyur town located at 16 km from the proposed project site. The approximate labour requirement during the construction period is estimated to be 800-1000 persons during the peak hours. During the operation phase, it is estimated that about 5 -8 technical persons would be required for operation of the entire solar power plant and nearly 100 security guards in different shifts would be required for security of the power plant.

The alternative to the project activity is production of fossil based power. The state of Karnataka is taking considerable steps to solve the issue of electricity shortage through increasing use of renewable energy. It includes the Karnataka Solar Policy which targets capacity addition of 200 MW by 2015-16. In addition to this, the State also supports Renewable Energy Certificate (REC) mechanism under renewable energy project developer can commercialize the green component of the electricity generated from its renewable energy projects. State Electricity Distribution Companies and other big electricity consumers have Renewable Purchase Obligations (RPO). RPO comes under The KERC (Power Procurement from Renewable Sources by Distribution Licensee and Renewable Energy Certificate Framework) Regulations, 2011. It mandates a particular category of consumers to purchase part of their electricity from Renewable Energy sources or they can buy REC generated from registered

renewable energy project to fulfil their RPO. All these measures will help to reduce the burden on conventional energy that uses fossil fuels. With decreasing cost of generation from renewable energy sources and the advancement in renewable energy technologies, the state as well as the country can reduce reliance on fossil fuels.

3. Applicable IFC Performance Standards

The ESIA study has been assessed for the overall impacts on Environmental and Social components due to construction and operational activities of the proposed solar power project. The applicable IFC performance standards for the project include:

- **PS 1: Assessment and Management of Environmental and Social Risks and Impacts**

The proposed project will have environmental and social impacts such as generation of onsite noise, domestic wastes from labour camp, and small quantities of hazardous wastes from the construction site. The company will contractually require the developer/operator to put in place a social and environmental organization consisting of qualified E&S personnel with appropriate responsibility allocation to implement/oversee/monitor. The key PS1 requirements are listed below:

Construction Phase:

a) Performance of contractors on labour and health & safety aspects

Operation Phase:

a) Periodic monitoring of social and environmental performance
b) Internal and third party audit
c) Management review

Both Construction and Operation Phase

a) The implementation of the ESMP
b) Community engagement and grievance redressal system/mechanism
c) Regular training of employees and contractors
d) Emergency preparedness and response
e) Periodic reporting of E&S performance to the management

Azure needs to implement an Environmental and Social Management System to manage the risks associated with its operations.

- **PS 2: Labour and Working Conditions**

During construction, which will last for around 4-5 months, man-power ranging from 250-300 will be required during normal construction activities, while peak construction activities will require about 850-1000 workers. Preference will be given to local community members. The project envisages a requirement of around 100 skilled workers, who will be hired from the immediate vicinity of the project area. Though the project plans to maximize local involvement in the employment during the construction phase some migrant labours are also envisaged. The plan will have back up of sourcing labour from outside the region, in case the labour requirements are not met locally. To this effect, labour accommodation is planned to be set up during the construction phase of the project for certain

specialized skilled workers of around 100 to 150 workers. Guidelines of *IFC Worker's Accommodation: Process and Standards* to be followed, while providing labour accommodation.

- **PS: 3 Resource Efficiency and Pollution Prevention**

The project will be developed on pooled private agricultural land (as per revenue records), a large part of which, seems to have been aggregated from investors, who have either pooled this land around 4 to 5 years back. During this period, an airport was announced in this location by the government, which cancelled later. However, records for the same has not been ascertained. Similarly, ROW of private land required for the construction of the transmission line (either pole/tower site and/or for the line right-of-way (RoW) will be leased from individual land owners through a negotiated settlement through vendors appointed by Azure. Water for project construction phase will be sourced from bore wells of adjacent villages by tankers and drinking water supply would be through packaged drinking water.

- **PS: 4 Community Health, Safety and Security**

The project will involve movement of vehicles on the approach road passing close to few villages, entering the site through the Hiriyur Bellary road. This approach will diagonally crossed to divert the project vehicles and trucks carrying the construction material in to the project boundary. The Hiriyur Bellary road has traffic plying 24 hours very frequently. This road is among the major roads in the district that connects Chitradurga, Bellary and Bangalore. Therefore, traffic has to be managed for the project vehicles to cross the road and enter the project boundary. Further, at the project site, the company will need to exercise appropriate access control. This control will include barricading of excavated areas; safety signage; illumination and other measures to mitigate the risk of accidents for general public during the construction phase. Also, the project envisages influx of labours from different nearby villages and migrant labours, who will be accommodated in the labour camp. Health and safety need to be taken care by the project developer, which should ensure that safety measures to be put in place both during construction and operation phase of the project.

Other performance standards viz. PS 5: Land Acquisition and Involuntary Resettlement, PS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources, PS 7: Indigenous Peoples & PS 8: Cultural Heritage are not applicable for the project.

4. Major Impacts Identified for the project

The impacts due to the project are minimal, site specific, temporary and reversible owing to the construction period (which is of short phase of 4-5 months only). The major impacts envisaged during the construction and operation phase is listed below:

Construction Phase:

- Construction water will be sourced through tankers by local vendors. The tankers will source the water from authorised village bore wells. During construction phase, the water requirement for construction activities, labour camp and construction workers, will be about 59 KLD, while water requirement of operation phase for domestic use is estimated to be about 5 KLD.
- As per Central Ground Water Board Report 2013, ground water in the two blocks (Hiriyur & Challakere) is partly over exploited and partly categorized as semi critical. Hence, impact on

the ground water during construction phase is anticipated to be moderate, based on the water requirement. During operation phase, the impact on ground water is not expected.

- About 800-1000 labourers are expected during the peak construction phase. About 150 labourers are estimated to be migrant labourer, who will be accommodated in the labour camps. Social impact associated with migrant labourer and possible conflict with local population is envisaged.
- The Hiriyur Bellary road will be diagonally crossed to divert the project vehicles and trucks carrying the construction material in to the project boundary near Gollahalli village. The Hiriyur Bellary road has traffic plying 24 hours very frequently, which is among one of the major roads in the district that connects Chitradurga, Bellary and Bangalore. So, the risk of accidents due to the crossing is identified as one of the major impact due to the project.
- The land parcels identified for the proposed project is mostly agricultural land which is unirrigated land. Total land requirement for the proposed project is 576 acres and till date only partial land purchase (About 184 acres) has been complete. Rest of the land purchase is in process.
- Selling of such rain fed unirrigated land may induce economic displacement to the land owners. However, compensation in terms of agreed price nullified the impact. Type and amount of compensation were mutually agreed and it was also verified with the land owners during stakeholder consultation. During stakeholders consultation it was analysed that the project does not cause complete landless to the farmers and none of the farmers reported selling more than 50% of their land to the project activity.
- Livelihood impact is less as most of the lands are left fallow due to lack of irrigation facilities and lands not being of good quality to generate satisfactory yields.
- Consultation with the land owners also revealed that agricultural is one of the source of livelihood in the area and people who accepted monetary compensation will also use compensation money to buy land parcels in some other places to continue with the agricultural practices. Other sources of income include cattle rearing, working as labourers in nearby towns and dairy. Considering the following factors adverse socioeconomic impact on land owners and cultivators due to land selling is not anticipated.

Operation Phase:

- During operation phase of the project minor impact is anticipated on the air environment due to movement of 2-3 project vehicles per day for inspection and operation of the plant.
- Impact on land is anticipated due to storage of hazardous wastes like broken solar panels and used oil but can be nullified with application of suggested mitigation measures.
- Minor impact on drainage is anticipated due to surface run off from project site due to rainfall.

5. Key Mitigation Measures

The various mitigation measures suggested for reducing the impact of the proposed solar power plant are as follows:

Construction Phase

- Alternative source of water for construction should be explored like sourcing water from nearby water bodies (Bellagere Lake and Sanikere Lake) for construction activities.
- It should be ensured that the labour camp (onsite) should have basic amenities such as electricity, drinking water, health & sanitation facility, kitchen and rest room.
- Proper traffic management plan should be designed and implemented to avoid accidents during the movement of project vehicles into the boundary of project site.
- Vehicles speed to be restricted to 20-30 km/hr on unpaved road and all the vehicles should be maintained and have valid PUC certificate.
- Azure will need to exercise appropriate access control, barricading of excavated areas; safety signage; illumination and other measures to mitigate the risk of accidents for general public during the implementation of the project.

Operation Phase

- Restricted movement of vehicles within project site during operation phase
- Maintenance of storm water drain and construction of check dams to prevent surface runoff due to rain and allow ground water recharge.
- Provide secondary containment for storing of hazardous wastes on site like broken solar panels, used oil and transformer oil prior to disposal to authorized vendor.

6. Conclusion

The proposed solar power project is having moderate impact due to ground water utilization and issues related to community safety during the construction period, insignificant impact due to generation of dust and fugitive emissions during construction phase only (short duration) and minor impact on resource utilization like land and socio economic conditions of project area villages. There is no impact on cultural resources as well as indigenous people due to their absence in the study area. The impacts anticipated during the operation phase is fugitive emissions from movement of project vehicles within the site (air environment), surface run off and onsite drainage of storm water (water environment) and impact on soil due to storage and spillage of hazardous wastes like broken solar panels, used oil and transformer oil (land environment) which can be mitigated by adopting suggested mitigation measures. Based on the conclusion drawn from the ESIA study with respect to the kind of impacts of the project on environment, resources, biodiversity, labours and community, the proposed project is categorized as Category B (as per IFCs categorization of projects), which specifies that this project is expected to have limited adverse environment and social impacts which can be mitigated by adopting suitable mitigating measures.

2. Introduction

Azure Power is a leader in solar industry since its inception in 2008. It has created a successful demonstration of private investment in renewable solar power generation in India. Azure design, execute, operate and maintain solar power plants in various parts of India. Azure has a strong pipeline of solar projects through clean energy generation for grid connected, rooftop and off grid. Azure Power has already installed a no. of projects in different states in India. ARCADIS has been appointed as an independent environmental consultant to conduct an Environmental and Social Impact Assessment (ESIA) in accordance with International Finance Corporation (IFC's) Performance Standards.

2.1. PROJECT BACKGROUND

The proposed 130 MW solar power project is located in Gollahalli, Khandikere, Kaparahalli and Jadekunte villages in Hiriyur and Challakere taluka of Chitradurga district of Karnataka state. The entire project is sub divided into three sub projects 50 MW, 40 MW & 40 MW respectively managed by three subsidiaries named Azure Power (Raj) Private Limited ("APRPL"), Azure Photovoltaic Private Limited ("APPL") and Azure Sunrise Private Limited ("ASPL").

As a part of Karnataka Solar Policy 2014-2021, Karnataka Renewable Energy Development Agency (KREDL) had invited competitive bids for 500 MW solar projects and Letter of Award has been issued by KREDL to 8 developers for 500 MW capacity. Azure has won three projects for 50 MW, 40 MW and 40 MW capacities with tariff of Rs 6.89/Unit, Rs 6.93/unit and Rs 6.96/unit, respectively. LOA has been issued by KREDL to Azure for three solar projects. The PPA for 130 MW project has already been signed with Chamundeshwari Electricity Supply Corporation Limited (CESC) (50 MW) on Jan 2, 2015, Gulbarga Electricity Supply Company Limited (GESCOM) (40 MW) on Jan 24, 2015 and Hubli Electricity Supply Company Limited (HESCOM) (40 MW) on Jan 9, 2015.

Total land requirement for the project (130 MW) is estimated at approximately 576 acres. The company has already identified the requisite land. Project Company has entered into Memorandum of Understanding (MOU) with land aggregator on April 3, 2015. At present, the company is in the process of necessary due diligence for the land parcel and will do the sale agreement subsequently.

A site visit was undertaken by ARCADIS and Azure team during June 16-17, 2015 to understand the site conditions. They had preliminary discussions with the Project Site In charge of Azure, the legal consultant as well as the land aggregator team assisting Azure in the land purchase process. This team assessed the preliminary environment and social risks due to development and operation of the project. Another site visit was undertaken by ARCADIS team in the month of October for undertaking social consultation for the proposed project. Baseline monitoring was conducted in the month of April 2015 by Avon Foods India Private Limited, a NABL and MoEFCC Accredited laboratory. A brief snapshot of the project as per the planning documented in the Detailed Project Reports shared by Azure is presented in **Table 2-1.** Location of the project is provided in **Fig 2-1 & Fig 2-2.**

TABLE 2-1: PROJECT SNAPSHOT IN BRIEF

Sr. No.	Project Details/Particulars	50 MW Project	40 MW Project	40 MW Project
1	Village	Kandikere, Kaparahalli & Gollahali	Kaparahalli & Jadekunte	Kaparahalli & Jadekunte
2	Taluk	Hiriyur		
3	District	Chitradurga		
4	State	Karnataka		
5	Nearest Railway Station & Airport	Railway Station -Chitradurga (approx. 30 km) Airport- Bangalore (approx. 200 km)		
6	Nearest highway	NH-4, Hiriyur- Bellary road		
7	Average annual Horizontal solar insolation	5.64 kWh/m^2/day		
8	Annual average Temperature	25.32 °C		
9	Annual average wind speed	4.2 m/ sec		
10	Project Capacity (AC)	50 MW	40 MW	40 MW
11	Project Capacity (DC)	53.250 MW	42.639 MW	42.639MW
12	Module Watt peak	110 Wp		
13	Type of PV Module	Thin film		
14	Warranty derate	0.8% per annum		
15	Expected derate	0.5% per annum		
16	Max Array Bus Voltage	1000V		
17	No of modules	489240	387630	387630
18	Number of Inverters	74	59	59
19	Tilting Provision	Fixed tilt at 10 degrees		
20	Number of Interfacing Transformer to 11 kV	19	15	15
21	Number of Interfacing Transformer from 11 kV to 220 kV	2		
22	Annual PV Generation (P50)	89.599 MU	71.597 MU	71.597 MU
23	Grid interfacing voltage	220 kV		

Sr. No.	Project Details/Particulars	50 MW Project	40 MW Project	40 MW Project
24	Project Life	25 years		

Source-Azure Technical Team

2.2. BENEFITS OF THE PROJECT

This solar power project offers the following advantages:

- The technology of electricity generation from solar power has been developed fully for smooth and trouble-free operation as well as for its economic viability.
- It is pollution free and eco-friendly;
- Low gestation period – less than six months from concept to commissioning, enabling fast bridging of power gap even in remote areas.
- With no fuel consumption, power generation becomes almost free after recovery of capital cost. O & M, cost is nominal.
- It can be developed in modular form with facilities for extension at a later date.
- No adverse social impact, such as resettlement and rehabilitation;
- Energy security and decreasing dependence on fossil fuels for power generation;
- Availability of government incentives to renewable projects in India.

2.3. APPROACH & METHODOLOGY OF ESIA

2.3.1. Approach

The overall approach of this assignment will be to understand the project activities through desktop review of project related documents like detailed project report, permits/clearances, maps etc. The approach will also cover to undertake a site visit to gain adequate familiarization with the proposed location. This will be followed by identifying environmental and social risks associated with the project with respect to applicable national regulations and IFC performance standards. The review and findings will be then assessed to identify gaps in addressing identified environmental & social risks and identifying additional risks (if any) due to planned project activities. The identified gaps will thereby lead to derive an environmental and social action plan (with timelines & responsibilities) to address these gaps. ARCADIS has taken following steps to achieve the above mentioned approach:

- Reconnaissance survey of project site and its surrounding areas.
- Desk review of the relevant project details and documenting the same.
- Meetings and discussions with project personnel of Azure and other project stakeholders
- Collection and verification of primary & secondary information on baseline environmental and social aspects
- Desk analysis and impact identification
- Developing environmental and social management plan and report writing

2.3.2. Methodology

ARCADIS has adopted following methodology to prepare the ESIA report:

- Formulation of a team of environmental and social experts
- Carrying out initial meetings with the project proponent and arrive at a common understanding and consensus on all important aspects, for efficient and effective delivery of the assignment's needs and objectives
- Review of basic project details and carry out reconnaissance survey of project site and its surroundings,
- Assessment of the project compliance with respect to IFC's performance standards
- Conducting detailed site visits, meetings, monitoring and consultations with project management & stakeholders, review and gather relevant documents and records
- Detailed desk review and analysis of all the information gathered during the site visits and consultations.
- Discussion on identified tasks in Environment & Social Management Plan

2.4. LIMITATIONS

The study is based on the project planning information and document provided by the project proponent, community consultation and observation recorded during site survey. The baseline condition is an extrapolation of surrounding areas to site. Any significant change in the proposed activities may result in variation of outcomes. The collected information and fact has been analysed and inference through professional judgment.

2.5. ESIA TEAM

ARCADIS has mobilized a diverse team of multidisciplinary experts for conducting the ESIA study. A number of these experts are accredited professionals by Quality Council of India to conduct regulatory EIA. Combination of these experts have provided consultancy services to over 75 wind power projects across India with over 750 MW installed capacity and 1000 MW of combined solar and wind power projects. The experts have been continuously working with funding agency and understand the modalities and procedures of evaluating and addressing environment and social risk associated with large scale investment.

2.6. STRUCTURE OF ESIA REPORT

Chapter 1: Executive Summary
Chapter 2: Introduction
Chapter 3: Project Description
Chapter 4: Applicable Policies, Legal and Administrative Framework
Chapter 5: Description of Environment
Chapter 6: Analysis of Alternatives
Chapter 7: Social and Environmental Impact Assessment
Chapter 7: Environmental and Social Management Plan
Chapter 8: Conclusion

FIGURE 2-1: PROJECT LOCATION MAP

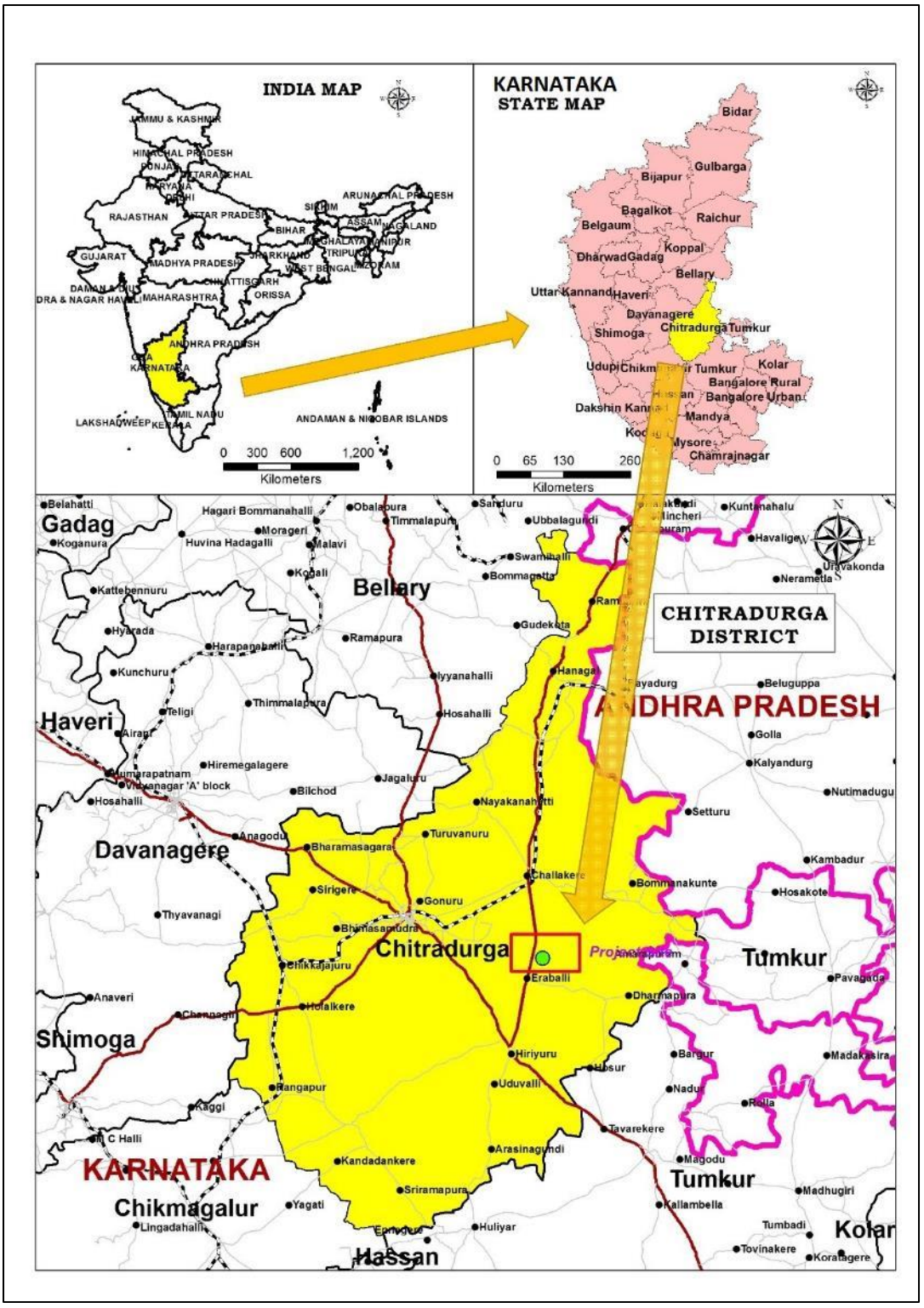
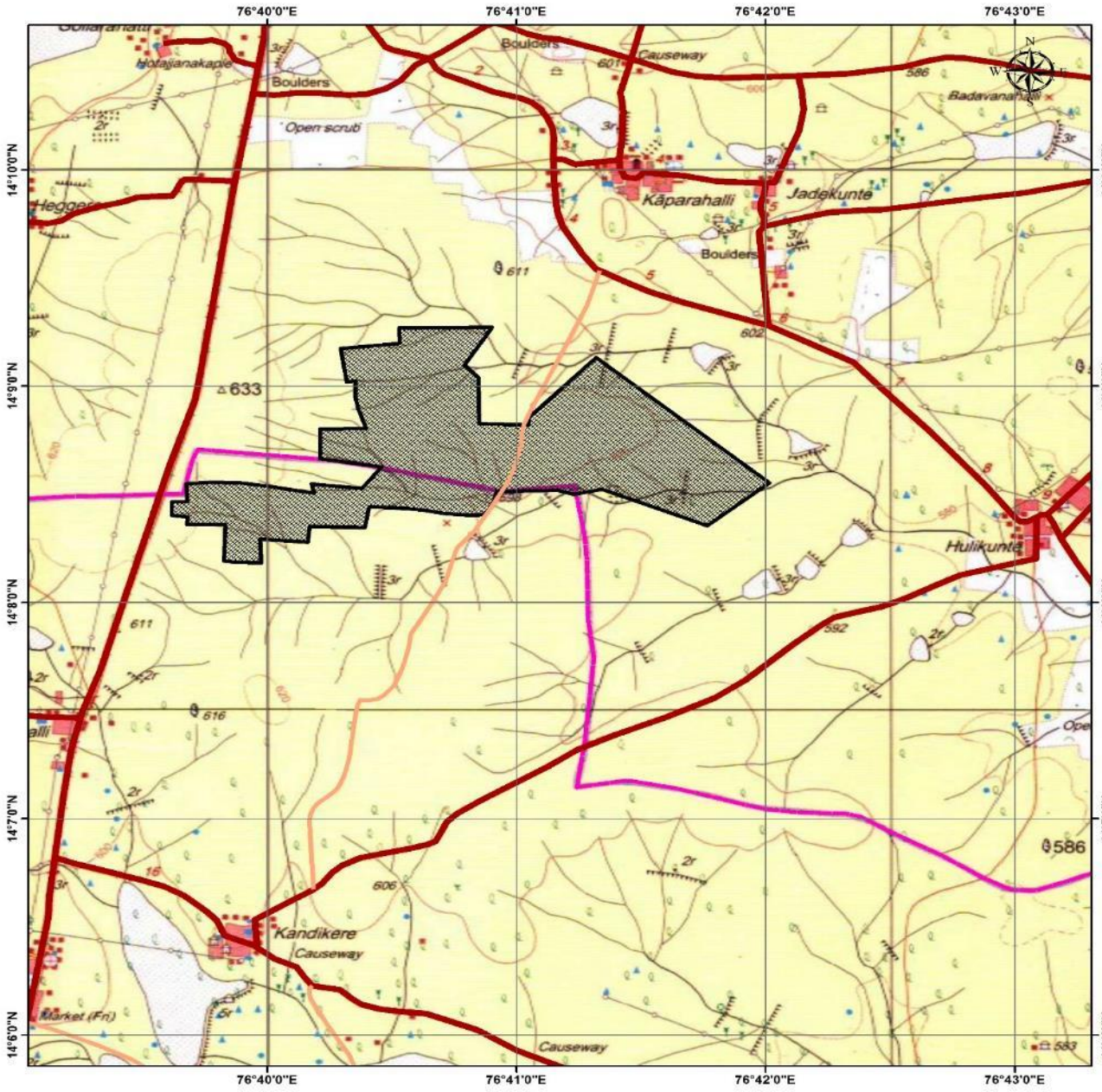


FIGURE 2-2: PROJECT BOUNDARY SHOWN ON TOPOSHEET



3. Project Description

3.1. PROJECT SPONSOR

The entire project is sub divided into three sub projects 50 MW, 40 MW & 40 MW, respectively. This is managed by three subsidiaries named Azure Power (Raj) Private Limited ("APRPL"), Azure Photovoltaic Private Limited ("APPL") and Azure Sunrise Private Limited ("ASPL"). All the three subsidiaries are of Azure Power India Private Limited (Company). The registration details of the three companies are provided below.

Brief detail of APRPL, APPL and APSL

Particulars	Details
Incorporation Date	APRPL (August 13, 2010), APPL (October 25, 2010), ASPL (May 18, 2012)
Constitution	Private Limited Company
Sector	Private Sector – Solar power generation
Registered Office	8, LSC, Pushp Vihar, Madangir, New Delhi - 110 062
Site Location	District Chitradurga, Karnataka

The Company has received equity/quasi equity funding from internationally renowned investors like Helion Ventures, Foundation Capital, IFC, DEG, and Proparco.

3.2. PROJECT COST

Project Cost is estimated at INR 948.9 crores to be financed in debt/equity ratio of 3:1 (75:25). IFC's funding is estimated at INR 199.3 crores. Promoter's contribution INR 237.2 crores and Term Loans from Banks/FIs of INR 711.7 crores.

Proposed Funding Arrangements

Particulars	Rs. million	%
Promoter's Contribution	2372	25.00%
Term Loans from Banks/ FIs	7117	75.00%
Total	**9489.00**	**100.00%**

3.3. PROJECT SITE SETTING

The project is proposed to be located in Gollahalli, Khandikere, Kaparahalli and Jadekunte villages in Hiriyur and Challakere talukas of Chitradurga district. The district is bounded by Tumkur district to the southeast and south, Chikmagalur district to the southwest, Davanagere district to the west, Bellary

district to the north, and Anantapur district of Andhra Pradesh state to the east. Elevation of the project site is approximately 610 m above sea level. Proposed project site is a mix of agriculture land and scrub land, while revenue records indicates entire land to be cultivable land. During site visit it was observed that few parcel of land near the project site is being used for plantation and cultivation of fruits like pomegranate but on project site no such activity is recorded. The land is unirrigated one, depending on rain fed cultivation. Sample Record to Conversion (RTC) has been attached as ***Annexure I,*** which mentions the land sold by the owner as cultivable land.

There are number of villages within 5 km radius of the proposed site viz Gollahalli, Sanikere, Yaraballi, Harthikote, Kaparahalli. The nearest settlement is Gollahalli about 3 km from the project boundary. There is a 10 MW solar power project of Azure Power near Harthikote village, located about 7 km south of the proposed project site. There is a Jindal 10 MW solar power project located near Kalamarahalli village about 8.5 km from the proposed project site. Environment setting of the proposed project area is shown in **Fig 3-1.** Photographs of environmental setting are shown in Photo 3-1 and 3-2

Photo 3-1: Immediate Site Setting of Project Site

Barren land within project boundary

Land parcel available from Land aggregator

Fallow land within the project site

Land adjacent to the project site

There are no big industries around the project site except a sponge iron factory located at a distance of about 500 m from the identified project site boundary. The factory is an operational sponge iron manufacturing plant located at Heggere village with manufacturing capacity of 20 TPD of finished steel products. The project starts with coal based Sponge Iron manufacturing kilns and Waste Heat

Recovery Boilers based captive power plant. The factory was established in 2010 and has no noncompliance issues with respect to contamination of air, ground water and soil[1]. It is spread across 27.10 acres of land employing about 145 workers mostly local people from neighbouring villagers.

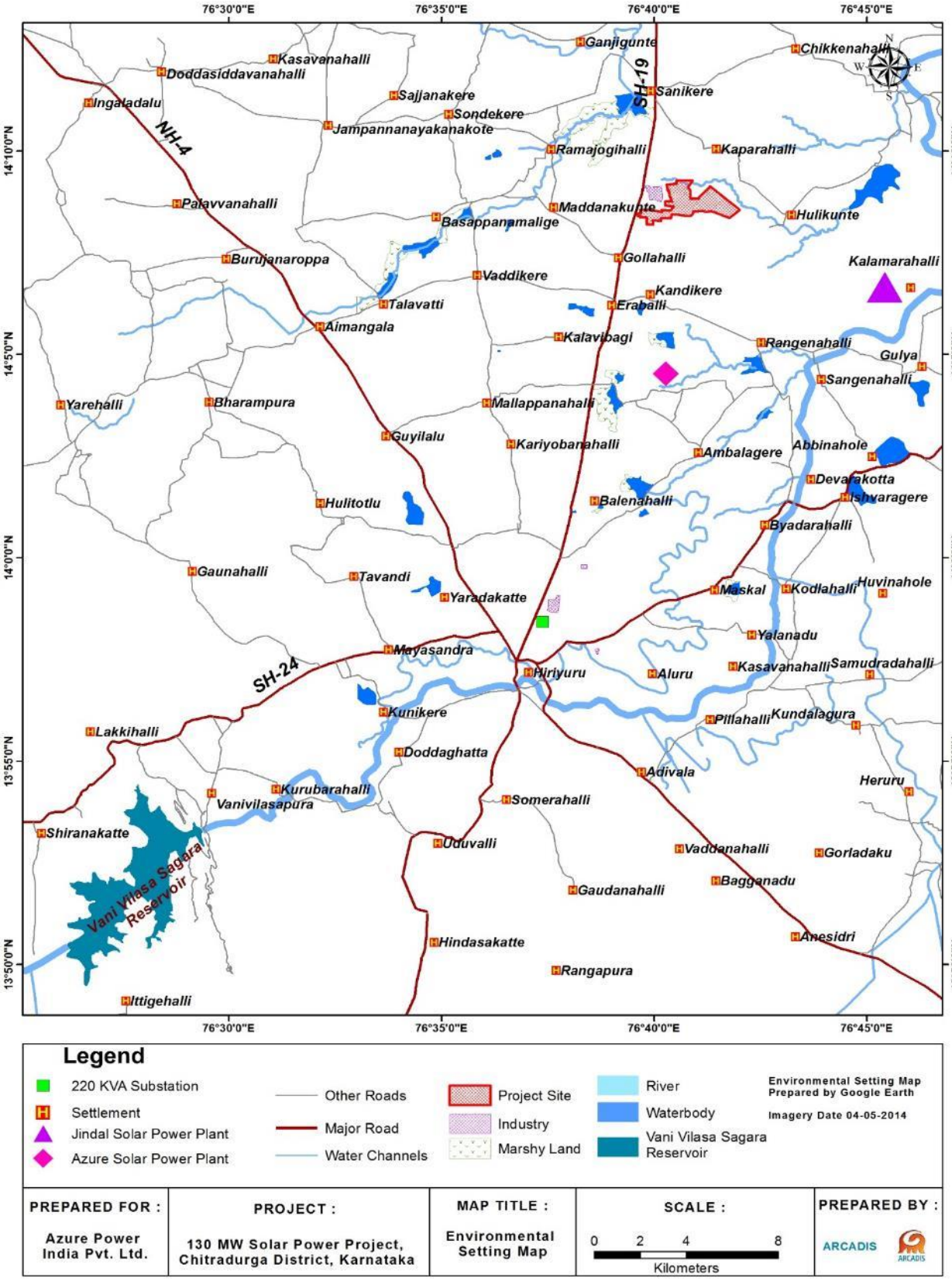
Photo 3-2: Sponge Iron Factory near the project site

Sponge Iron factory as seen from the Hiriyur Bellary Road

Close approach to the factory

[1] As per Regional Office Record, Karnataka State Pollution Control Board, Chitradurga

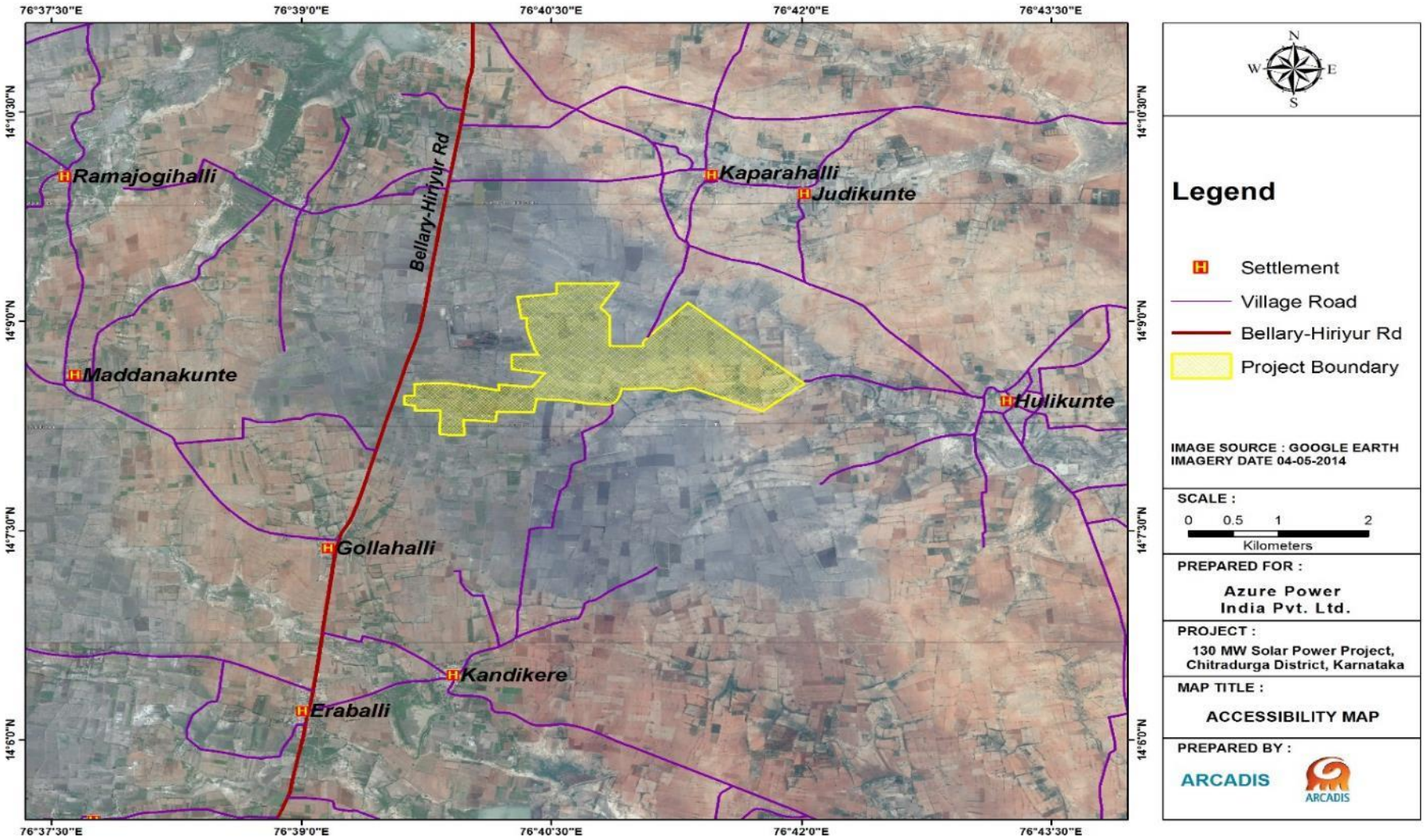
FIGURE 3-1: ENVIRONMENT SETTINGS OF THE PROPOSED PROJECT SITE



3.4. SITE ACCESSIBILITY

The site can be approached from Bangalore by road via NH 4 & NH 13 through Chitradurga. The site can also be approached via Hiriyur Bellary road bypassing NH4. The nearest airport is Bangalore located at a distance of around 200 km and nearest railway station is at Chitradurga about 30 km from the proposed site. There are metallic village roads that can be used for approaching the site from different directions. The accessibility map is provided in **Fig 3-2**

FIGURE 3-2: ACCESSIBILITY OF THE PROPOSED PROJECT SITE



3.5. LAND REQUIREMENT

The land required for the proposed project is about 576 acres of land. The land is being taken from four villages viz. Gollahalli, Kaparahalli, Jadekunte and Khandikere villages. The land is mostly rain fed agriculture land with few parcels of land is barren land termed as 'Kharab land'[2] land. For 184 acres of land acquired by Azure kharab land is 3 acres. There is no vegetation or inhabitants on the land as such no relocation of settlements would be required. Right of use for erecting the transmission line would be acquired by Azure through the vendors. The negotiation for the same is in process. The transmission route length will be about 16 km in length parallel to the Hiriyur Bellary Road about 500 m from the road. Transmission line would avoid the land parcels having plantations like areca nut, coconut and banana. Azure has registered about 184 acres of land under Azure Raj Private Limited and rest of the land purchase is under process.

3.6. TECHNOLOGY, COMPONENTS AND LAYOUT

The major components involved in the solar PV power plant are:

- Solar PV modules
- Array Junction Boxes / Combiner Boxes
- Cables & Connectors
- Central Inverters
- Transformers
- Earthing System
- Lightning & over voltage protection

3.6.1. Solar PV Modules

Solar PV Modules with thin-film technology (CdTe) shall be sourced from First Solar. The Modules shall be tested & certified by an independent testing laboratory that is accredited with ISO Guide 25. The Module type will be qualified as per IEC 61730 or IEC 61646 and CE mark or UL 1703 and ULC1703 under latest amendment. The Modules shall be provided with a junction with provision of external screw terminal connection and with arrangement for provision of by-pass diode. The box will be hinged, weatherproof lid with captive screws and cable gland entry points.

[2] As per Mysore Land Revenue Rules-in a judgement for transfer of property the court upheld that the Kharab land is so called because it is not cultivable and is a classification made for purposes of revenue exemption. Kharab land is also capable of ownership and cannot be regarded as an adjunct to cultivable land which gets transferred along with cultivable land. Acquisition to the title to the Kharab land is similar to the acquisition of the title to cultivable land.

3.6.2. Combiner Box

In the junction boxes, individual module strings are bundled and safely routed to the inverter. The junction boxes will have suitable cable entry points fitted with cable glands of appropriate sizes for both incoming and outgoing cables. These junction boxes are enclosed in IP-65 rated poly- carbonate housing, making it ideal for long-term use in PV systems. In addition, the direct connection between the strings and the spring clamp connectors ensures a durable and safe installation

3.6.3. Cables and Connectors

Solar cables are extremely robust and resist high mechanical load and abrasion. High temperature resistance and excellent weatherproofing characteristics provide a long service life to the cables used in large scale projects. Connectors with high current capacity and easy mode of assembly are to be used for connecting power cables

3.6.4. Module Mounting Structure

Photovoltaic arrays are mounted on a stable, durable structure that can support the array and withstand wind, rain, hail and other adverse conditions. Sometimes, this mounting structure is designed to track the sun. However, stationary structures are usually used with flat plate systems. It shall support SPV modules at a given orientation, absorb and transfer the mechanical loads to the ground properly. These structures tilt the PV array at an optimum tilt angle determined by the latitude of the site, the requirements of the load and the availability of sunlight. Among the choices for stationary mounting structures, rack mounting may be the most versatile. It can be constructed fairly easily and installed on the ground or on flat or slanted roof.

3.6.5. Inverters

To convert DC solar power to AC and for linkage with the grid, special grid interactive inverters will have to be installed along with interfacing, protection and control mechanisms to operate in parallel with the grid. These will be housed in an indoor arrangement as they are IP20 rated inverters. Rated capacity of Inverter is 680 KW (AC) having 1000V nominal DC input voltage and 380V output with 50Hz and total of 74 no's (XC 680) inverters to be used.

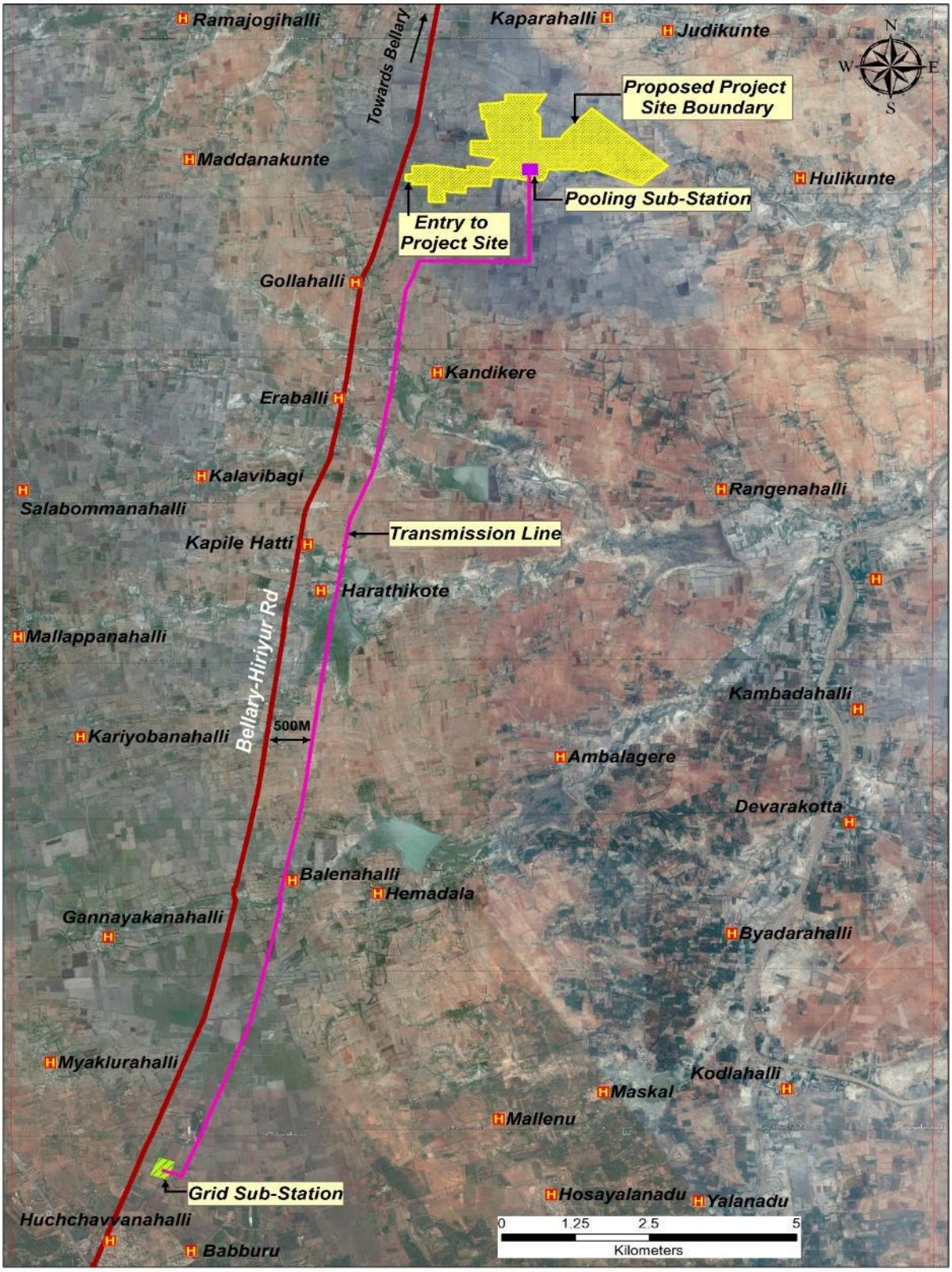
3.6.6. Transformer

Transformers shall meet IEC 76(1-5), ISO 2026 standards. The output of 4 inverters is connected to one transformer. There will be 49 transformers of 2.8 MVA and 1.4 MVA to step-up the output voltage of inverters from 380 V to 11 KV. There will be 3 Power Transformer of 50MVA, 40 MVA & 40 MVA to step up from 11kV to 220kV.

3.6.7. Grid Interface

Generated power from 130 MW project site plant shall be transmitted by a 220 kV substation at Hiriyur (SRS) located at 13°58'37"N and 76°29'7"E, which is at a distance of approx. 16 km to the South of the land identified for locating the main plant. Here, solar power generated will be converted to 380 V AC using PCU, and then it will be stepped up to 11 kV level and then 220 kV. Quantity and capacity of 0.380/ 11 kV and 11/220 kV stepped up MVA transformer will depend upon the electrical system specification and total no. of transmission towers of solar compact substation. Feasibility study for connection to the substation and survey for transmission route is being carried out. Company will obtain necessary approval for setting up the tower and ROW approval for laying the transmission line. The company is in discussion with various consultants for carrying out load flow study and will be submitting the report to Karnataka Power Transmission Company Limited (KPTCL). Subsequently, Company will enter into long term agreement with KPTCL for transmission of power.

FIGURE 3-3: PROPOSED PROJECT LAYOUT



3.6.8. Project Phases

Construction Phase:

The construction phase would involve civil and electrical engineering works. The construction phase of ground mounted solar power plant may vary from 3-6 months depending upon project capacity and technical issues. The construction phase generally involve following stages:

- **Site Clearance and Levelling**: Site clearance is a process through which an area where a new development will take place undergoes large scale cleaning and clearance. This process would involve demolition of existing building (if any), removal of vegetation and leveling of site. After the site clearance process is done foundation of new structure is laid.
- **Foundation Works**: Foundation works are required for firming the solar panels to the ground. Soil testing is suggested to determine the type of foundation required for the proposed plant.
- **Installation of solar panel structure**: The panel structure is designed for holding designed number of modules in series. The frames and leg assemblies of the array structures are made of structural steel sections. The composition of steel shall conform to IS 2062, suitable for welding purposes. The structural sections shall conform to IS-808- 1985, for their chemical and mechanical properties. They shall be hot dip galvanized for a minimum of 86 microns to provide along life of 25 years in the field. All fasteners shall be of Stainless steel grade SS-304. The structure is designed in such a way that it will occupy minimum space without sacrificing the output from SPV modules at the same time it will withstand severe cyclonic storm with wind speed up to maximum 47m/s.
- **Installation of solar PV modules**: The solar cells (usually made of silicon) sit in the sun. When a photon from the sun hits a cell, it knocks loose an electron from the silicon atoms that make up the cell. There are wires connected to the solar cell that collect these roaming electrons. The wires are connected to other cells and all of the cells together make a solar panel. One panel is connected in the next in a combination of series and parallel connections known as a "string." All of these connections of cells, panels, and strings are considered a solar PV array.
- **Connection of PV modules to inverter**: The DC electricity generated by the modules is converted to AC in the inverters or PCU as is also called. It should be having efficiency levels of 98.6%. Each inverter shall be with a minimum capacity of 1000 kW. The output power factor of the PCU should be of suitable range to supply or sink reactive power. The PCU shall have internal protection arrangement against any sustained fault in feeder line and lightning in feeder circuit. The PCU should be three phase static solid state type power conditioning unit. Both AC & DC lines shall have suitable fuses and contactors to allow safe start up and shut down of the system.

- **Connection with electricity grid**: Synchronization is the process of matching the voltage amplitude, phase and frequency of a source to a running network. The document describes the procedure of grid synchronization in a typical solar power plant having 66/11kV Switchyard. The Synchronization in a Solar PV Power plant happens at the Solar Inverter level.

Operational Phase:

Operation phase involves mainly electrical works for routine operation & maintenance of plant. The proposed project is designed for a period of 25 years of operation. Various activities under operation phase include:

Operations and Maintenance	
Plant monitoring	Daily analysis and evaluation of operational plant data through monitoring
Preventive maintenance	Preventive inspection and maintenance of system components according to manufacturer's specifications – Documentation of events and measures – Provision of small parts and operating material – Conduction of regulatory tests according to technical standards
Fault detection and analysis	Function check after fault message is received – Immediate start of fault removal measures – Long-term trend analysis
Management of repairs and claims	Analysis of interruptions and incidents – Supply chain management for spare parts i.e. modules, inverters, cabling and mechanical components
Warranty and service management	Monitoring and tracking of warranty rights – Support with insurance cases – Coordination and managing of external (i.e. 3rd party) service providers
Facility management	Maintenance of vegetation – Implementation of official requirements for technical operation – Module cleaning
Documentation and data management (KPIs)	Documentation of plant energy output and system availability – Electronic plant logbook – Detailed information about main events and measures – Customer Reports on a quarterly and/or yearly basis

3.6.9. Implementation Schedule

Brief project schedule of the project is presented below. Detailed project schedule is attached as ***Annexure II*** of this report.

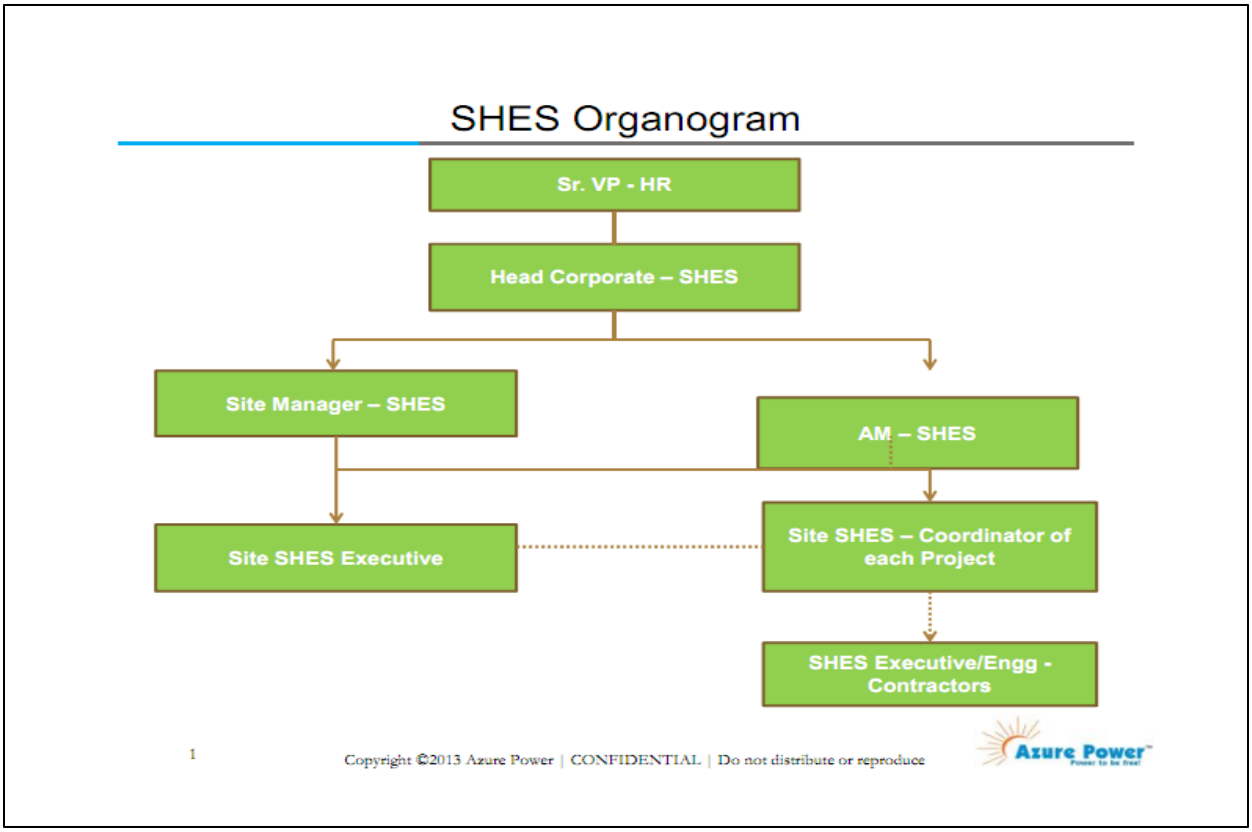
Implementation Schedule

S. No.	Particulars	Timeline
1	Signing of LOA	19-11-2014
2	Signing of Power Purchase Agreement	Completed on 25-01-15
3	Identification of land parcels	January-April 2015
4	Land purchase for the project (Signing of land deed)	Expected by August-November 2015
5	Completion of construction phase (130 MW)	Expected by 30-06-16
6	Commissioning date of the project (130 MW)	Expected by 30-06-16

3.6.10. Operation and Maintenance

Solar PV power plants are characterized by their simple and low cost Operation and Maintenance ("O&M"). The O&M of a PV plant mainly involves cleaning of the photovoltaic modules at regular intervals. Additional O&M activities include regular checking of electrical connections, minor replacement of electronic components, and similar activities. In addition to cleaning staff, the PV power plants typically require security staff and site engineers or supervisors. Performance monitoring of such plants are typically done remotely and an engineer may be deployed onsite for troubleshooting of issues. Azure will be directly in charge of operation and maintenance of the solar power plant. As such adequate staff engagement for operation and maintenance of the proposed project will be undertaken by Azure that will include site engineers and technicians along with security guards to undertake supervision and monitoring of the plant. The responsibility for managing Environment, Health

and Safety of the project during the construction and operation phase is distributed among various personnel in the organization as presented in the Organogram below.



Resources Required

During construction phase water will be procured through authorised tanker suppliers from village bore wells. About 59 KLD of water is required for construction purpose. During operation phase the water requirement of around 5.5 KLD is expected to be fulfilled using ground water from bore wells for, which Azure/Tanker suppliers will take the required permission from the designated authorities. Total labour requirement for the construction phase of the proposed project is estimated to be around 800-1000 labours during peak period. Labour camp would be set up for 150 migrant labours, while rest of the labour requirement would be met from local villages. The technical team during construction phase would comprise of transmission line team from Chennai and module erecting team from Delhi who will be accommodated in the labour camp. During operation phase about 7-8 site persons per site would be employed apart from 100 security guards for security purpose, who will be hired from nearby villages.

4. Social and Environmental Compliance Requirements

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

4.1. NATIONAL REGULATIONS

Environmental Protection has been given the constitutional status. Directive Principles of State Policy states that, it is the duty of the state to 'protect and improve the environment and to safeguard the forests and wildlife of the country'. It imposes Fundamental duty on every citizen 'to protect and improve the natural environment including forests, lakes, rivers and wildlife'. In India, the Ministry of Environment and Forests and Climate Change (MoEFCC) is the apex administrative body for (i) regulating and ensuring environmental protection; (ii) formulating the environmental policy framework in the country; (iii) undertaking conservation & survey of flora, fauna, forests and wildlife; and (iv) planning, promotion, co-ordination and overseeing the implementation of environmental and forestry programmes. Several laws have been promulgated for protection of environment and Occupational Health & Safety in India by the Central & State Government. The relevant regulation pertaining to the project activity has been discussed as under:

TABLE 4-1: APPLICABLE ENVIRONMENTAL, HEALTH, SAFETY AND SOCIAL REGULATION

S. N	National Environment, Health & Safety Regulation	Brief Requirement	Applicability
1	The Air (Prevention & Control of Pollution) Act 1981	As per Solar Policy of Karnataka 2014-2021 published on 22nd May 2014, point 18, "*Solar PV projects shall be exempted from obtaining clearances of pollution control board"*. Karnataka State Pollution Control Board (KSPCB) has ordered the implementation of the solar policy through its office memorandum dated *15th May 2015* clearly stating that Solar PV projects shall be exempted from obtaining clearances of pollution control board.	Not applicable
2	The Water (Prevention & Control of Pollution) Act 1974	Same as above.	Not applicable
3	Change in Land use	As per Karnataka Solar Policy 2014-2021, point 18, GoK contemplates to facilitate the deemed conversion of land for solar power projects by amending section 95 of Land Reform Act. Also developers will be allowed to start project execution without waiting for formal approval on filing application for conversion of agriculture land for setting up of solar power projects on payment specified fees.	Applicable to the project
4	The Environmental (Protection) Act 1986 and Rules	Requirement of the law states that establishing the project should ensure that there is no impact or minimal impact on the environment due to project activity.	Applicable during construction & operation Phase

S. N	National Environment, Health & Safety Regulation	Brief Requirement	Applicability
5	Environmental Impact Assessment (EIA) Notification 2006 & MoEFCC Office Memorandum dated 30th June'11.	The EIA Notification 2006 and thereafter the MoEFCC Office Memorandum dated, 13th May '11 exempts PV solar power projects from obtaining prior Environmental Clearance from the regulatory authorities. But, under the provision of MoEFCC office memorandum dated 30th June 2011, requisite permission is required to be obtained from competent authority for water and land usage.	Not Applicable
6	Environment (Protection) Seventh Amendment Rules 2009	As per Office Memorandum published by KSPCB, dated 15the May 2015, solar power projects 5 MW and above only come under the purview of Pollution Control Acts. Ambient air quality monitoring has to be carried out and the concentration limits for the air quality parameters should be in compliance with NAAQS 2009. Activities in the project especially during construction should not result after adopting mitigative measures in exceeding National Ambient Air Quality Standards (NAAQS) for ambient concentrations of air pollutants (such as particulate matter). If violation of the Rules takes place then the penalty will be decided on the basis of the parent Air Act 1981.	Prior to construction and if required during operation.
7	Noise (Regulation and Control) Rules 2000 amended in 2010	The Rules stipulate ambient noise limits during day time and night time for industrial, commercial, residential and ecologically sensitive areas. The rules apply both during the construction and operation of	Prior to construction and if required during operation

S. N	National Environment, Health & Safety Regulation	Brief Requirement	Applicability
		the project. Violation of the standards for assessing the noise quality due to the project will lead to penalty as under the EPA Act 1986.	
8	Hazardous Waste (Management, Handling and Trans-boundary Movement) Rules 2008	These Rules outline the responsibilities of the generator, transporter and recycler/re-processor of the hazardous wastes for handling and management in a manner that is safe and environmentally sound. Azure need to obtain consent from State Pollution Control Board for generation and storage of hazardous waste like damaged solar panel, transformer oil, waste oil etc. irrespective of quantity of waste. As per the law the occupier and the operator of the facility shall be liable to pay financial penalties as levied for any violation of the provisions under these rules by the State Pollution Control Board with the prior approval of the Central Pollution Control Board.	Applicable during construction and operation phase
9	Environment (Protection) Second Amendment Rules 2002	The DG sets installed during construction should comply with maximum permissible noise levels and noise control measures for diesel generators up to 1000 KVA capacity as specified in the Act.	Applicable during construction phase
10	The Building and Other Construction Workers'	Azure through its contractors shall ensure all vendors employed should have valid labour license. Compensation to workers (own and vendors) should not be below daily wage rate as specified by Government. Muster roll must be maintained. Employee ID card	Applicable during construction phase

S. N	National Environment, Health & Safety Regulation	Brief Requirement	Applicability
	(Regulation of Employment and Conditions of Service) Act 1996	must be issued (own and vendors). Safety, health and welfare measures of building and construction workers as mentioned in the act needs to be complied with. Failure to comply results in financial penalty /imprisonment of the principal employer along with vendor and closure of project	
11	Central Electricity Authority (Safety Requirements for Operation, Construction and Maintenance of Electric Plants and Electrical Lines) Regulations 2008	The solar power plant as the plant is going to be having electrical appliances and facilities installed for grid connected power generation. As per the act, all equipment and system installed shall comply with the provision of the statute, regulations and safety codes.	Applicable both during construction and operation phase
12	Workmen's Compensation Act, 1923 & Rules 1924	Azure should ensure through its contractors in case of any accident / injury / loss of life the workmen should be paid a minimum compensation as calculated under this act both during construction and operation phase of the project. The reporting of accidents needs to be done in prescribed forms as per the act and the incident / accident register needs to be maintained accordingly. The Act also gives a framework for calculating amount of compensation and wages.	Applicable during construction phase
14	The Contract Labour (Regulation and Abolition) Rules, 1971	All vendors employed through contractors of Azure should have valid labour license. Compensation to contract workers (own and	Applicable during construction phase

S. N	National Environment, Health & Safety Regulation	Brief Requirement	Applicability
		vendors) should not be below daily wage rate as specified by Government of India. Mustard roll must be maintained. Employee ID card must be issued (own and vendors). Safety, health and welfare measures of building and construction workers as mentioned in the act needs to be complied with. Failure to comply results in financial penalty. Failure to comply results in financial penalty.	
15	Minimum Wages Act, 1948	Minimum wages needs to be paid by the employer to the person employed as per the Act.	Applicable during construction phase

TABLE 4-2 PERMITTING & COMPLIANCE FOR THE PROPOSED PROJECT

PERMIT	AUTHORITY	REMARKS
Approval for solar power development in the area	Karnataka Renewable Energy Development Limited	Letter of Award has been issued on 18th Nov 2014 for all three sub projects (50 MW, 40 MW& 40 MW).
Environmental Clearance	Ministry of Environment, Forest & Climate Change (MoEFCC)	Solar power projects are exempted from obtaining an environmental clearance (EC) from Ministry of Environment, Forest and Climate Change (MoEFCC), as per the EIA notification, 2006 and its subsequent amendments
Forest Clearance from MoEFCC/ State Government	Forest Department	No forest land involved.
Power evacuation approval	Power distribution company-CESC, HESCOM & GESCOM	Approval has been obtained by Azure for three sub projects separately. For 50 MW project PPA has been signed between M/s Azure Sunrise Pvt. Ltd. & M/s Chamundeshwari Electricity Supply Corporation Limited, Mysuru. For 40 MW projects the PPA has been signed with M/s Hubli Electricity Supply Company Limited & M/s Gulbarga Electricity Company Limited.
Consent to Establish (CTE)	Karnataka State Pollution Control Board (KSPCB)	Karnataka State Pollution Control Board (KSPCB) has ordered the implementation of the solar policy through its office memorandum dated *15th May 2015* clearly stating that Solar PV projects shall be exempted from obtaining clearances of pollution control board.
Consent to Operate (CTO)	KSPCB	Karnataka State Pollution Control Board (KSPCB) has ordered the implementation of the solar policy through its office memorandum dated *15th May 2015* clearly stating that Solar PV projects shall be exempted from obtaining clearances of pollution control board.
NOC state nodal agency	Industry Commissioner/R.O.	Change in land use from agriculture to industry to be obtained from Deputy Commissioner Industry by payment of requisite fees. Azure is in preparation for submission of application for obtaining the land conversion certificate in two phases.
Ground water use approval	Karnataka Ground Water Board	For sinking of bore well for extraction of ground water in the state, application to be made by filling up requisite forms under The Karnataka Ground Water (Regulation and

PERMIT	AUTHORITY	REMARKS
		Control of Development and Management) Act, 2011.
Contractor permits	Project Developer	The contractor will need to abide by the following laws and the Project Company (Azure Power) will have to ensure this as they are the principle employer: • The Workmen's Compensation Act, 1923; • The Maternity Benefit Act, 1961; • The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996; • The Contract Labour Act, 1970; • The Child Labour (Prohibition and Regulation) Act, 1986; • The Bonded Labour System (Abolition) Act 1976; • The Minimum Wages Act, 1948; and • The Equal Remuneration Act 1976.
Land procurement	Project Developer	Procurement of land is in process.
No Objection Certificate from the Gram Panchayat	Gram Panchayats	Needs to be taken from the Gram Panchayats of the villages from whom land will be purchased for the development of the project. This will be initiated after land conversion certificate is issued to Azure and land purchase completed for the project.

4.2. IFC PERFORMANCE STANDARDS AND EHS GUIDELINES

IFC, a member of the World Bank Group, is the largest global development institution focused exclusively on the private sector in developing countries. The International Finance Corporation (IFC) Environmental & Social Performance Standards ("IFC Standards") have become the global benchmark for corporate social responsibility (CSR) and sustainability in project financing. While the IFC Standards originated in relation to projects financed by the World Bank, they are now used by all financial institutions around the globe that have signed up to the "Equator Principles", accounting for a substantial proportion of global project finance.

The IFC Standards (Performance Standards and Equator Principles) updated 2012 edition of IFC's Sustainability Framework applies to all investment and advisory clients whose projects go through IFC's initial credit review process **after January 1, 2012. It** establish a private regulatory framework in respect of labour and working conditions; environmental practices; workplace health & safety; community health, safety and security; land acquisition and involuntary resettlement; relations with indigenous communities, and; preservation of cultural heritage. In addition to the express guidelines of the IFC Standards themselves, adherents must meet the requirements of local and international laws in these areas, regardless of whether such

laws are regularly or consistently enforced by local governmental institutions. Hence the standard has been chosen to evaluate the project activity. The International Finance Corporation has laid down a set of eight Performance Standards that the project developers need to comply with while establishing the project. The provisions of the Performance Standards relevant to the wind power project are summarized below:

Applicable for the proposed project are:

- IFC Performance Standards on Environmental and Social Sustainability 2012.
- IFC/World Bank General EHS Guidelines;
- IFC/World Bank EHS Guidelines for Power Transmission and Distribution.

Based on preliminary desktop analysis of the location and project details shared by the corporate team of Azure Power, site visit to the location of identified land and its surroundings, consultations with land aggregator team and other stakeholders, legal advisor for land purchase, the site in-charge and his team the Performance Standards PS 1, PS 2, PS 3 and PS4 seems to be definitely applicable for this project. The project may result in limited number of specific environmental and social impacts, which can be avoided or mitigated by adhering to generally recognized performance standards, guidelines or design criteria. Therefore, the project can be preliminarily categorized as Category "B" as per IFC's screening criteria.

TABLE 4-3: IFC PERFORMANCE STANDARDS & APPLICABILITY TO THE PROJECT

Title of Performance Standard	Overall Objective	Applicability
PS 1: Assessment and Management of Environmental and Risks and Impacts	PS 1 establishes the importance of: • Integrated assessment to identify the E & S impacts, risks and opportunities of projects. • Effective community engagement through disclosure of project related information & consultation with local communities. • Management of E & S performance throughout the life of the project by the project developer.	The PS is applicable for the project. Potential impacts during construction phase besides being mitigable are likely to be limited to project site; short term; and not expected to impact environmentally sensitive areas. During operation phase there going to be minor and mitigable impact on air environments in terms of fugitive dust emissions due movement of project vehicles movement, drainage of project site and possible contamination of soil due to storage of hazardous wastes like used oil and broken solar panels. The company will, ensure adherence to IFC Performance Standards as applicable to its project and operations by implementing the mitigation, monitoring and management measures as outlined in the ESIA. This will be done by including the E&S provisions in the contractual agreement with developer/ O&M operator and putting in place a robust own oversight mechanism (deputing personnel, regular monitoring, internal audits and reporting). The company will contractually require the developer/operator to put in place a social and environmental organization consisting of qualified E&S personnel with appropriate responsibility allocation to implement/oversee/monitor a) the implementation of the ESMP, b) community engagement and grievance redressal system/mechanism, c) performance of contractors on labour and health & safety aspects, d) regular training of employees and contractors, e) emergency preparedness and response, f) periodic monitoring social and environmental performance; (g) internal and third party audit; (i) management review; (j) and periodic reporting of E&S performance to the management.

Title of Performance Standard	Overall Objective	Applicability
		The proposed project will have environmental and social impacts such as generation of noise and small quantities of hazardous wastes (operation of DG sets etc.). PS 1 is therefore applicable for the project and thus requires an Environmental and Social Impact Assessment (ESIA) study to be conducted before commencement of the project. Azure needs to implement an Environmental and Social Management System to manage the risks associated with its operations. Azure has developed the management system which is attached as ***Annexure III.***
PS 2: Labour and Working Conditions	• To promote the fair treatment, non-discrimination, and equal opportunity of workers, • To establish, maintain, and improve the worker management relationships • To promote compliance with national employment and labour laws • To protect workers, including vulnerable categories of workers such as child workers, migrant workers, workers engaged by client or third party, • To promote safe and healthy working conditions and the health of workers and • To avoid use of forced labourers	The PS is applicable for the project as the project developer is going to employ labours for both the phases-construction as well as operation. During construction, which will last around 4-5 months, man-power ranging from 250-300 will be required during normal functions while peak construction activities will require about 850-1000 workers. Preference will be given to local community members. However, the project envisages a requirement of around 100 skilled workers who will be hired from outside the immediate project area. Though the project plans to maximize local content in employment in the construction phase, it also has back up plans for sourcing labour from outside the region in case the labour requirements are not met locally. To this effect, labour accommodation is planned to be set up during the construction phase of the project for certain specialized skilled workers of around 100 to 150 workers. Azure Power will ensure that adequate facilities and amenities are provided in the labour accommodation for construction workers including: adequate living/sleeping facilities and space per person; potable water that meets national standards and standards as laid down by ILO; toilets, washing and cleaning facilities; canteen/mess or fuel for cooking; locker/storage facilities; and facilities for management and disposal of garbage, sewage and other waste. The company will periodically review and monitor the condition of the labour camps. The

Title of Performance Standard	Overall Objective	Applicability
		worker accommodation standards as laid down by ILO is presented in ***Annexure XXI*** of the document. The contractor management plan to be developed as a part of the ESIA and the relevant provisions of Azure's HR policy and SEHSMS will be implemented for the project. The company will need to communicate with the contractors on its SEHSMS and HR policies and PS 2 requirements with respect to access to grievance mechanisms, health & safety, benefits and welfare provisions etc. To this effect it will have to plan provision of trainings and capacity building support to the contractors. The company, as a part of the contractor oversight procedures will need regular monitoring of compliance to the aforesaid guidelines/requirements and ensure that these are met. Internal audits and follow up on corrective actions will also need to be undertaken to assess efficacy of the oversight system. Azure will also require the developer to ensure usage of relevant personal protective equipment, implement work permit and incident/accident recording/ reporting systems etc.). The company will (apart from the periodic internal audit) engage a qualified third party to review/audit its labour, OHS and contractor management practices during the construction phase to assess compliance to aforesaid requirements.
PS 3: Resource Efficiency and Pollution Prevention	• To avoid or minimize adverse impacts on human health and environment by avoiding or minimizing pollution from project activities, • To promote sustainable use of resources, including energy and water, • To reduce project related GHG emissions.	The PS is applicable to the project. The project will be developed on pooled private agricultural land (as per revenue records), a large part of which seems to have been aggregated from investors who have either pooled this land around 4 to 5 years back due to an airport announced in this location by the government and later cancelled though no records for the same has been found. Similarly private land required for the construction of the transmission line (either pole/tower site and/or for the line right-of-way (RoW) will be leased from individual land owners through a negotiated

Title of Performance Standard	Overall Objective	Applicability
		settlement through vendors appointed by Azure. Water for project construction phase will be sourced from bore wells of adjacent villages by authorised tanker water suppliers and drinking water supply would be through packaged drinking water. The project, is expected to contribute to significant GHG avoidance beginning in FY2016-17. No material impact on ambient air quality is expected on account of this Project. However, temporary impacts on ambient air quality and noise levels may be expected during construction. The company will implement measures during construction: for management of excavated earth and construction rubble; and minimization of fugitive dust emissions. Further, the company will ensure that other wastes (packing material, metal, debris, cement bags, drums etc.) are collected, stored and disposed off to re-users or in appropriate authorized debris disposal areas. Limited concreting work is expected for structure foundations, sub-station, and transformer yard and transmission towers. Cement concrete mixers will be expected to be used at site since significant concreting work is not expected. Concreting and other construction activities including use of earth moving equipment and increased traffic for material movement is expected to result in increase in ambient noise levels. However, this increase is short term during construction stage only. The construction work will be carried out only during day time and no noise generating equipment will be operated at night. Dry brush cleaning solutions are currently being evaluated, to avoid requirement of water for panel cleaning. Water if required is expected to be either sourced from authorized water tankers or bore well to be sunk within the plant premises after obtaining necessary permissions from competent authority. No material impact on surface or groundwater resources is expected on account of the project, except

Title of Performance Standard	Overall Objective	Applicability
		that the water sourcing requirement during the construction phase will need to safeguard the immediate and medium term needs of water by the local communities. The company will have to ensure that the water made available to workers and employees' meets national potable water quality norms, and preliminary information about water quality indicates some related challenges in ground water quality of the area. Appropriate facilities for collection, treatment and disposal of sewage (septic tank and soak pit) both during construction and operation phases will also need to be provided. Also, disposal of hazardous materials like broken solar panels should be disposed off through authorized vendors.
PS 4: Community Health, Safety and Security	• 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; and • 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.	The PS is applicable as the project will involve movement of vehicles on the approach road passing through villages, enter the site through the Hiriyur Bellary road that will be diagonally crossed to divert the project vehicles and trucks carrying the construction material in to the project boundary near Gollahalli village. The Hiriyur Bellary road has traffic plying 24 hours very frequently as it is one of the major roads in the district that connects Chitradurga, Bellary and Bangalore. So, the traffic has to be managed for the project vehicles to cross the road and enter the project boundary. Further, at the project site, the company will need to exercise appropriate access control, barricading of excavated areas; safety signage; illumination and other measures to mitigate the risk of accidents for general public during construction. Also, the project also envisages influx of labours from different nearby villages and migrant labours will be accommodated in the labour camp. As such community health and safety need to be taken care by the project developer and ensure safety measures to be put in place both during construction and operation phase of the project.

Title of Performance Standard	Overall Objective	Applicability
PS 5: Land Acquisition and Involuntary Resettlement	• To avoid, and when avoidance is not possible, minimize displacement by exploring alternative project designs; • To avoid forced eviction; • To anticipate and avoid, or where avoidance is not possible, minimize adverse social and economic impacts from land acquisition or restrictions on land use by (i) providing compensation for loss of assets at replacement cost4 and (ii) ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation, and the informed participation of those affected, • To improve or restore the livelihoods and standards of living of the displaced persons • To improve living conditions among physically displaced persons through provisioning of adequate housing with security of tenure at resettlement sites.	No expropriation of land is anticipated for the purpose of the transmission line. A lump sum compensation based on the agreement will be paid to the affected land owners. No forest land seems to be involved in the RoW of the transmission corridor proposed for the project. No physical displacement will result from the setting up of the project and its associated utilities. The project will provide for access roads to ensure continued access to the other lands in its operational phase. Hence, PS5 (Land Acquisition and Involuntary Resettlement) does not seem to be applicable to the project.
PS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	• To protect and conserve biodiversity • To maintain the benefits from the ecosystem service, • To promote the sustainable management of living resources through the adoption of practices that integrates conservation needs and development activities.	There are no ecologically sensitive zones/areas within a 10 km radius of the project site. No significant adverse impacts of the project on fauna is expected nor are any forest/protected areas being impacted by the project and planned developments. Hence, PS6 also does not seem to be applicable to the project.
PS 7: Indigenous Peoples	• To ensure that the development process fosters full respect for the human rights, dignity, aspirations, culture, and natural resource-based livelihoods of Indigenous Peoples; • To anticipate and avoid adverse impacts of projects on communities of Indigenous Peoples, or when avoidance is not possible, to minimize and/or compensate for such impacts;	With regard to PS7 (Indigenous Peoples), the project and its activities will not impact any indigenous people/community. No tribal land is being taken for the development of the project and its associated utilities. Hence PS 7 can also be considered to be not applicable to the project.

Title of Performance Standard	Overall Objective	Applicability
	• To promote sustainable development benefits and opportunities for Indigenous Peoples in culturally appropriate manner; • To establish and maintain an ongoing relationship based on Informed Consultation and Participation (ICP) with the Indigenous Peoples affected by a project throughout the project's life- cycle; • To ensure the Free, Prior, and Informed Consent (FPIC) of the Affected Communities of Indigenous Peoples when the circumstances described in this Performance Standard are present; and • To respect and preserve the culture, knowledge, and practices of Indigenous Peoples.	
PS 8: Cultural Heritage	• To protect cultural heritage from the adverse impacts of project activities and support its preservation; and • To promote the equitable sharing of benefits from the use of cultural heritage.	No cultural heritage is expected to be adversely impacted, as the site does not have any archaeological sites, or any structure that have paleontological, historical, cultural, artistic or religious values. The proposed project site do not have any place of worship, crematorium ground or any other cultural structure used by the local villagers. Hence PS 8 is not applicable for the project.

5. Description of Environment

This section describes the existing environmental settings and socio-economic conditions in the project area. The description is based upon the reconnaissance survey, primary monitoring of key environmental attributes, primary socio-economic survey and secondary information collected from the published sources.

The proposed 130 MW solar power plant project is located near villages Gollahalli, Khandikere, Kaparahalli and Jadekunte villages in Chitradurga District of Karnataka State. Chitradurga district is located at a distance of 202 km Northwest of Bangalore. The district is bounded by Tumkur district to the southeast and south, Chikmagalur district to the southwest, Devanagari district to the west, Bellary district to the north, and Anantapur district of Andhra Pradesh state to the east. The district is divided into six taluks, namely Chitradurga, Hiriyur, Hosadurga, Holalkere, Challakere and Molakalmuru.

5.1. THE PHYSICAL ENVIRONMENT

5.1.1. Air Environment

Meteorology

In general the rainfall in the district during the last decade (1996-2005) was higher than long-term normal rainfall. However, the district faced deficit rainfall continuously from 2002 to 2004. It receives low to moderate rainfall and is one of the drought prone districts in the state. The normal annual rainfall in the district based on 30 years is 574mm. However, in the last decade (1996-2005) the district received an average annual rainfall of 631.7mm[3]. **Table 5-1** gives the climatological data for Chitradurga district for the year 1951-1980 and **Table 5-2** gives the data for average rainfall for 2008-2012 in the district.

TABLE 4.4: CLIMATOLOGICAL DATA FOR CHITRADURGA DISTRICT

Month	Mean Temperature °C		Mean Rainfall in mm	Relative Humidity %	Avg Wind Speed Km/h
	Maximum	Minimum			
January	28.8	17.1	106.7	67	7.4
February	31.7	19.3	32.0	58	7.4

[3] *(Source: Chitradurga Information Booklet CGWB, August 2007)*

Month	Mean Temperature °C		Mean Rainfall in mm	Relative Humidity %	Avg Wind Speed Km/h
	Maximum	Minimum			
March	34.6	21.6	81.9	58	7.1
April	35.7	22.9	144.5	69	7.3
May	34.3	22.4	259.3	76	10.5
June	30.1	21.5	177.0	82	14.3
July	27.7	20.9	215.4	87	14.2
August	27.7	20.7	332.2	87	13.6
September	28.8	20.5	303.8	85	10.5
October	29.1	20.4	403.3	81	6.5
November	28.1	18.6	274.8	75	6.7
December	27.4	16.8	139.2	73	7.6

(Source: Climatological Table Data 1951-1980)

TABLE 4.5: AVERAGE RAINFALL IN CHITRADURGA BETWEEN 2008-2012

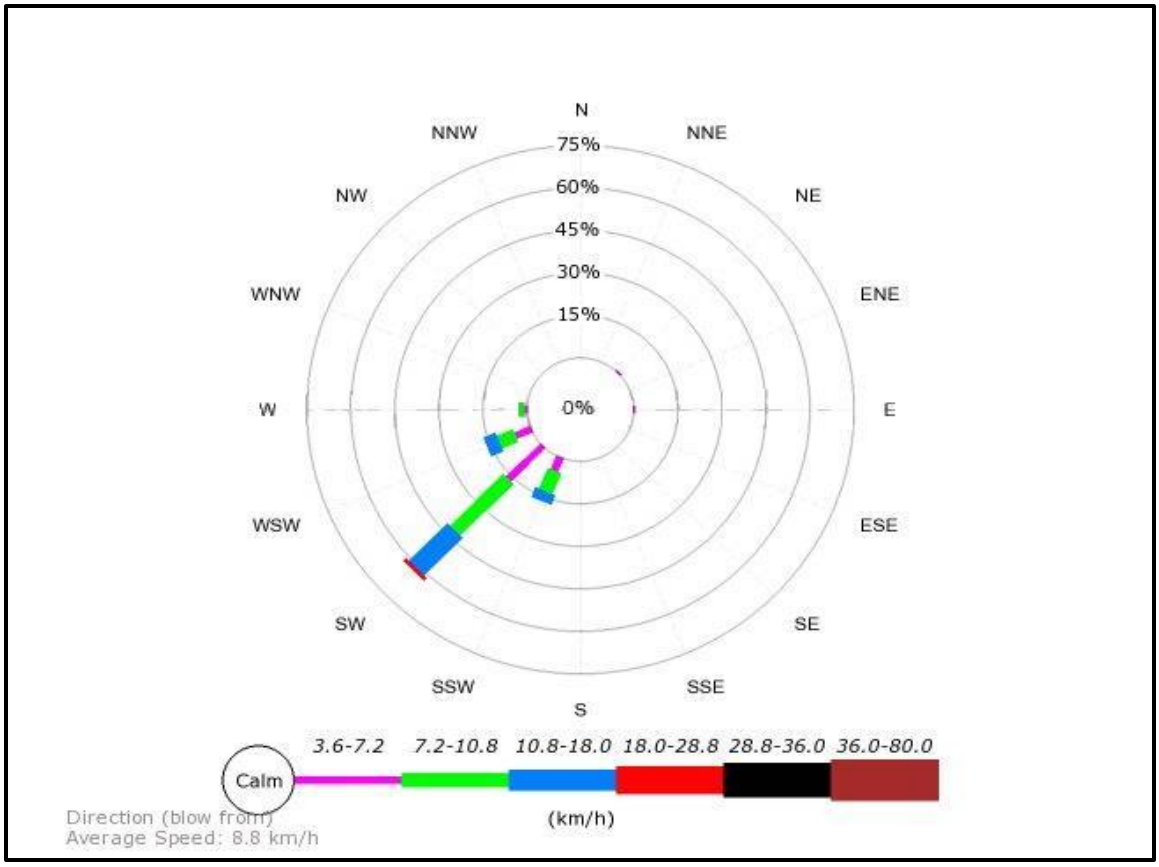
Average rainfall received in Chitradurga (2008- 2012) (in mm)						
Station Name	Month	2008	2009	2010	2011	2012
Chitradurga	January	0.0	0.0	7.5	0.0	0.0
	February	23.4	0.0	0.0	0.3	0.0
	March	83.2	8.1	1.4	1.5	0.0
	April	8.4	5.8	93.2	57.7	131.4
	May	77.5	148.3	140.2	52.3	44.3
	June	42.6	61.8	44.0	46.9	20.3
	July	61.2	55.3	121.6	37.4	40.7
	August	128.7	152.4	191.8	58.5	139.9
	September	127.3	226.0	81.6	26.9	61.6
	October	90.8	99.4	93.3	115.9	35.0
	November	15.0	59.8	196.9	19.9	102.0
	December	0.7	25.5	0.0	0.2	0.4

Temperature: The meteorological data of Chitradurga station shows that, the maximum temperature occur in the month of April (35.7^0C), whereas the lowest temperature was observed in the month of December ($16.8\ ^0$ C).

Wind Speed: The average wind speed is ranges from 6.5 to 14.2 km/hr highest being in the month of July and lowest wind speed recorded in the month of October.

Wind direction: Predominant wind direction is towards south west during the study period.

FIGURE 4-1: WIND ROSE FOR THE PROPOSED PROJECT AREA (MAY-JUNE 2015)



5.1.2. Topography

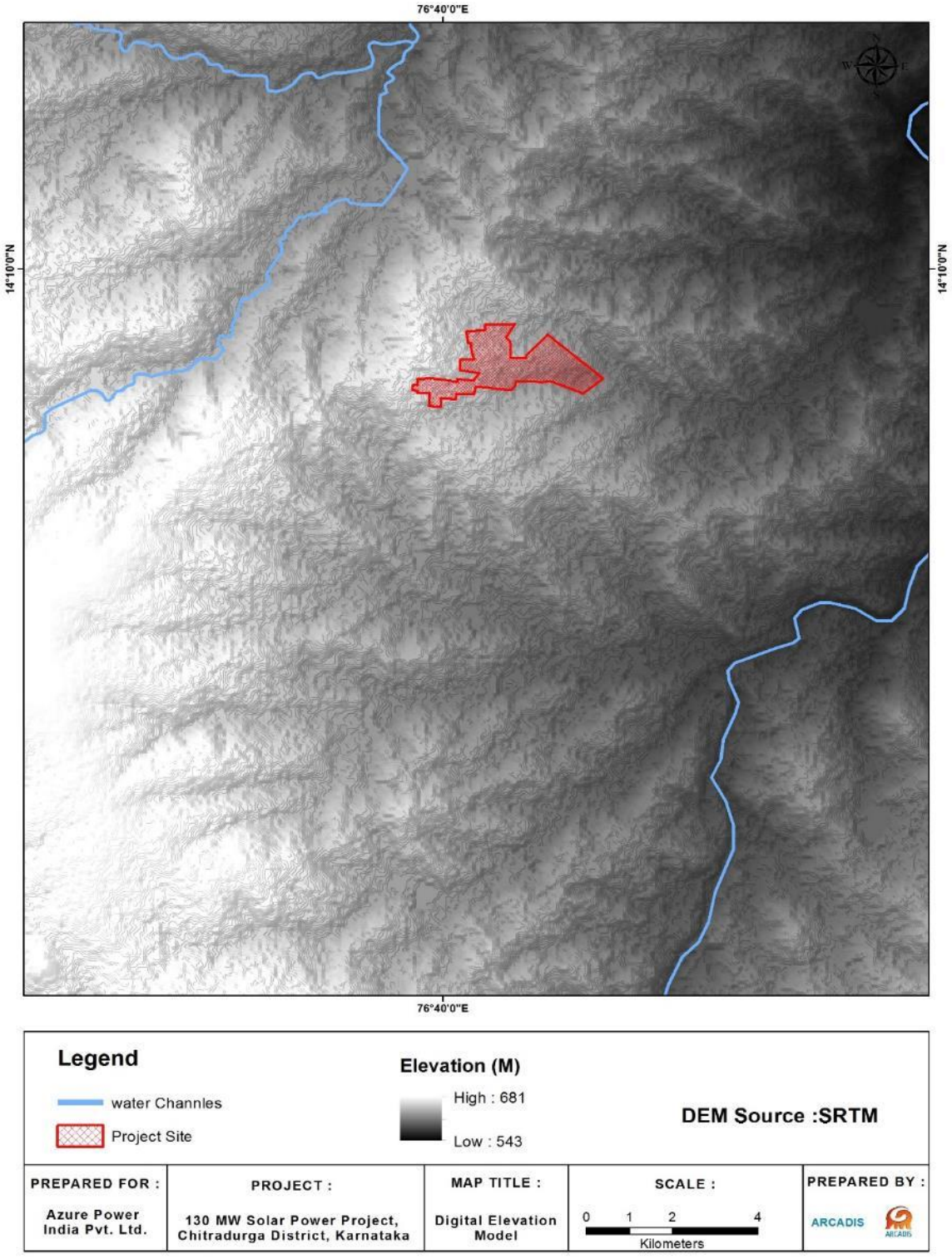
Proposed site is generally flat with slight undulation at few patches. A part of land was originally used for seasonal agriculture depending on rain but most of the land has non-fertile land and supports dry crops like ground nut and horse gram once a year. The highest elevation is about 581 m above sea level. The elevation of the proposed project area is presented in **Fig 5-2** below.

Photo 4-1: Topography of the area

Red granular soil within the project site

Flat terrain within the project site

FIGURE 4-2: ELEVATION OF THE PROPOSED PROJECT AREA



5.1.3. Land Use

As per Chitradurga district website, the district covers a geographical area of about 8440 sq.kms and comprises of six taluks. It receives low to moderate rainfall and is one of the drought prone districts in Karnataka state. Normal annual rainfall varies between 668 mm in Holalkere in western part to 457mm in Challakere, in the north-eastern part of the district. Agriculture is mainly dependent on the timely and adequate rainfall in the district.

As per District Agriculture Department & Agriculture Contingency Plan for Chitradurga the land use of the district is mainly agriculture land followed by permanent pastures land. As per department of Horticulture and Agriculture, Chitradurga, most of the crops cultivated are rain fed crops. The crops majorly grown are groundnut, maize ragi, sunflower, jowar, Bengal gram, red gram. The horticulture crops includes banana, mango, sapota, coconut, pomegranate & mosumbi. Initial consultations undertaken with the team members of the land aggregator having local knowledge have also confirmed similar characteristics of weather conditions, land use, agricultural practices and occupational profile of the villages in which the land for the project is identified.

Topo sheet published by Survey of India for this area also indicates the land use of the project area and its surroundings to be a mix of agriculture land and open scrub. Land Use map of the proposed project site and surrounding area of 500 m, prepared based on the topo sheet of the area is provided in **Fig 5-3** which shows about 62% of the land use is agriculture while about 33% is scrub land. Similarly, land use of the proposed route of the transmission line is presented in **Fig 5-4.**

The cultivable land in the district is mostly under occupation of small and medium farmers. In Hiriyur the land holding of marginal farmers is highest compared to Challakere. The category wise number and area of operational holdings in the district and the two blocks is presented in **Table 5-1.**

Purchase of land for the proposed project is under process. About 180 acres of land has been registered under Azure Raj Private Limited. The land to be purchased is private agriculture land which is cultivated only once during monsoon as the area is very dry and devoid of rains except for a small period of monsoon. As per the land use map of the proposed project site the major land use comprises of agriculture land (62.5%) followed by open scrub area (33.8%). There is no settlement within 500 m of the proposed project site. The transmission line is about 16 km in length and is passing through agriculture land. The land use of the proposed project site reveals that majority of the land use is agriculture land (74.65%) followed by open scrub and plantation which includes banana and coconut.

TABLE 4.6: LAND HOLDING TYPE IN THE DISTRICT

Sl. No	Size group(ha)	Chitradurga Dist.		Hiriyur - Tehsil		Challakere-Tehsil	
		Total holdings		Total holdings		Total holdings	
		Number	Area	Number	Area	Number	Area
1	Marginal Farmers (Below 1 Ha)	109177	59138	17101	9234	18387	10052
2	Small Farmers (1-2 Ha)	90370	127587	15980	22840	20143	28911
3	Semi-Medium (2.0 - 3.99)	60063	158777	11638	31305	17326	44983
4	Medium Farmers (4-10 Ha)	26795	152834	6219	36137	8403	48192
5	Large Farmers (>10 Ha)	4172	62441	1129	16484	1551	22782
	ALL GROUPS	290577	560777	52067	116000	65810	154920

Source: Published by District Statistical Office, Chitradurga District/2013-14

FIGURE 4-3: LAND USE MAP OF THE STUDY AREA

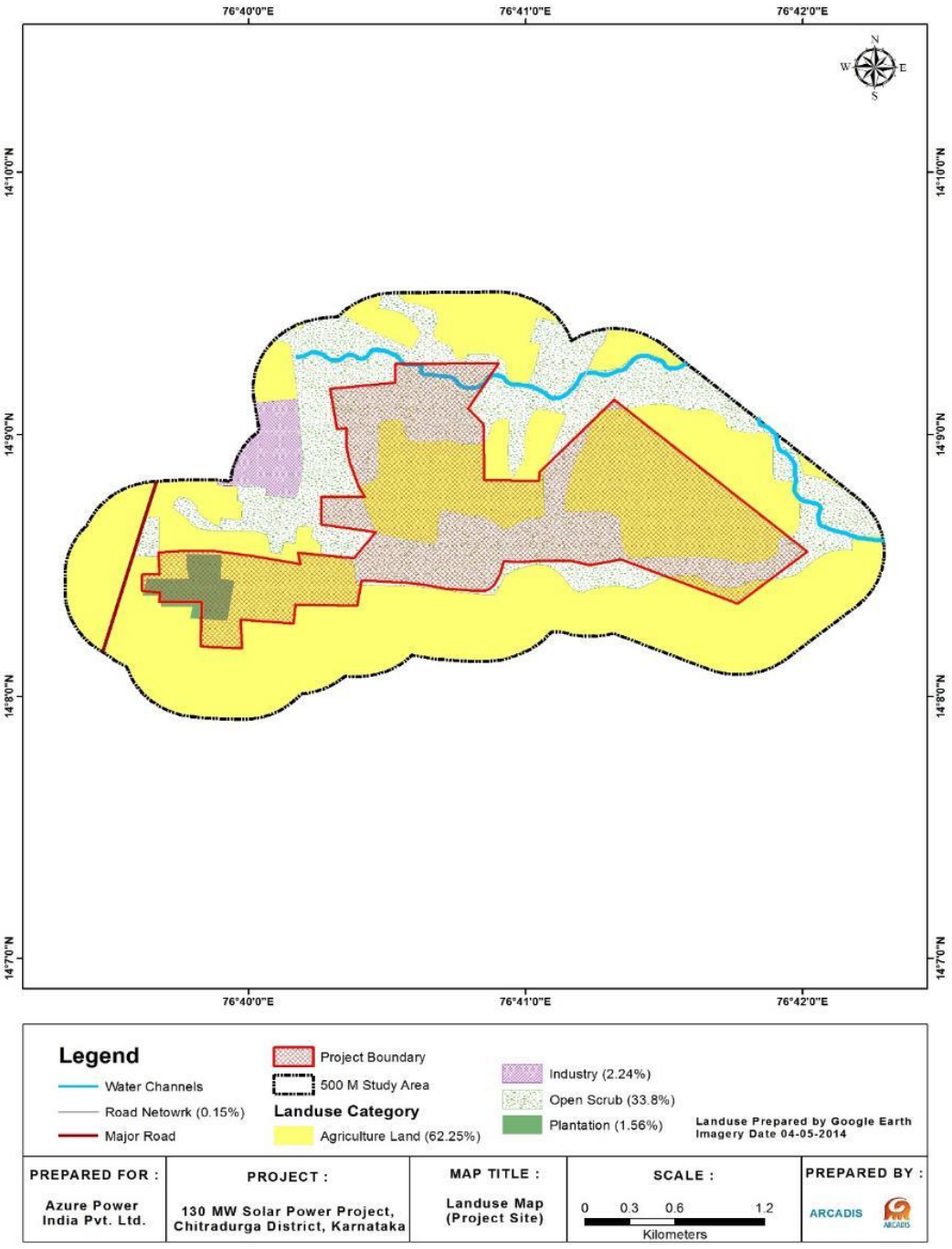
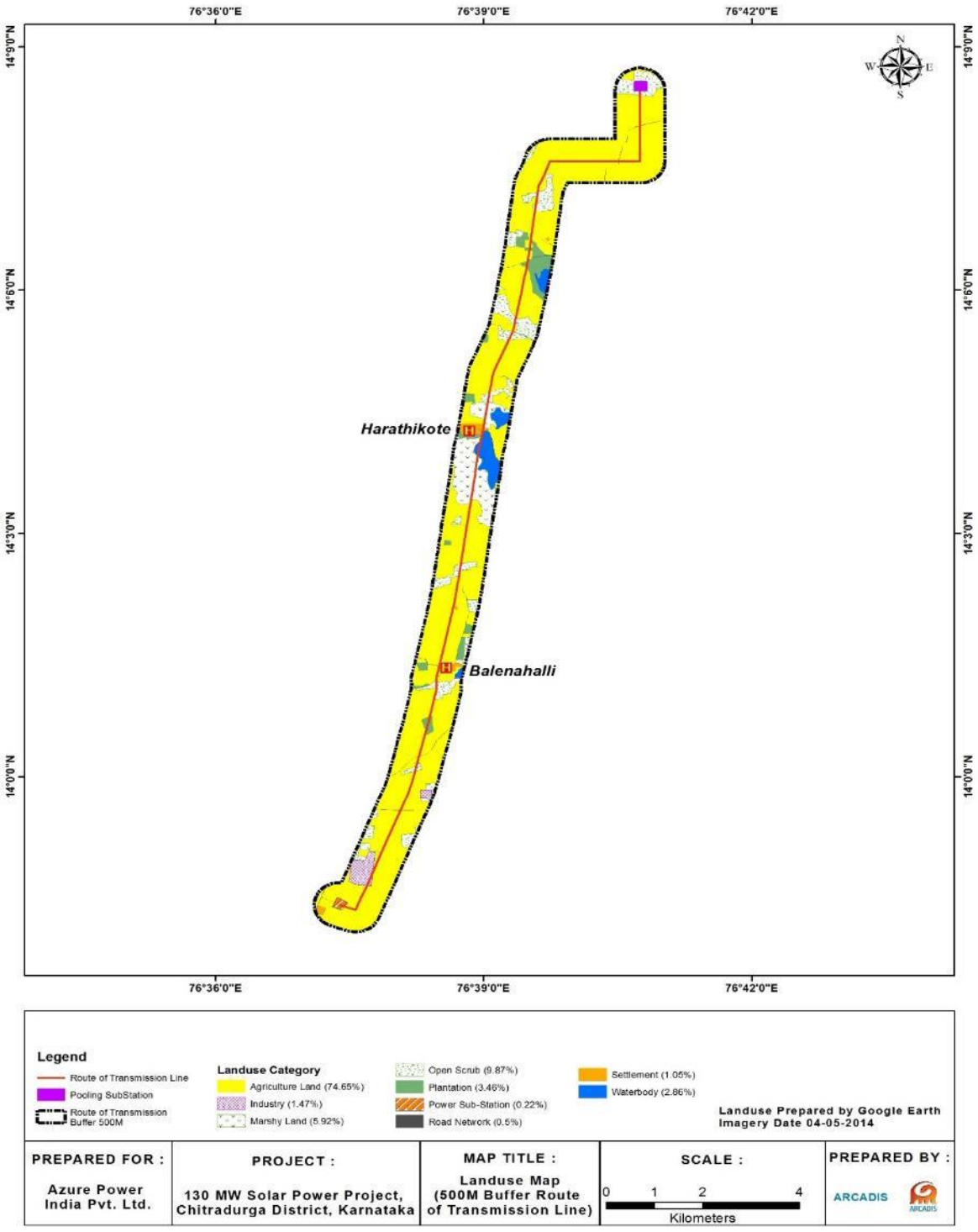


FIGURE 4-4: LAND USE MAP OF THE TRANSMISSION LINE



5.1.4. Drainage & Surface Water

The drainage of the project site is aligned towards north east as the topography slope of the site is towards that direction. There is a lake called Bellagere Lake, which is about 5 km from the proposed site boundary. Water gets collected in the lake due to the formation of a depression where water gets collected due to joining of various seasonal water channels. Vani Vilasa Sagara (also called as Mari Kanive) is a dam located at a distance around 35 km to the south west of the project site connecting river Vedavati. The river flows on the eastern direction at a distance of about 5 km from the proposed site. The dam supplies water to a lot of surrounding cities, towns as well as villages, which are mostly water scares.

Photo 4-2: Water body near the project site

Vedavati river flowing 6 km away towards northeast of project site

Belegare Lake located 5 km north east of the project site

Canal connecting Vedavati river to Challakere

Unlined canal running north of project site approx. 6 km away

Reconnaissance visit to the site and preliminary discussions with the land aggregator team having knowledge of the locality was undertaken. The discussion indicated that the land in these four villages of the project is devoid of irrigation facilities or any sort of canal network associated with this dam. There is a canal network connecting Vedavati river that supplies water for irrigation in few villages in Challakere taluka but the project site does not come in the command area of the canal. Also, Upper Bhadra Project is a major lift irrigation Scheme under implementation in the central region of Karnataka State. It envisages lifting upto17.40 TMC of water in first stage from Tunga to Bhadra and lifting 29.90 TMC of water in second stage from Bhadra to Tunnel near Ajjampura, in Tungabhadra sub-basin of Krishna basin. It is planned to irrigate an extent of 2, 25,515 hectares of land by micro irrigation in drought-prone districts of Chikmagalur, Chitradurga, Tumkur and Davangere. However, our proposed project site doesn't fall under the command area of the proposed irrigation scheme through Chitradurga Branch Canal as presented in **Fig 5.6.** This has also been confirmed by the irrigation department of Chitradurga.

However, use of bore wells has been observed for irrigating some of the farms located adjoining the land identified for setting up of the project. Agriculture practiced in the area has been observed to be primarily rain fed. Drainage map of the project area is presented in **Fig 5.5.**

Interpretation of Surface water quality monitoring results

Surface water characteristics were assessed against water quality criteria as per CPCB guidelines for water resources. The surface water samples were collected from four different sources viz. pond water from Sanikere village, water sample from Bellagere Lake, Vedavati River and water sample collected from pond near Yaraballi village. The results of the surface water sample collected from natural drainage channel near the project site have been discussed in the section 5.1.9. The DO levels observed between 3.8 and 4.2 mg/l, indicating favourable conditions for the growth and reproduction of normal population of fish and other aquatic organisms in the water bodies. BOD levels were below detection level (0.1 mg/l) in all the four water samples. Total coliforms detected in Bellagere lake is higher (80 MPN/100 ml) than observed in other three water sources where the total coliform ranges between 17-30 MPN/100ml.The surface water sample is analysed to be slightly alkaline in nature having average pH value of 7.4. Total dissolved solids in all the water samples ranges from 306-651 mg/l. Hence, the best use class of the surface water bodies according to the CPCB Water Use Classification conforms to Class C (Drinking water source after conventional treatment and disinfection) inland surface water quality. The surface water quality results is attached as ***Annexure IV*.**

FIGURE 4-5: DRAINAGE MAP OF THE STUDY AREA

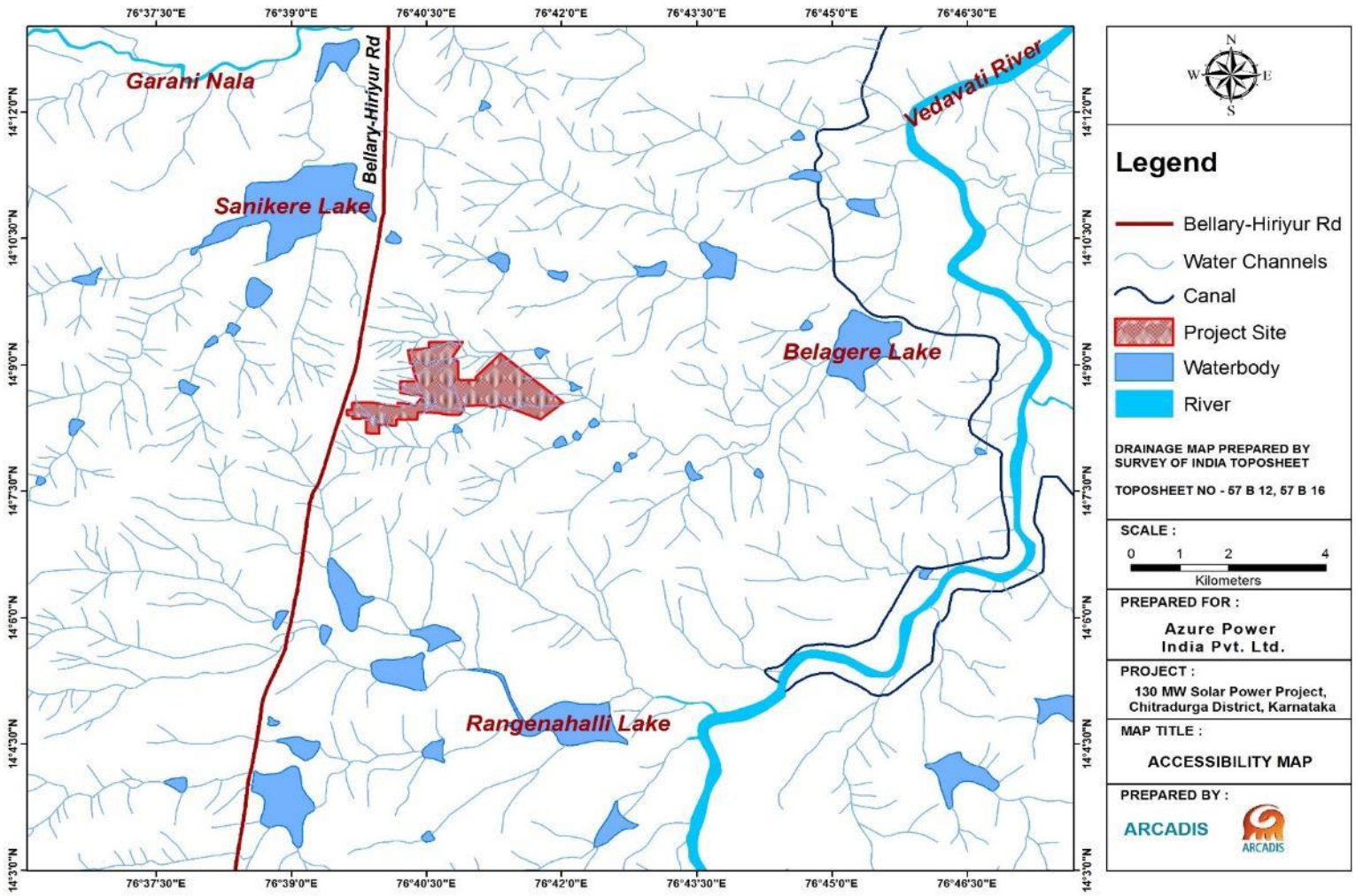
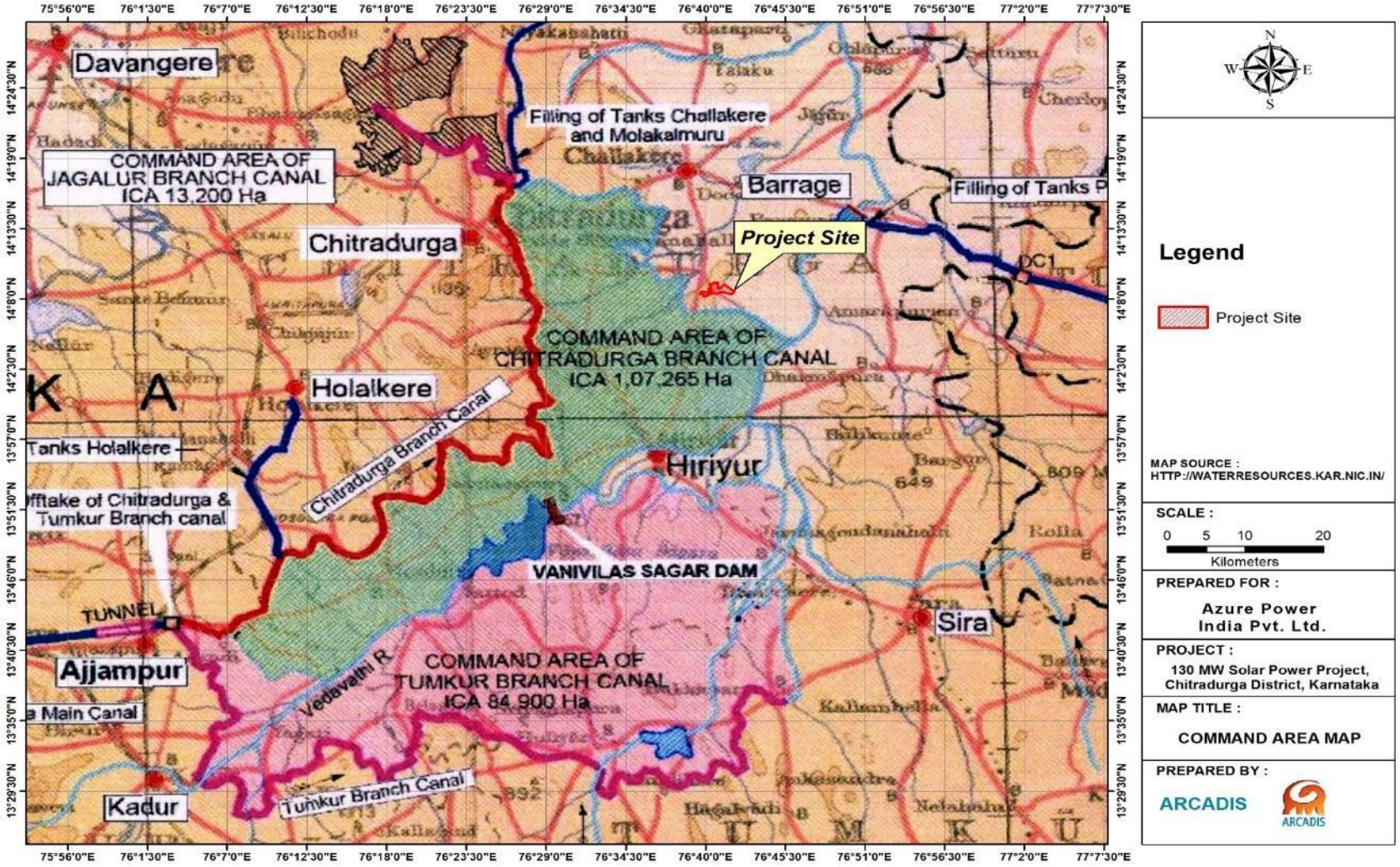


FIGURE 4-6: COMMAND AREA MAP OF THE STUDY AREA



5.1.5. Ambient Air Quality

The objective of the ambient air quality monitoring during an environmental impact assessment 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 June 2015. Out of total six monitoring locations, three locations are in downwind and two is in upwind and one location is the project site. **Table 5-4** gives the air ambient quality monitoring locations.

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 twice a week at six locations in the project area. Air samples were collected using methods specified by the Central Pollution Control Board and analysed by a known NABL & MoEFCC approved laboratory namely Avon Foods Lab. Baseline conditions of each ambient air quality parameter at the monitoring locations are graphically represented below in ***Figure 5-7 to Figure 5-10***.

TABLE 4-7: AMBIENT AIR MONITORING LOCATIONS

S.No.	Station Code	Land use Status	Villages	Distance and Direction from the Project Site
1	AQ1	Project site	Hullikunte (S)	3 km, N
2	AQ2	Residential	Gollahali	Approx. 1 km, S
3	AQ3	Residential	Khandikere	Approx. 5.06 km, NE
4	AQ4	Residential	Kaparahallii	Approx. 06 km, S
5	AQ 5	Residential	Hullikunte (N)	3 km,N
6	AQ 6	Residential	Harrithkote	4 km, S

Monitored concentrations of each parameter at all the three locations have been compared with the National Ambient Air Quality Standards (NAAQS) stipulated by the Ministry of Environment and Forests. Concentrations of all the ambient air quality parameters (PM_{10}, $PM_{2.5}$, SO_2 and NO_x) at all monitoring stations were observed to be well below the NAAQS threshold for residential area. CO has not been detected in most of the locations. Overall the air quality of the project area is good and in compliance with NAAQS.

FIGURE 4-7: PM 10 CONCENTRATION AT AAQ MONITORING STATIONS

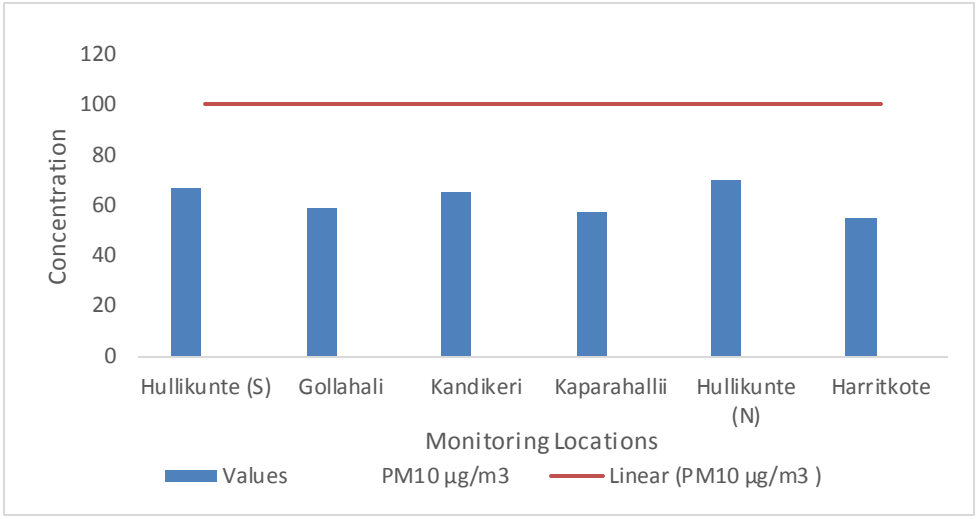


FIGURE 4-8: PM 2.5 CONCENTRATION AT AAQ MONITORING STATIONS

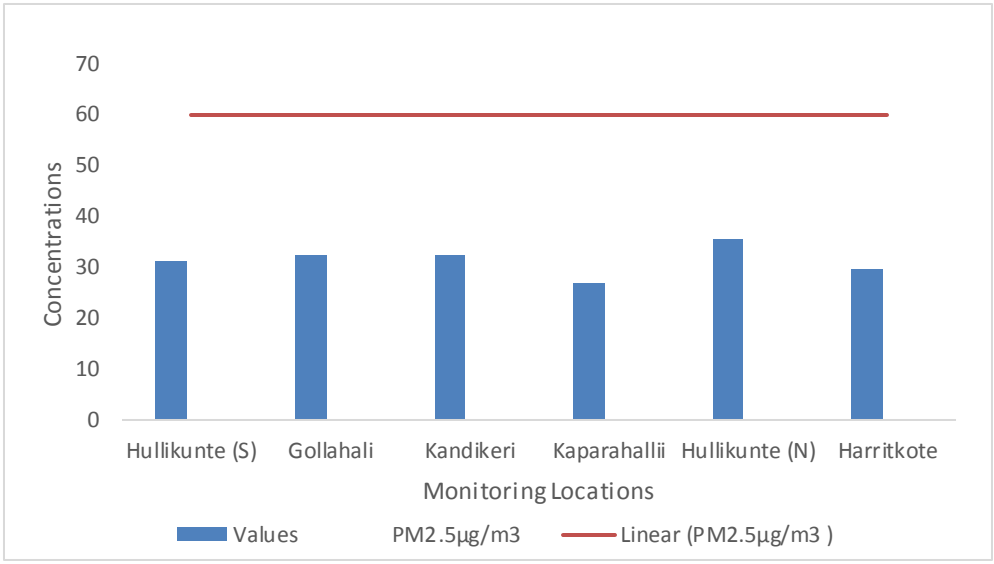


FIGURE 4-9:SO_2 CONCENTRATION AT AAQ MONITORING STATIONS

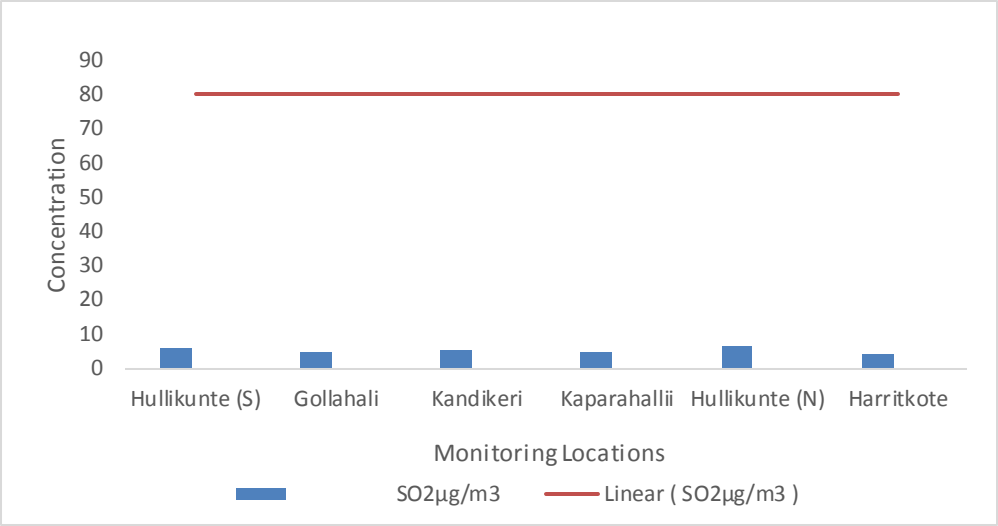
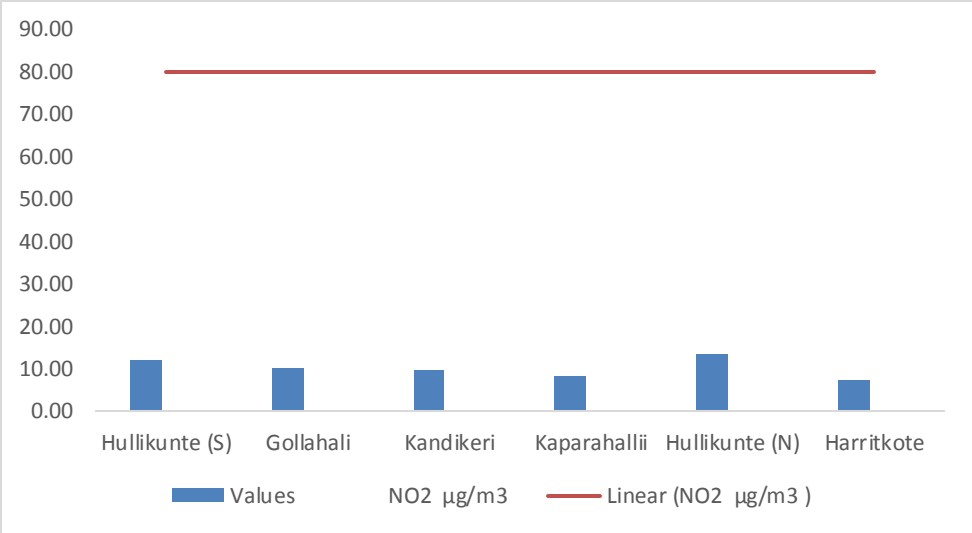


FIGURE 4-10: NO_2 CONCENTRATION AT AAQ MONITORING STATIONS



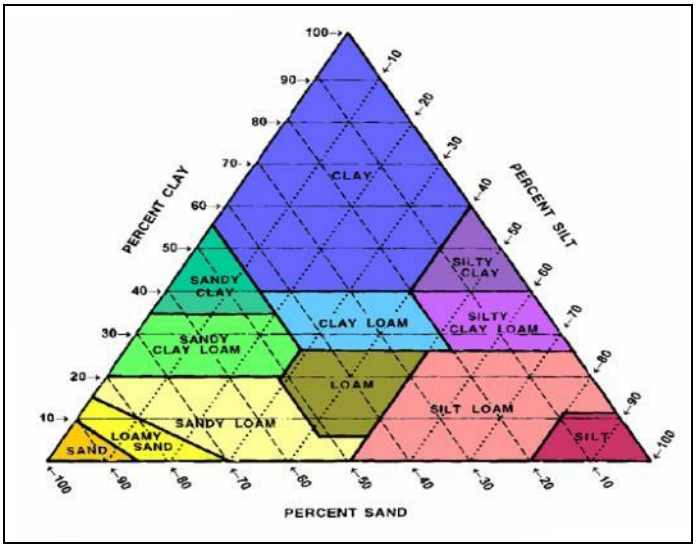
5.1.6. Ambient Noise Quality

Ambient noise was monitored at three locations viz. near Hullikunte village, near the Hiriyur Bellary road near Gollahalli village and near Kandekere village. The average ambient noise during day time at all the locations was observed to be 50.7 decibel which is within the limit as prescribed by Ambient Noise Quality Standard 2000 for residential areas. During night time at all locations the noise levels ranges between 36-39 decibels. Hence confirming to the limit as per the standard which is 45 decibels.

5.1.7. Geology and Soils

The district is largely composed of crystalline schishts, granatic, gneissis and the new granities with a few later intrusive basic dykes all belonging to the oldest rock formation in India. Soil types of the district comprise deep & shallow black soil, mixed red & black soil, red loamy & sandy soil. Physiographically the district comprises of undulating plains, interspersed with sporadic ranges and isolated low ranges of rocky hills. The soil is alkaline in nature within the project site. The potash content in the soil is medium to very high but the phosphorous content is low to medium. Soil map of the district is provided in **Fig 5-12**.

Interpretation of Soil testing result



Monitoring of soil samples were carried out at three locations (agriculture field) near Gollahalli, Khandikere and Hullikunte villages. Based on the particle size distribution obtained from the soil analysis, the texture of soil is sandy loamy type soil. The soil sample contains high concentration of sodium and chloride ions, and soil is alkaline in nature. Soil sample also contain high concentration of other minerals like calcium, magnesium, nitrogen and phosphorous. As per the Soil Textural Triangle (USDA), a sandy loam has 60% sand, 10% clay and 30% silt. The monitoring results shows that the composing of sand in all three soil samples is around 70%. Water holding capacity and nutrient holding capacity are higher for clayey textured soil than sandy textured soil while drainage is better in case of sandy soil. Soil in the project is of medium fertility having low concentration of nitrogen but good concentration of potassium and phosphorous.

FIGURE 4-11: GEOLOGICAL MAP OF THE DISTRICT

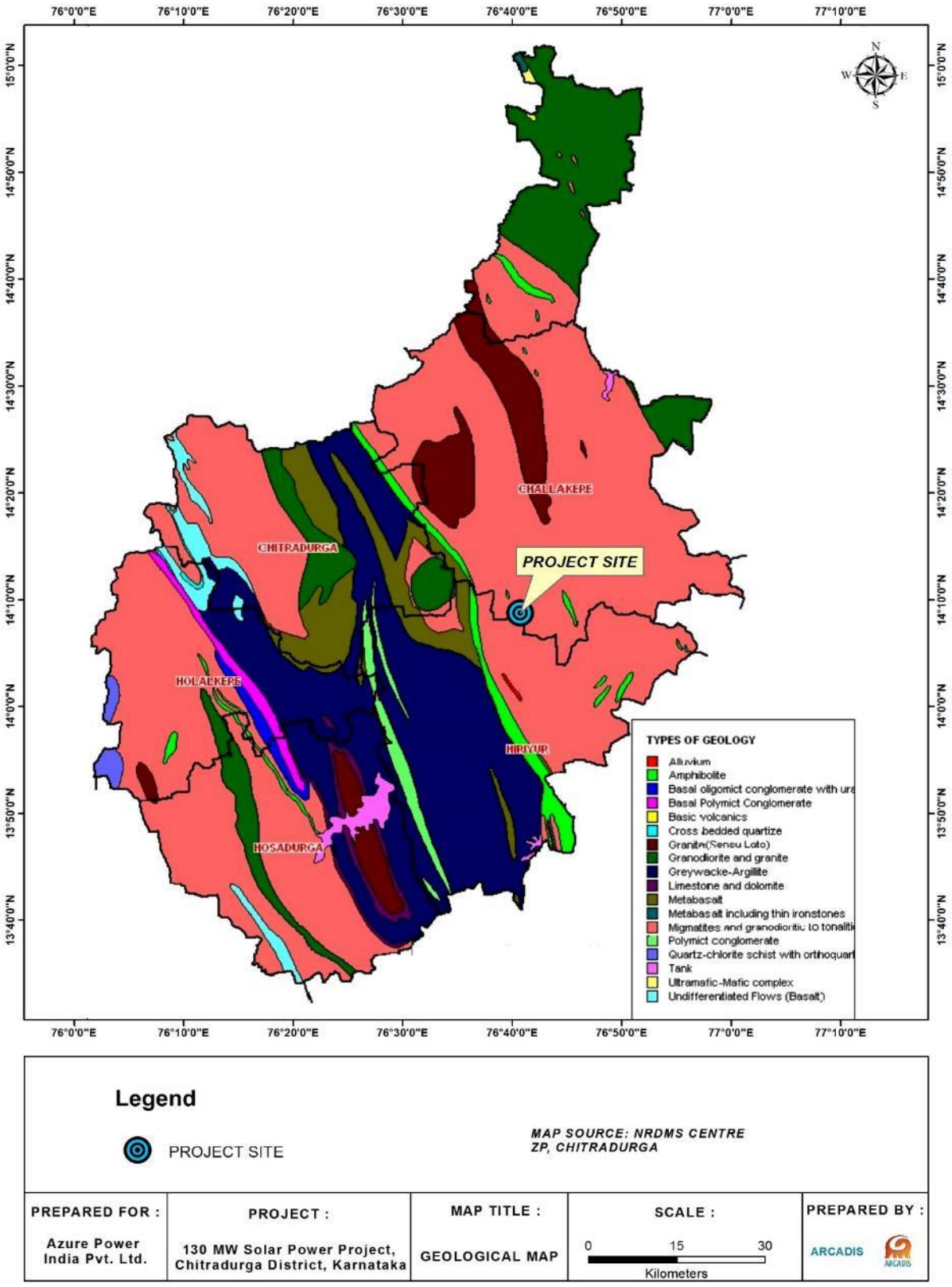
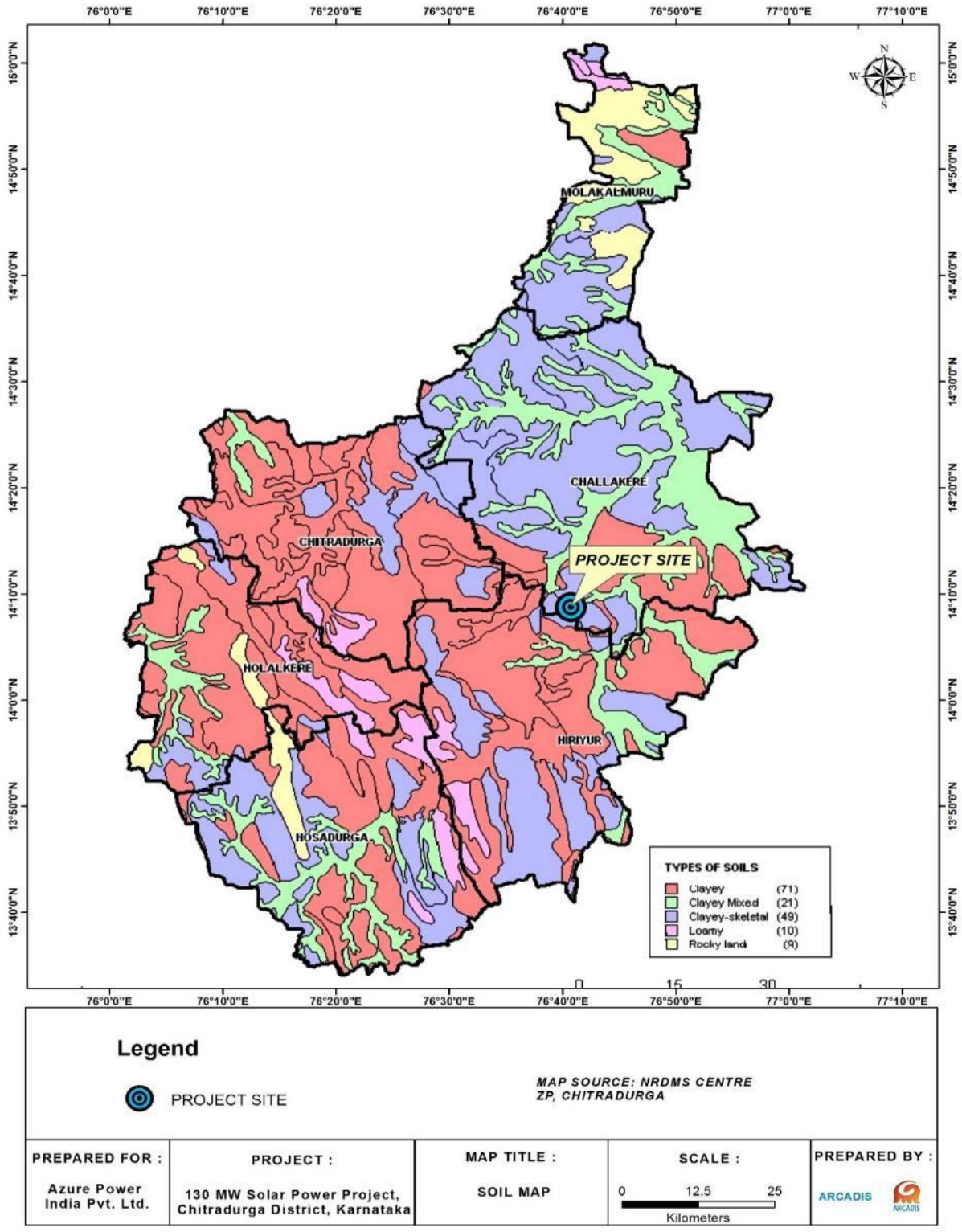


FIGURE 4-12: SOIL MAP OF THE DISTRICT



5.1.8. Hydrogeology

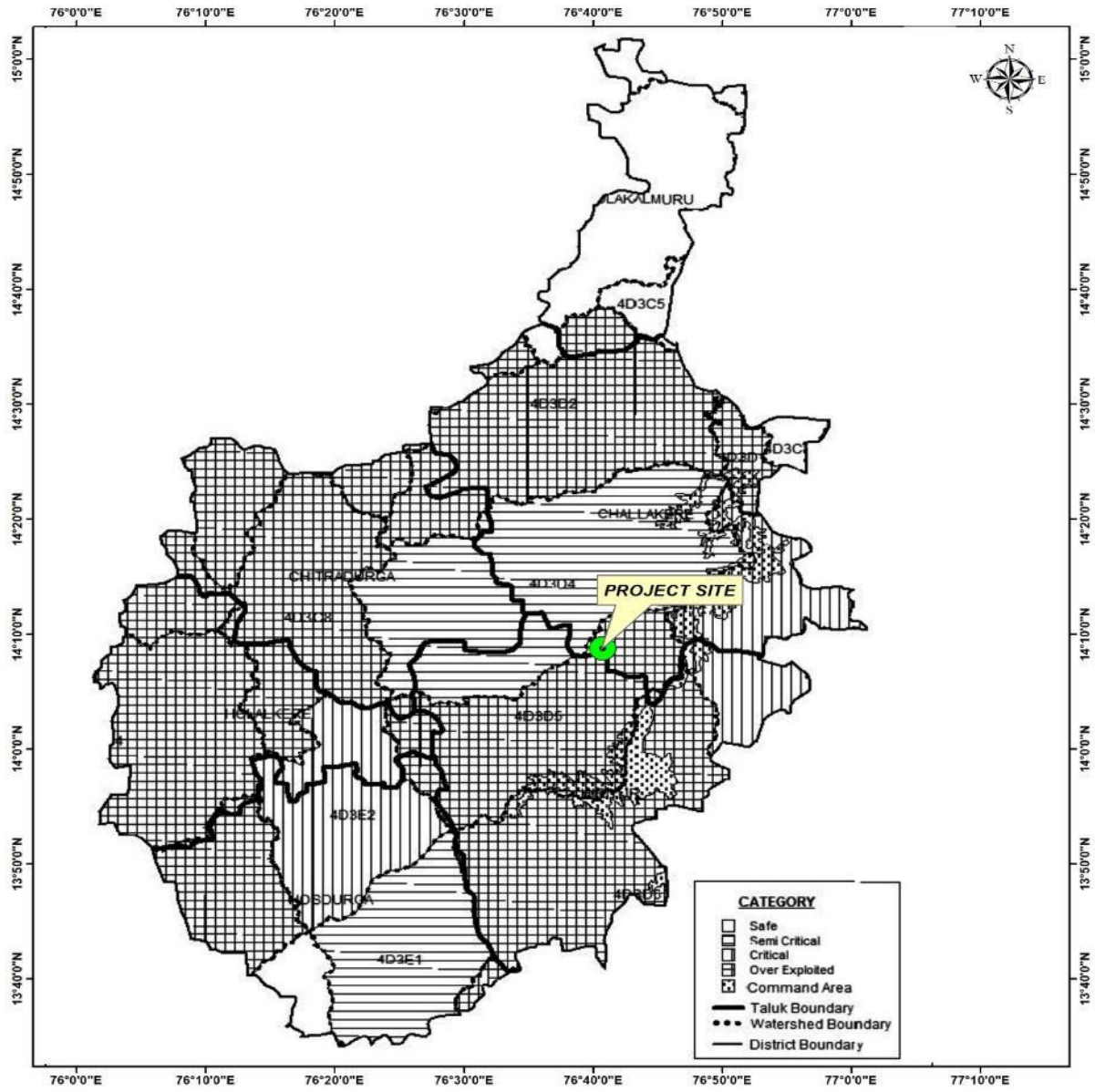
The ground water in Chitradurga district occurs under phreatic condition in the weathered rock formations of the 'Peninsular Gneissic Group' of rocks comprising of Granites, gneisses and schist. The thickness of weathered zone varies from less than a meter near hill slopes and higher altitudes to about 39 m. in valleys and topographic low areas. At depth, the groundwater occurs in the fractures and fault zone of these crystalline rocks under semi-confined to confined conditions. In Challakere taluk, gneisses, granitic-gneisses and amphibolites are the main water bearing formations. Ground water occurs within the weathered and fractured rocks. Ground water exploration reveals that aquifer systems are encountered from depth15.4 mbgl to 182.9 mbgl. Bore wells drilled depth in the taluk is ranging from 118.82 mbgl to 200 mbgl. Depth of weathered zone ranges from 5.32 to 20.64 mbgl. Yield ranges from 0.21 to 8.23lps. Transmissivity ranges from34.50 to 665.17 m2/day. Ground water is major source of drinking water in surrounding villages, where water is pumped from the borewells and distributed through pipelines through overhead tanks.

5.1.9. Groundwater

Ground water exploration reveals that aquifers are encountered between the depths of 15 mbgl and 192 mbgl in the district. In Chitradurga fractured granitic-gneisses, gneisses and hornblende-schists are the main water bearing formations. Ground water occurs within the weathered and fractured rocks under water-table conditions and semi-confined conditions. During May 2006 (pre-monsoon season) the minimum and maximum depth to water level are 2.43 and 13.13 mbgl, respectively. As per Central Ground Water Board Report 2013, ground water in the two blocks (Hiriyur & Challekera) is partly over exploited and partly categorized as semi critical zone **(Fig 5-13**). Therefore, two blocks Hiriyur & Challekera should not be considered for ground water abstraction.

During May 2011 the pre monsoon water level ranges greater than 4 mbgl around the project site while in November 2011 (post-monsoon) water level ranges between 5-10 mbgl. **Fig 5-14** and **Fig 5-15** given below shows the pre and post monsoon ground water level in the district and at the project site. Also stakeholder consultation corroborated similar number for ground water levels at project site.

FIGURE 4-13: STATUS OF GROUND WATER IN CHITRADURGA DISTRICT (MARCH 2009)



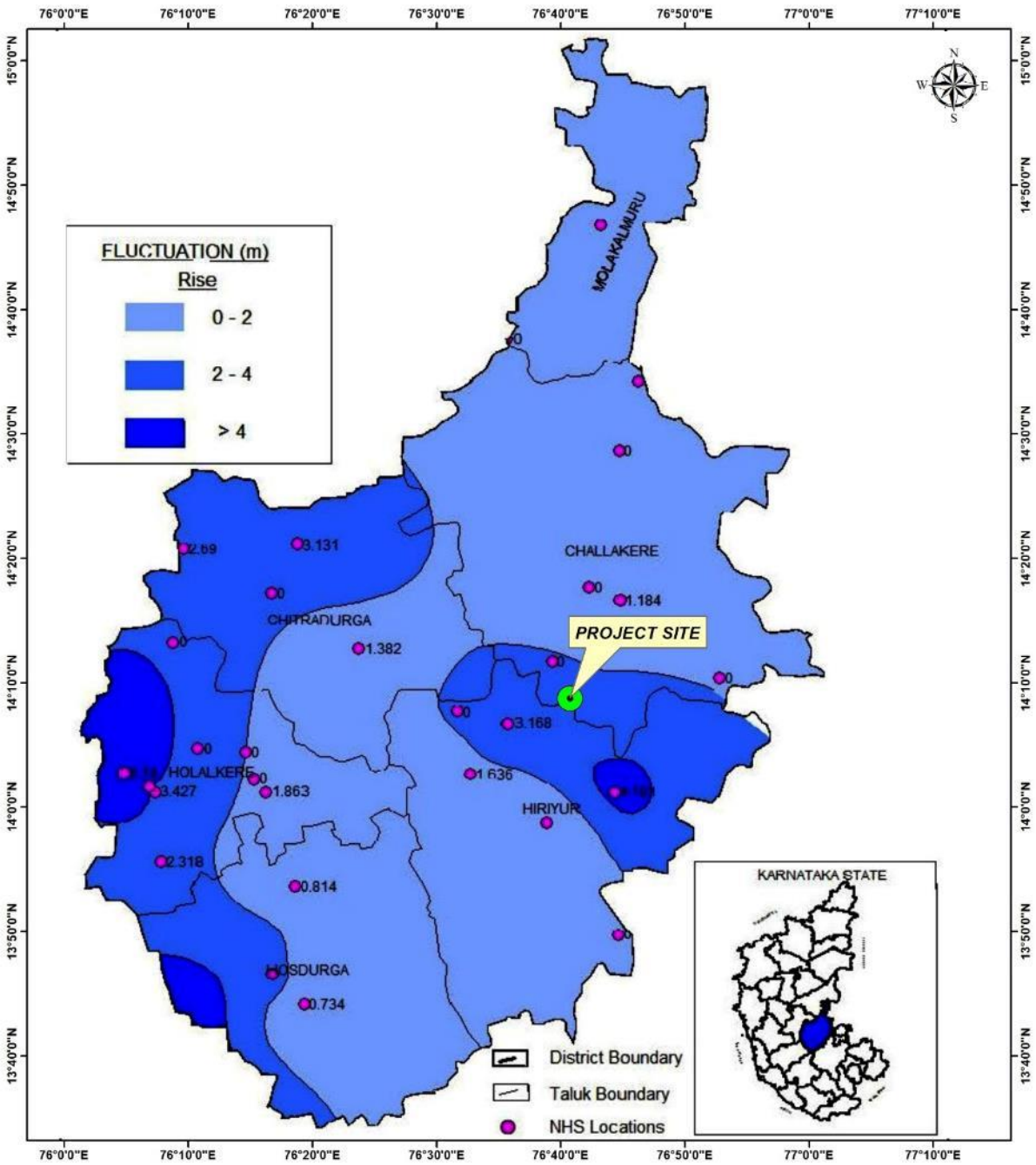
Legend

PROJECT SITE

MAP SOURCE: GOVERNMENT OF INDIA
MINISTRY OF WATER RESOURCES
CENTRAL GROUND WATER BOARD

PREPARED FOR :	PROJECT :	MAP TITLE :	SCALE :	PREPARED BY :
Azure Power India Pvt. Ltd.	130 MW Solar Power Project, Chitradurga District, Karnataka	STATUS OF GROUNDWATER UTILISATION CHITRADURGS DISTRICT (As on March 2009)	0 12.5 25 Kilometers	ARCADIS

FIGURE 4-14: WATER LEVEL IN PRE MONSOON TIME (MAY 2011)



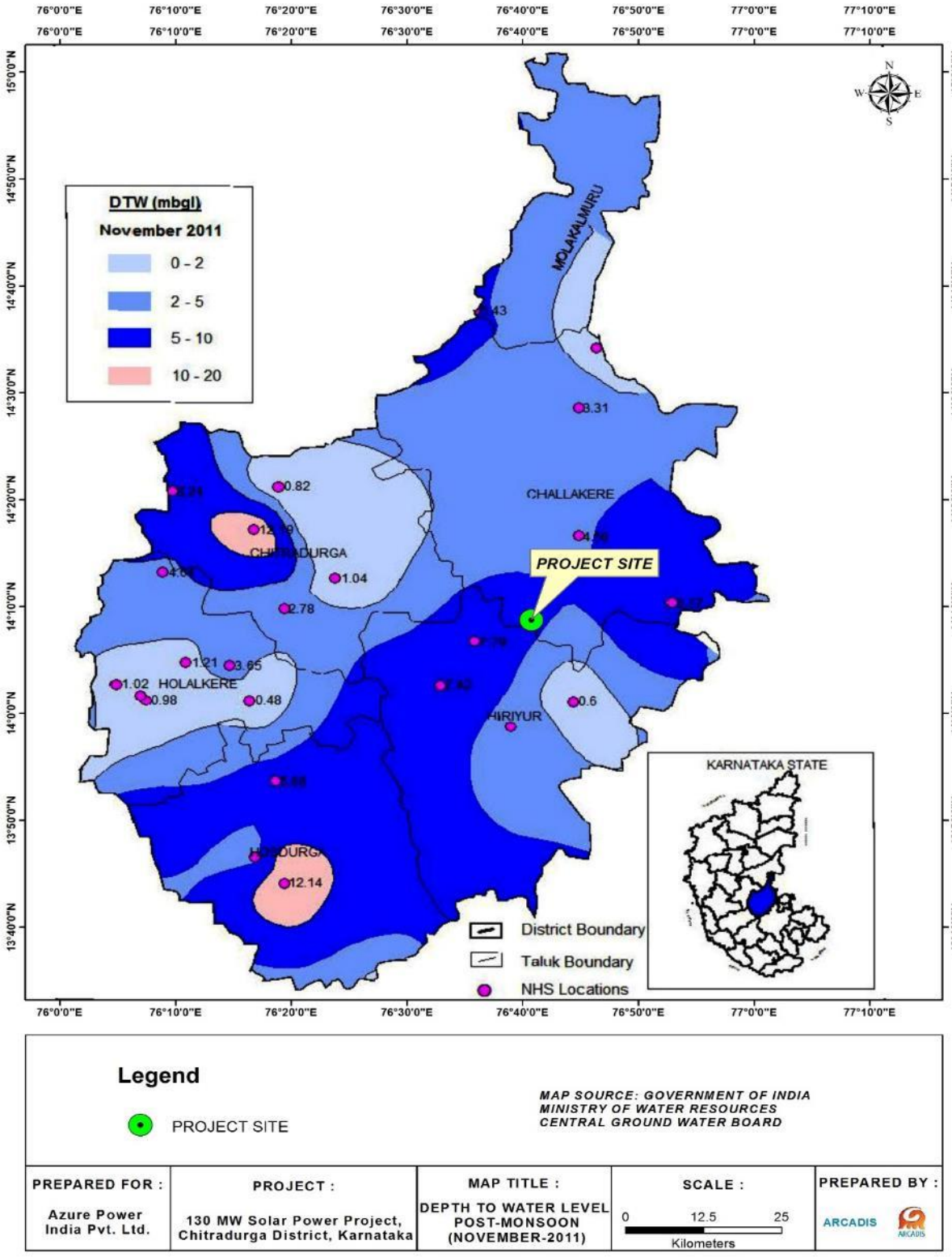
Legend

PROJECT SITE

MAP SOURCE: GOVERNMENT OF INDIA
MINISTRY OF WATER RESOURCES
CENTRAL GROUND WATER BOARD

PREPARED FOR :	PROJECT :	MAP TITLE :	SCALE :	PREPARED BY :
Azure Power India Pvt. Ltd.	130 MW Solar Power Project, Chitradurga District, Karnataka	GROUND WATER LEVEL FLUCTUATION DECADAL MEAN (MAY 2001 - MAY 2010) WITH MAY 2011	0 12.5 25 Kilometers	ARCADIS

FIGURE 4-15: WATER LEVEL IN POST MONSOON TIME (NOV 2011)



Legend

PROJECT SITE

MAP SOURCE: GOVERNMENT OF INDIA
MINISTRY OF WATER RESOURCES
CENTRAL GROUND WATER BOARD

PREPARED FOR :	PROJECT :	MAP TITLE :	SCALE :	PREPARED BY :
Azure Power India Pvt. Ltd.	130 MW Solar Power Project, Chitradurga District, Karnataka	DEPTH TO WATER LEVEL POST-MONSOON (NOVEMBER-2011)	0 12.5 25 Kilometers	ARCADIS

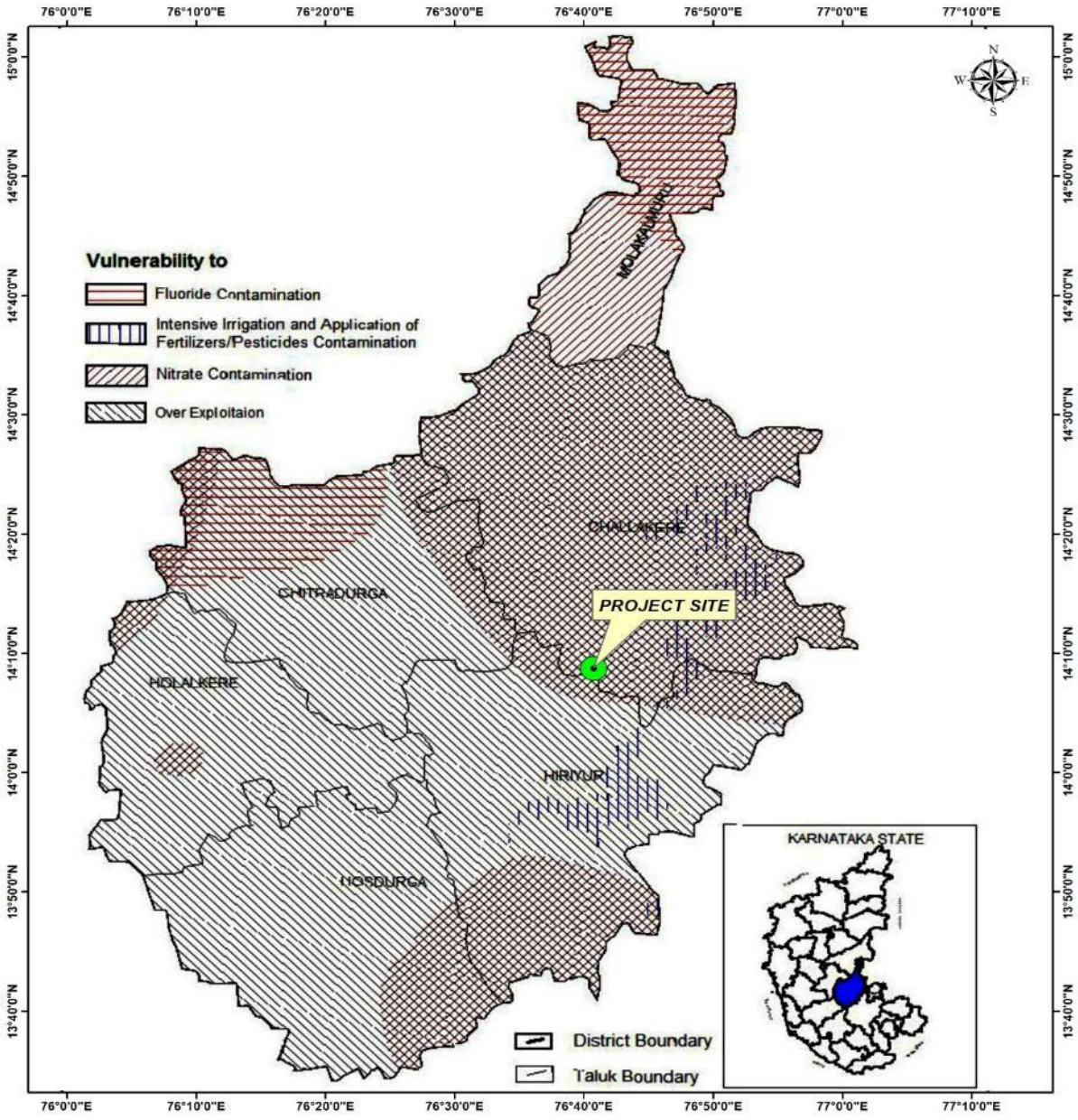
Interpretation of Ground Water Quality Results

The samples were collected from three sources (bore well in Hullikunte village, and from hand pumps in Gollahalli and Khandikere village). 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. The results for relevant drinking water quality parameters have been discussed below.

Ground Water Monitoring Result - Analysis

- pH value indicates that water is slightly alkaline and found within the acceptable limit 7.1 -7.7 of drinking water standards
- Total Dissolved Solids (TDS) –At Gollahalli village the TDS level found is 311 mg/l which is within the desirable limit as per drinking water standard but for other two ground water samples TDS levels are observed above the desirable limit but within the permissible limit as per IS: 10500 standards. A higher TDS means that there are more cations and anions in the water. This is probably due to the reason that the area is an agricultural area and use of manure and pesticides are being used for crop cultivation which has leached the soil and seeped in to the ground water. Also, the area is having unconfined aquifer that may contribute to higher TDS values.
- Fluoride and nitrate concentration is higher than the desirable limit in the ground water sample of Hullikunte village while for the other two water samples the fluoride concentrations are within the desirable limit (1 mg/l). It has been observed during community consultation that the area suffers from fluoride contamination of ground water and people suffers from health problems due to the same. The **Fig 5-16** presented below also demarks the project site as nitrate contaminated area and over exploited area for ground water.
- Total alkalinity concentration is found within the desirable limit for all the ground water samples.
- Faecal coliform found in the ground water samples is in the range of 6-11 and total coliform count ranges from 23-50 in all the ground water samples. It can be said that the ground water is contaminated and consumption should be followed only after treatment.

FIGURE 4-16: VULNERABILITY TO GROUND WATER CONTAMINATION



Legend

PROJECT SITE

MAP SOURCE: GOVERNMENT OF INDIA
MINISTRY OF WATER RESOURCES
CENTRAL GROUND WATER BOARD

PREPARED FOR :	PROJECT :	MAP TITLE :	SCALE :	PREPARED BY :
Azure Power India Pvt. Ltd.	130 MW Solar Power Project, Chitradurga District, Karnataka	AREA VULNERABLE TO GROUND WATER CONTAMINATION	0 12.5 25 Kilometers	ARCADIS

5.2. ECOLOGICAL ENVIRONMENT

The proposed project site is dry and semi-arid in nature comprising of dry, thorny scrub land mixed with pockets of private agriculture land. There is no protected area, wild life sanctuary or national park located around the project site. Vegetation is observed on project site is scarce in the land identified as project area and devoid of dense and large trees. Project site is having a good mix of scrub vegetation including grasses and shrubs ***(Refer Photo 5-9).*** According to recent classification done by Wildlife Institute of India, the country can be divided into 10 bio-geographic Zones. According to this classification the study area lies within the Deccan Plateau biogeographic region. This is the largest unit of the Peninsular Plateau of India.

Photo 4-3: Flora surrounding the proposed project site

Anogeissus latifolia (Crane Tree)

Prosopis cineraria (Banni)

Prosopis juliflora (Subabool)

Calotropis Procera (Ak)

Amaranthus viridis (Kuppacheera)

Cynodon dactylon (Dhub grass, Bermuda)

Cassia auriculata (Tanner's Cassia)

Parthenium hysterophorus (Congress Weed)

There were few birds observed in the project area viz. Red vented bulbul, yellow wattle lapwing, white breasted kingfisher, sparrow lark, Eurasian collared dove, green bee eater and palm swift. Sparrows were found in plenty in project area villages. Near Belegare Lake few birds were observed around the water body.

Common Coot

Brown headed Gull

Opportunities exist as part of this project development, to enhance the overall vegetative cover of the area and support avian / other habitat, although the selection of plant species to be planted within the project site will need to consider the shading restrictions that these plant can bring to solar power generation from the PV modules. Karnataka Forests Department has two

nurseries in Chitradurga (Katral and Chandravalli) which can be referred for selection of native species for green belt development around the project site.

5.3. SOCIOECONOMIC ENVIRONMENT

5.3.1. Land Identification and Verification

In the revenue land some of the locations had been decided by the Government for the companies as per the Karnataka Renewable Energy Policy 2009-14. Government had invited bids based on which locations had been decided. The relevant sections are reproduced below:

5.3.2. Land Policy for Renewable Energy Projects

The availability of suitable land and making the land available expeditiously is a major issue for RE development. To realize the targeted potential of 4200 MW during the policy period about 12000 Ha of various categories of lands like Government Barren lands, Revenue lands, Private lands, Panchayat lands and Forest lands etc. are estimated to be necessary in different districts of the state. To address the land issue following is proposed.

- **Land Identification for Renewable Energy Projects:** Inventory of surplus and unused land available with Public Sector Undertakings, State Govt., Urban Local Bodies/ Gram Panchayat lands and suitable private waste lands, unproductive single crop agricultural lands will be undertaken District wise, by the Deputy Commissioners to identify lands for the Renewable Energy projects. Care will be taken to exclude archaeological heritage lands, prayer and temple lands, burial grounds and monuments etc. The Government will provide such available lands, waste lands for developing the Renewable Energy projects under the provisions of Section 71 of Land Revenue Act to Karnataka Renewable Energy Development Limited. Further necessary amendments to section 79(a), 79(b) and 80 of the Karnataka Land Reforms Act are to be made to enable the Renewable Energy project developers to purchase suitable private land directly from the owners of the land.
- For waste to energy Renewable Energy projects the Municipal Bodies will identify and keep the lands at the disposal of Karnataka Renewable Energy Development Limited. The identified lands will be acquired through the Karnataka Industrial Area Development Board (KIADB), under the provisions of the Karnataka Industrial Policy, and made available to the Karnataka Renewable Energy Development Limited for the Renewable Energy projects. Further, keeping in view the welfare interest of the Farmers, certain equity of not less than 5% of gross energy generated will be provided to take the land owner Farmers as equity partners in the Renewable Energy projects. Non Agricultural conversion for the express purpose will be accorded

within a period of one month from the date of applying for the same. Government will review the applicable stamp duty.

- **Government. Barren lands meant for Industrial Use**: The barren Government lands, reserved, as per the industrial planning for industrial use, at declared Renewable Energy sites, 10% of such lands will be kept at the disposal of Karnataka Renewable Energy Development Limited for developing the land to set up the Renewable Energy power projects.
- **Forest Land**: Wherever Forest land is identified for the Renewable Energy projects, the same will be processed and considered by the Karnataka Forest Department under the provisions of the Forest Conservation Act (1980) subject to the Ministry of Environment & Forest guidelines within a period of 4 (four) months.
- **Land Development for Renewable Energy Projects**: The identified Revenue, Private and Forest lands will be developed by Karnataka Renewable Energy Development Limited to facilitate setting up of various Renewable Energy projects expeditiously. The Akshaya Shakthi Nidhi Funds will be utilised to develop the lands including the payment towards Net Present Value and Compensatory Afforestation in case of Forest Lands. This will enable the State to offer ready to use developed land to set up Renewable Energy projects. Karnataka Renewable Energy Development Limited will sub lease the developed lands to the Renewable Energy developer for a period of 30 years. After 30 years the project stands transferred to the Government. Land-Lease Rent will be as per the prime lending rate over current market price as on the date of handing over of the project, subject to land availability and financial limits on case-to-case basis. However, it is not permissible to mortgage the lands by the Renewable Energy developers to any financial or other agency/institution/body.

5.3.3. Azure - Procedure for Land Purchase

Azure Power proposes to develop three solar projects of capacities 50 MW, 40 MW and 40 MW (totalling 130 MW) (hereinafter referred as "Project") in the Chitradurga district state of Karnataka through its three subsidiaries named Azure Power (Raj) Private Limited ("APRPL"), Azure Photovoltaic Private Limited ("APPL") and Azure Sunrise Private Limited ("ASPL").

Total land requirement for the project (130 MW) is roughly estimated at ~576 acres. Based on the current status of the land procurement (184 acres) the proportion of total area required from three villages Khandikere, Kaparahalli and Jadekunte is between 8 to 11 % (rounded off) . From Gollahalli less than 3 acres of land is procured. The land is private unirrigated agricultural land. Identified land area is well connected to state and national highway NH-63, SH-19, SH-132.

The proposed project site is about 16 km from grid substation[4]. See Table below for details of land procurement for the projects.

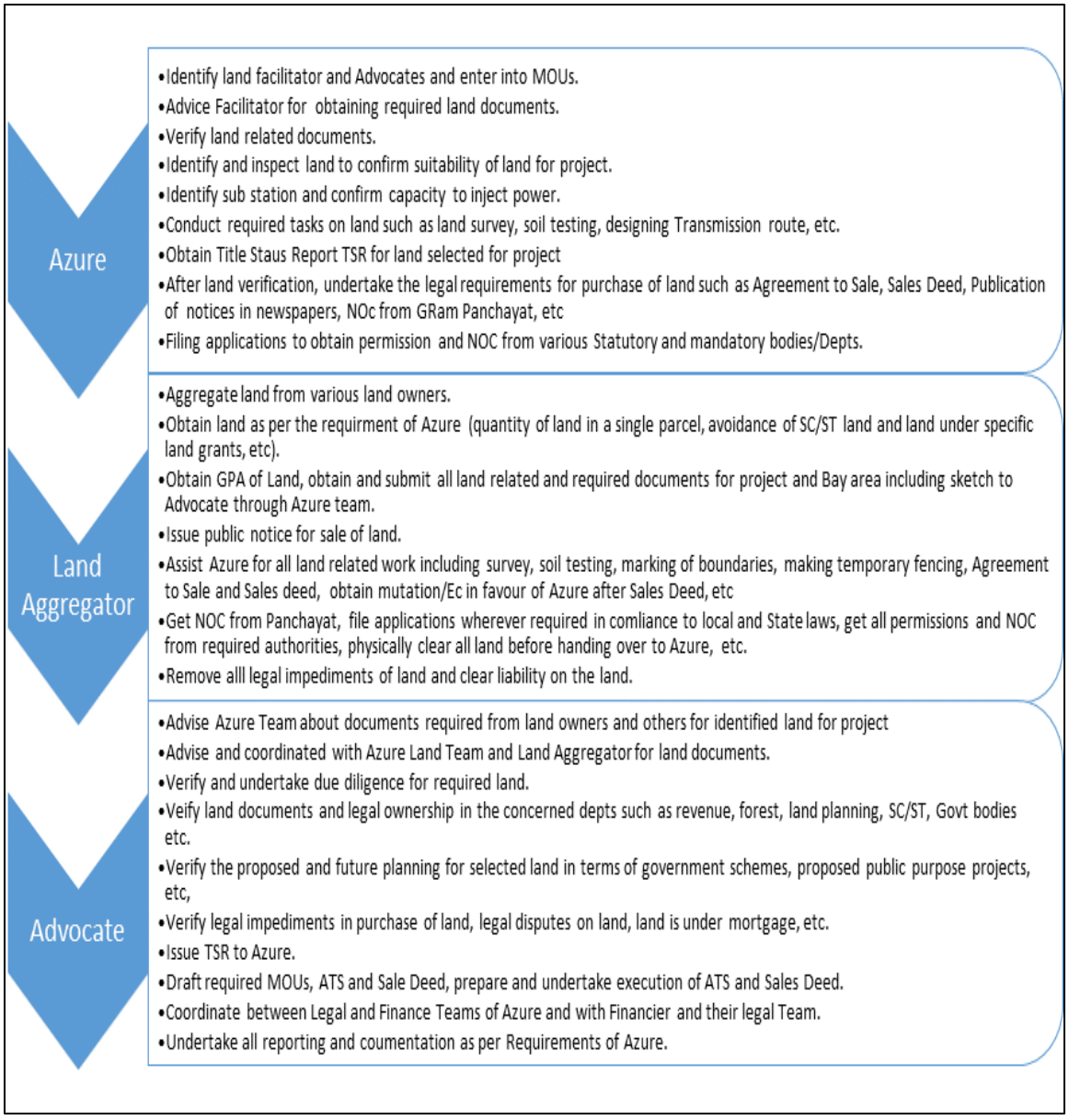
TABLE 4-8: TOTAL LAND PROCUREMENT FOR THREE SUB PROJECTS

S. No	Project	Villages	Total Land to be purchased for the project (acres)
1	Azure Power Raj Pvt. Ltd (Completed)	Gollahalli	3
		Khandikere	172
		Kaparahalli	9
		Total	**184**
2	Azure Photovoltic Pvt. Ltd (under process)	Jadekunte	137
		Kaparahalli	47
		Total	**185**
3	Azure Sunrise Private Limited (under process)	Khandikere	85
		Kaparahalli	122
		Total	**207**

Azure has formulated a broad land purchase procedure. The procedure is flexible and allows for modifications at the project level based on relevant laws and state level requirements. Project Company has signed MOU with land aggregator and Advocate for the identification, selection and procurement of land from willing buyers on a negotiated settlement basis. Azure Power has through aboard resolution held on 1st March 2015 authorized six of its Officials to negotiate and finalize the terms of acquisition and to sign and execute purchase/sale/lease deed and all other documents and papers which deemed to be necessary related to purchase/sale/lease of the property. Attached ***Annexure V*** for Sample. Flow chart reproduced below gives the outline of the procedure.

[4] As per the Brief Information Memorandum regarding the Project. The actual transmission route and the distance is under process and details will be available only after the same is approved by the concerned authority and Project Company.

FIGURE 4-17: LAND PURCHASE PROCEDURE



Azure Power identifies and selects land based on its requirements for solar projects in the Challakere and Hiriyur talukas of the Chitradurga district. MOUs with the Land Aggregator and Advocate for purchase of land and addressing legal requirements for purchase of land are undertaken by Project Company. Land aggregator and the team is responsible for identifying land as per the requirements of Azure Power. Land held under land grants, land owned by SC and ST is avoided due to the complexity involved in the purchase and transfer of such lands. As far as possible a large contiguous quantity of land is preferred over small scattered patches to decrease the time delays in fulfilment of legal transaction requirements for procurement of land. Land Aggregator also collects and gives the land related documents to the advocate for further action. Based on discussions with the Project company officials and Advocates there

are unanticipated time delays in execution of land transaction due to the following reasons: all family members are not available in the area, some of the family members go for grazing livestock, coordination between the farmers and land aggregator is time taking and obtaining some of the link documents required for land transaction such as family trees, RTC, etc is time consuming.

After procurement of all required land documents, title search report is prepared and filed by advocates within 15 days.

Agreement to Sell (ATS) and (Power of Attorney) PoA is obtained in favour of Project Company, due diligence of the land selected for procurement is undertaken (through Advocate). The legal opinion of the advocates is obtained. A conversion application is filed for change of land use from private agricultural to industry.

Sample documents of the Agreement to Sale were collected from Azure along with the circle rate for the villages and the title search reports for some of the survey Numbers/Gut Numbers of the land plots purchased. The government rate stated in the sales deed was much higher than the agreed rate of land as per the ATS.

5.3.4. Negotiated Rate of Land

A flat rate has been set for the entire area regardless of individual plot rates which fluctuate based on the proximity to the highway, quality of land, etc. As per the revised market rates of immovable property[5] within the villages Kaparahalli, Jadekunte, Khandikere and Golahalli, the rates for dry land with no source of irrigation vary across the villagers and range from Rs. 60000 per acre to Rs. 65000 per acre. See ***Annexure VI*** for details on market rates in the four villages from where the land purchase is being made and ***Annexure VI A*** for ATS. The highest rates of land are for Arecanut and coconut in wet/dry land in Khandikere at Rs. 385000/acre. ATS shared by Project company shows that Project company is paying the rate of Rs. 596250 per acre as a flat rate which is much higher than the existing market rates regardless of the type and location of land. Most of the land purchased and in the process of being purchased at the time of the site visit was observed to be uncultivated dryland.

5.3.5. Record of Rights and Kharab land

Revenue records indicate that for some of the cases the first record available is from 1928. For such cases the preliminary record is used. RTC is available as of 1965 onwards which is obtained for selected land. See ***Annexure VII*** for preliminary record, ***Annexure VIII*** for RTC

[5] Department of Stamps and Registration, Government of Karnataka as on 19/10/15

and translated sample unfilled RTC from Kannada into English and ***Annexure IX*** for Old and New RTC.

As per the Record of Rights RTC, kharab land is included in the land records as part of the particular Sy. No. After coming into force of the Karnataka Land Revenue Act 1964 the word pot Kharab has been defined under Rule 21 (2) of the Karnataka Land Revenue Rules, 1966 as under:

- During the process of classification land included as unarable shall be treated as "Pot Kharab". Pot Kharab lands may be classified as follows:-
- That which is classified as unfit for agriculture at the time of survey including the farm buildings or threshing floors of the holder; which is A Kharab. That which is not assessed because, (i) it is reserved or assigned for public purpose; (ii) it is occupied by a road or recognized footpath or by a tank or stream used by persons other than the holders for irrigation, drinking or domestic purposes; (iii) used as burial ground or cremation ground; (iv) assigned for village potteries; which is B Kharab.
- The 'A' Kharab area normally forms part of the Survey number which is owned by a party as the Kharab area which was part of it, could not be used for agricultural purposes. Therefore sometimes, it is exempted from the assessment. The title with respect to the 'A' Kharab area normally goes with the title of the owner of land in which the said 'A' Kharab area is located.
- In the deed of conveyance, the boundaries of land would include the kharab area located within boundary of the land, which is designated by survey number or a sub survey whose boundaries are fixed by law. So the crucial question is the intention of the party in transfer of property, i.e. whether transfer intended to include newly converted kharab area also. The kharab land which is categorized as 'B' kharab belongs to the Government and the same can neither be converted nor conveyed. Even though the 'B' kharab is conveyed it remains as 'B' kharab land to be reserved or assigned for public purpose and will not confer any right, title and interest over the said 'B' kharab land. See ***Annexure X*** for Kharab land Judgement.
- The payment made is only for the cultivable area only and does not include any monetary value for the Kharab land. Azure Power proposes to submit the application under section 109 of the Karnataka Land Reforms Act 1961 for permission to acquire land for non-agricultural purposes in a phased manner from end of October 2015 to end of November 2015. Sales Deed for the land is executed after the permission is received under section 109. See ***Annexure XI*** for notification. NOC will be undertaken from Panchayats after the permission is received.

5.3.6. Approach and Methodology

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

Methodology

Site visit was undertaken along with primary and secondary data collection from various sources. Primary data includes consultation with land aggregator, and some land sellers who have sold land or have agreement to Sale with the project proponents for the Project. Interviews were also undertaken with Azure Land Team Officials at site, Government Officials and Azure Officials in the Corporate Office.

The assessment of socio-economic environment was carried out based on the primary survey with the help of framed questionnaire to conduct community consultation (as presented in ***Annexure XII***). Secondary data includes Census 2011, information available on the District Chitradurga official website, District statistical handbook, other available data on Official Government websites and Public domain. Land related document samples including Revenue records, ATS, Location change letter and facilitation letter to Karnataka Renewable Energy Department Limited KREDL, the nodal agency, Village map depicting land purchase, Judgement for kharab land, Land Reforms Act amendment, Title Search Report, MOUs with Aggregator and Advocate, Board Resolution, circle rates of land were obtained from the Project Company.

The land procurement procedure was discussed with all vendors with whom MOU, has been agreed upon with Azure. General observation of the affected villages was not undertaken as land transactions were in process and negotiations were ongoing. Due to ongoing Project activities consultations was held with few land sellers who had sold land for the project, Panchayat Presidents and some Panchayat members, members of the land aggregator's team, Advocate and Village development Officer.

5.3.7. District and Demographic Profile of Village

Project Impacted Villages

The proposed solar project (130 MW) and transmission line falls under three Gram Panchayat under the jurisdiction of tehsil Challakere and Hiriyur of Chitradurga district respectively as presented in Table 5-6. In terms of land records, the project falls in four villages Kaparahalli, Jadekunte, Khandikere and Gollahalli under the jurisdiction of tehsil Challakere and Hiriyur of Chitradurga district respectively. Therefore, for Socio-Economics study, these four villages were considered as presented in **Table 5-6.**

TABLE 4-9: LIST OF VILLAGES UNDER THREE GRAM PANCHAYAT

Sl. No.	State and District	Sub District Name(Taluka)	Village Name	Gram Panchayat Name
1	Karnataka, Chitradurga	Challakere	Kammathmarikunte	SANIKERE
2			Sanikere	
3			Sanikere Kaval (B)	
4			Heggere	
5			Kaparahalli	
6			Jadekunte	
7			Badavanahalli (B)	
8			Bellagere	BELLAGERE
9			Hulikunte	
10			Bellagere Kaval	
11			Kyathanamale	
12			Kalamarahalli	
13			Gorlathu	
14		Hiriyur	Gollahalli	YARABALLI
15			Khandikere	
16			Yaraballi	

Source: census 2011

TABLE 4-10: LIST OF STUDY AREA VILLAGES

Sl. No	State and District	Mandal/Tehsil	Village	Gram Panchayat Name
1	Karnataka, Chitradurga	Challakere	Kaparahalli	Sanikere
2			Jadekunte	
3		Hiriyur	Khandikere	Yaraballi
4			Gollahalli	

Source: census 2011

Demographic Profile

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

Population & Sex ratio

State: As per census 2011, the total population of Karnataka is 61,095,297 which includes 30,966,657 males and 30, 128,640 females. Sex Ratio in Karnataka is found to be 973 female per 1000 male, which is indicating the better female ratio as compared to the national average of 940 as per census 2011. Literacy rate in Karnataka is 75.36% of that, male literacy stands at 82.47% and female literacy is 66.01%.

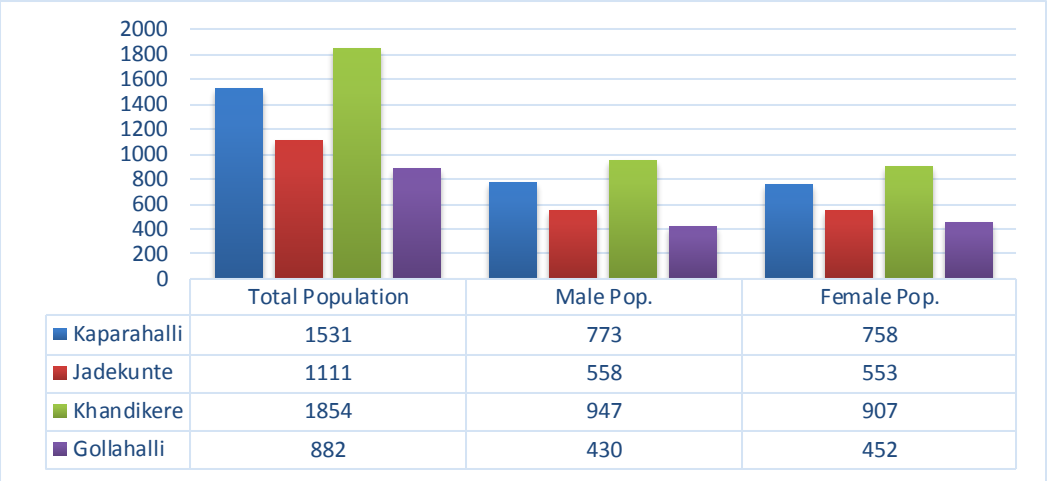
Chitradurga District Demography: As per census 2011, Chitradurga has a total population of 1,659,456 of which male and female are 840,843 and 818,613 respectively. With regards to sex ratio at 974 per 1000 male compared to 2001 census figure of 955. Average literacy rate of Chitradurga has 73.71 compared to 64.45 of 2001 census. The details are presented in ***Annexure XIII.***

Tehsil Challakere and Hiriyur: Both tehsil are comes under Chitradurga district. As per census 2011, the total population of Challakere and Hiriyur tehsil are 3, 65,784 and 2, 86,133 of which male and female are 185931 and 179853 (Challakere) and 144160 and 141973 (Hiriyur). In regards to sex ratio of Challakere and Hiriyur are 967 and 985. As details referred in ***Annexure XIII.***

Study area villages: As per census 2011, in respect to the study area villages (four villages), the total population of the area is 5378 out of which 2708 are male and 2670 are females. Khandikere village has the highest population (1854), followed by Kaparahalli (1531) and Gollahalli has the lowest population (882). The details are presented in ***Annexure XIII.***

The average sex ratio in the study area villages is found to be 995 which is higher than the average sex ratio of district Chitradurga (974) and tehsil Hiriyur (985) followed by tehsil Challakere (967). The lowest sex ratio is recorded in Khandikere village (958) and highest sex ratio is recorded for Gollahalli Village (1051) as shown in **Figure 5-18.**

FIGURE 4-18: MALE AND FEMALE POPULATION IN THE STUDY AREA VILLAGES



	Total Population	Male Pop.	Female Pop.
Kaparahalli	1531	773	758
Jadekunte	1111	558	553
Khandikere	1854	947	907
Gollahalli	882	430	452

Source- census data 2011

Household Size

As per census 2011, an average house hold size of dist. Chitradurga is 4.6 and in regards to tehsil Challakere (4.8) and Hiriyur (4.5). In regards to study area villages an average house hold size is 4.4 which is lowest to the average of tehsil and district (4.4). As details presented in ***Annexure XIII.***

Schedule Caste (SC) and Schedule Tribes (ST)

Challakere, Hiriyur taluka and Chitradurga district:

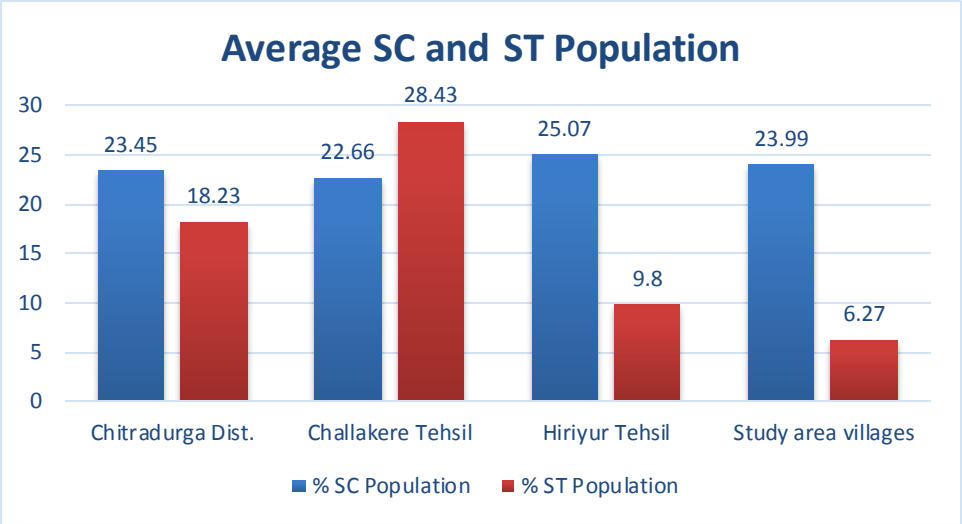
As per census 2011, in respect to Chitradurga district, the average SC and ST population constitute 23.45% and 18.23%. In respect to the tehsil Challakere SC and ST population constitute 22.66% and 29.43%, ST population is found to be more than that of average of district (18.23%). In respect to the Hiriyur taluka, SC and ST population constitute 25.07% and 9.80%, SC population is found to be mora than average of district (23.45%). As shown in **Fig 5-19**.

Study area villages:

As per census 2011, with respect to the study area villages, the average SC and ST population is 23.99% and 6.27% respectively as shown in **Fig 5-19**. Proportion of SC population is higher than the average proportion in tehsil and district, and ST population is lower than average in tehsil and district. The maximum ST population is in Khandikere (11.27%) followed by

Gollahalli village (10.77%). Details of SC and ST population in the study area is given in ***Annexure XIV.*** The villages also have nomadic tribes' communities. The details could not be ascertained during consultations.

FIGURE 4-19: SC AND ST POPULATION IN PROJECT IMPACTED VILLAGES



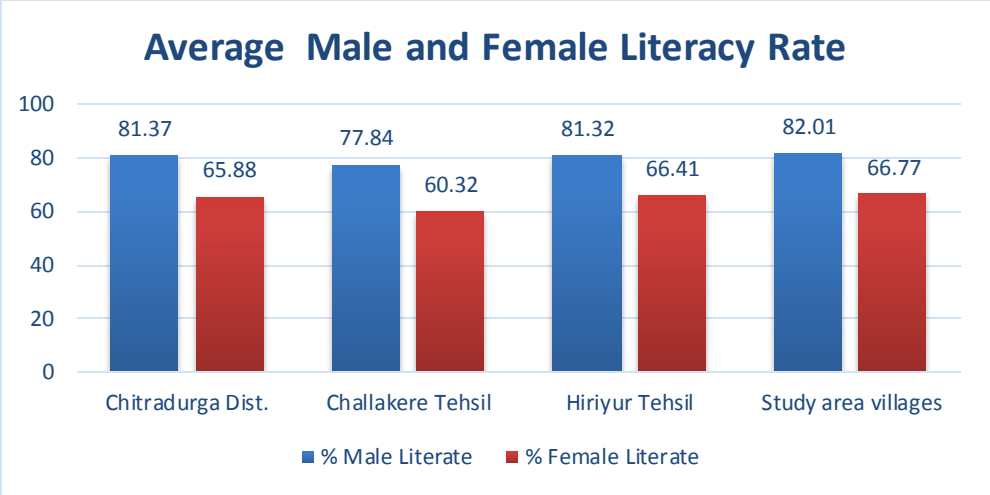
Source: census 2011

Literacy

As per census 2011, average literacy rate of Chitradurga district is 73.71 %. Of that, Gender wise, male and female literacy is 81.37 and 65.88 respectively. With respect to tehsil level, an average literacy rate of tehsil Challakere tehsil is 69.22% and Hiriyur tehsil is 73.91%. Challakere tehsil literacy is 69.22% which is below the average literacy of district Chitradurga and Hiriyur is 73.91% as shown in **Fig 5-19.** Details as presented in ***Annexure XV.***

As per census 2011, with respect to study area villages, an average literacy rate of the four villages are 74.17%. Gender wise male and female literacy is 80.52% and 63.71% which is below the average of district Chitradurga (73.71) and tehsil Challakere (69.22%) and Hiriyur (73.91%). The maximum literacy rate is in Kaparahalli village (76.05%) and lowest literacy rate is for Khandikere village (69.65%). The maximum female literacy rate is observed for Kaparahalli village (70.61%) followed by Jadekunte (70.61%) and lowest literacy rate recorded for Khandikere village (59.41%). The village wise literacy rate provided in ***Annexure XV.***

FIGURE 4-20: AVERAGE LITERACY OF MALE AND FEMALE (STUDY AREA VILLAGES)



Source: census 2011

Agriculture, Irrigation and Cropping Pattern

In Chitradurga district agriculture is the main occupation. More than 65 per cent of the population is engaged in agriculture. Among the cereals, Paddy, Ragi, Jowar, Maize, Wheat are the important crops. Among pulses Gramdal, Turdal, Urdal are important crops. Oil seeds like, Groundnuts, Sunflower, sesame are also grown in the district. Along with these commercial and horticulture crops like Cotton, Tobacco, Coconuts, Areca nuts, Banana and Mango are also grown in the District. During consultation with local people, it was informed that, the norm of this region is single crop and rain-fed agriculture with ragi, jwar as the main kharif crop. Some affluent farmers also grow some other crops such as Sunflower, pomegranates, onion, groundnut, horse gram and groundnut. Some of these crops require irrigation facilities. Production, yielding and market price of some crops in Chitradurga district and consulted villages is provided in following **Table 5-8.**

TABLE 4-11: PRODUCTION & PRODUCTIVITY AND PRICE OF KHARIF AND RABI CROPS

Sl No	Season	Name of Crop	District Durg			Consulted Villages()	
			Production ('000 mt)	Productivity (kg/ha)	Support Price for 13-14 [in Rs/Quintal]	Productivity (kg/Acre)	Price/ Quintal
1		Paddy (Rice)	21.34	3954	1345		

Sl No	Season	Name of Crop	District Durg			Consulted Villages()	
			Production ('000 mt)	Productivity (kg/ha)	Support Price for 13-14 [in Rs/Quintal]	Productivity (kg/Acre)	Price/ Quintal
2	Kharif	Sunflower	13.16	543	3700	600	3500
3		Red gram	4.5	559	-		
4		Maize	317.35	3966	1310		
5		Groundnut	77.14	638	4000	400	4000-5000
6		Ragi	72.13	1500	1500		
7		Jowar	16.72	1555	1520	120	2000
8		Cotton				150	3000-5000
9	Rabi	Paddy (Rice)	4.48	3137	1345		
10		Sunflower	3.05	0596	3700	600	3500
11		Maize	15.61	4006	1310		
12		Ragi	0.44	1978	1500		
13		Jowar	9.10	0074	1520	120	2000

Source: Agriculture Contingency Plan for District, Chitradurga and primary consultation

Sunflower crops in nearby project area ***Groundnut crops in nearby project area***

Livestock

Animal husbandry and dairy are important sources of supplementary income to farmers. Karnataka is the 9th largest state in cattle and buffalo population in the country. As per 19th livestock census 2012, the total livestock, Sheep contributes highest with 34.60% followed by Cattle 34.35%, Goat 17.31% and Pigs 1.10%. The Chitradurga District has a Sheep Breeding Farm at Khudapura in Challakere Taluk. Dairy, Sheep and Goat rearing are the major subsidiary activities in the district. As per 19th livestock census 2012, Chitradurga district has a sizable livestock of about 2.76 lakh cattle, 1.52 lakh buffaloes, 9.40 lakh sheep, and about 2.31 lakh goats. Though the main occupation of the people is agriculture, they have taken up rearing of cows, buffaloes, sheep, goat, poultry etc.

During consultation, it was reported that the villages has large populations of livestock and small ruminants (around 70-80% HH) i.e. Buffaloes, Cow, goats and sheep, which are primary livestock's. Consultation with village Panchayat president from Kandekere and Saikere revealed that, although the village has demarcated grazing land as shown in **Table 5-10.** Open field, fallow agricultural land are used for open grazing. Farmers are mostly using agricultural waste after harvest (ground nut, sunflowers etc.) as fodder for livestock. The animal population consists mainly of milch animals. Most villages have milk collection by intermediaries.

Goatery and shipping in the area

Local Employment and migration

During consultation it was observed that, labour agriculture and non-agriculture is an important source of livelihood for many in the study area villages. People in rural areas try to earn wages within the village under NREGS scheme or nearby areas. If they do not find work in and around the village, they migrate to nearby cities like Bangalore and other states. During the consultation with Kaparahalli villagers, it was observed that, in the area poultry farms nearby and govt. dairy outlets (Karnataka Milk Federation) are available. In the village household industries such as bidi and agarbatti is ongoing. People engaged in bidi making earn around Rs. 500 per day.

Land Holding

The category wise number and area of operational holdings in the district is as following **Table: 5-9.** And the detailed information of land utilization in project influenced villages is shown in **Table 5-10.**

TABLE 4-12: THE TOTAL LAND HOLDING SIZE IN HIRIYUR, CHALLAKERE TEHSIL AND CHITRADURGA DIST.

Sl. No	Size group(ha)	Chitrdurga Dist. Total holdings		Hiriyur - Tehsil Total holdings		Challakere-Tehsil Total holdings	
		Number	Area	Number	Area	Number	Area
1	Marginal Farmers (Below 1 Ha)	109177	59138	17101	9234	18387	10052
2	Small Farmers (1-2 Ha)	90370	127587	15980	22840	20143	28911
3	Semi-Medium (2.0 - 3.99)	60063	158777	11638	31305	17326	44983
4	Medium Farmers (4-10 Ha)	26795	152834	6219	36137	8403	48192
5	Large Farmers (>10 Ha)	4172	62441	1129	16484	1551	22782
	ALL GROUPS	**290577**	**560777**	**52067**	**116000**	**65810**	**154920**

Source: *District Statistical Office, Chitradurga District/2013-14*

TABLE 4-13: LAND UTILIZATION IN PROJECT INFLUENCED VILLAGES (IN HECTARES)

Village Name	Net Area Sown (in Hectares)	Barren & Un-cultivable Land Area (Ha)	Permanent Pastures and Other Grazing Land Area (Ha)	Culturable Waste Land Area (Ha)	Fallows Land other than Current Fallows Area (Ha)	Current Fallows Area (Ha)	Total Unirrigated Land Area (in Hectares)	Area Irrigated by Source (in Hectares)
Kaparahalli	833.08	0.52	68.94	31.56	22.25	10.11	658.55	174.53
Jadekunte	515.26	2.83	107.65	19.54	19.54	8.94	370.79	144.47
Khandikere	1254.57	45.87	22.66	23.87	0	150.05	1071.65	182.92
Gollahalli	323.74	0	19.06	6.47	0	64.76	242.8	80.94

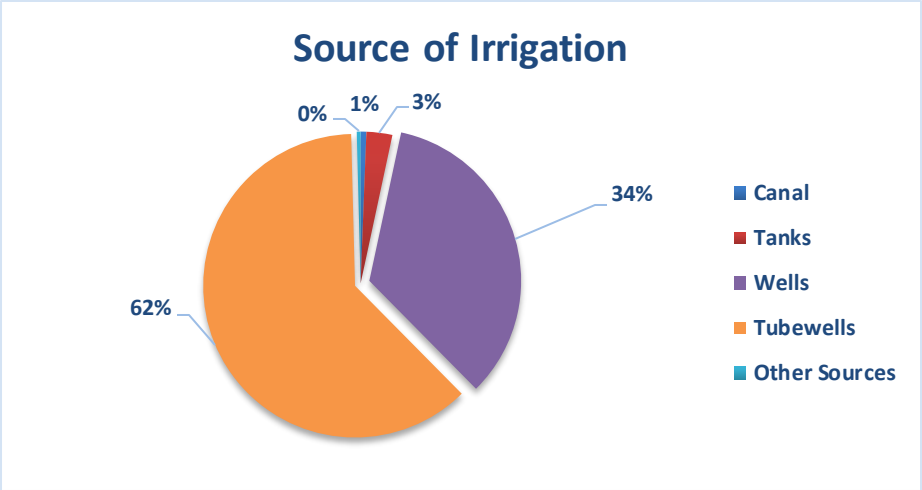
Source: District Census Hand Books-villages 2011

Irrigation

The average annual rainfall in the Chitradurga district is around 537.5 mm, more than 80 percent of which occurs in the South West monsoon season. The minor irrigation facilities like, Tanks, Wells and Bore-wells provide a considerable amount of irrigation facility and has played an important role in the development of agriculture in the district.

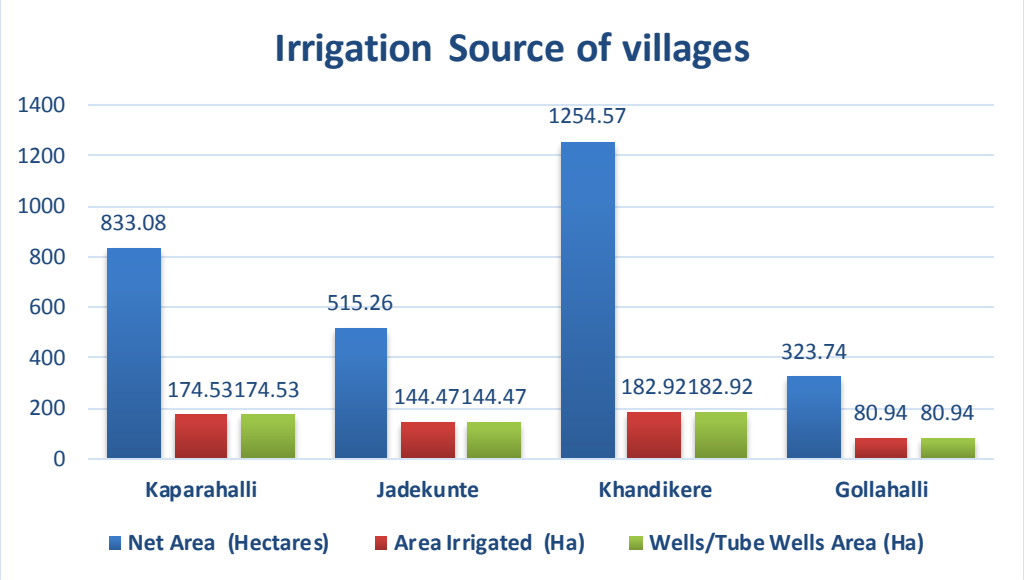
As per agriculture census 2010-11 for Chitradurga district, tube wells are a major source of irrigation in the district. Of the source of irrigation, the overall dependence on tube wells for irrigation purpose is 62 percent and wells are the second main source of irrigation at about 34 percent. The overall usage of canal, dug wells, tanks and others, amounts to 4% as shown in **Fig 5-21**. In respect to the study area villages major source of irrigation is tube wells as shown in **Fig 5-22**. During consultation it was observed that, tube wells are main source of irrigation. However, canal channel is available at a distance of 5 km from the project affected villages in Bellagere Panchayat. In the consulted (Kandikere and Sanikere, Bellagere panchayat) villages adequate irrigation facilities were not available.

FIGURE 4-21: SOURCE OF IRRIGATION IN THE CHITRADURGA DISTRICT



Source: Agriculture Census-2010-11/Karnataka

FIGURE 4-22: SOURCE OF IRRIGATION IN STUDY AREA VILLAGES



Source: District Census Handbook-villages 2011

5.3.8. Workers and Occupation

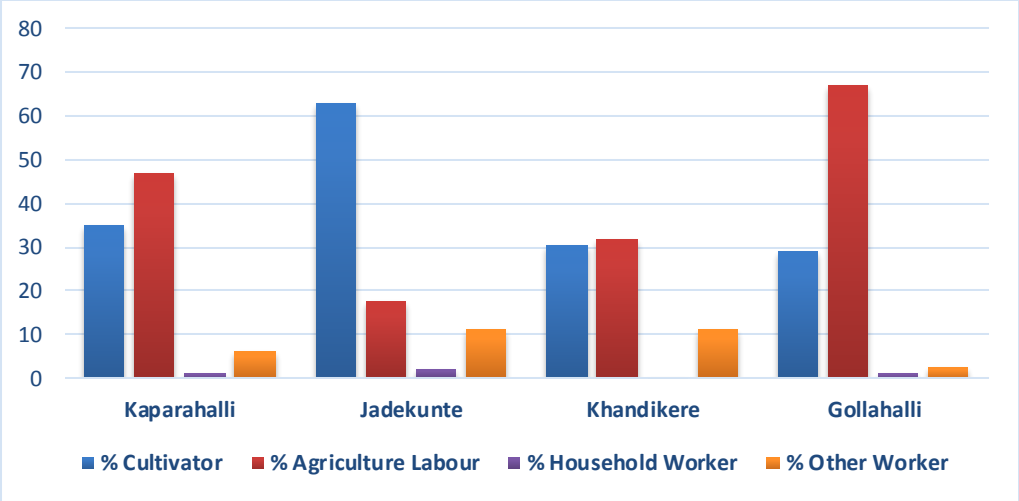
According to the 2011 Census, the Work Force Participation Rate (WFPR) for the State is observed to be 45.66%, males 59% and females 31.87%.

Chitradurga District:

As per census 2011, with respect to the district the average WFPR is 51.62% which is more than compared to State average (45.66). The number Cultivators and Agriculture labours is 30.01% and 22.50% its reveal that major source of livelihood in the district. Other work force participation rates of district consists of 23.46% it's the second highest livelihood source. Household workers in the district is 1.95 % which is below the average of agriculture and cultivators. Details of work force participation of district, tehsil and village level has provided in ***Annexure XVI.***

Study Area: Census 2011, with respect to the study area villages, shows that average percentage of agriculture, cultivator labours and other workforce participation are 40.89%, 39.38% and 7.79 % respectively. House hold workers in the study villages are 1.21% as shown in **Fig 5-23** Comparative analysis of workforce participation data with the district and tehsil data shows that major livelihood in the study area is related to agriculture. Majority of the population in the study area villages depends on agricultural activities and agricultural labourers. Details of Workforce participation is provided in ***Annexure XVI.***

FIGURE 4-23: WORK FORCE PARTICIPATION IN RATE IN THE STUDY AREA VILLAGES



Source: census 2011

Females Workforce participation

According to 68th round survey on employment and unemployment conducted by NSSO during July 2011-12 the female work participation rate in the state of Karnataka is 24.50% and for the rural area participation rate is 28.9% which is more compared to the National average female work participation rate at 25.3%. Census 2011 reports that the female work participation rate in the district Chitradurga is 40.07% which is more compared to the state female work participation rate (24.50%). With regards to study area villages an average female work

participation rate is 45% which is higher compared to average district (40.07%) and state (24.50%).

Wages

According to Economics Survey of Karnataka 2013-14, the average wage of regular workers (Rs.247/-) in rural Karnataka are lower than that of rural India (Rs. 298.96/-), while in urban Karnataka average wage of regular workers (Rs.486/-) is higher compared to urban India (Rs.449.65/-). Similarly, average wages of male regular workers in Karnataka is similar to all-India (Rs.417.08/-), whereas in case of female regular workers average wage (Rs.312/-) is higher as compared to their counterparts at all-India level (Rs.307.72/-).

5.3.9. Self *Help Groups (SHGs)*

According to NABARD focus paper 2014-15, Karnataka is one of the pioneer states in promoting and propagating the self-help movement. The State has always been in the forefront in innovating and furthering the SHG movement in the country. During 2012-13, 1, 20,561 SHGs were formed and 1,27,598 lakh SHGs were credit linked in the State, , taking the cumulative SHGs formed and credit linked in the State to 8,11,231 and 7,51,231 respectively as on 31 March 2013. Further, the average loan per SHG has risen from 1.44 lakh during 2010-11 to 1.66 lakh during 2012-13.

As per district statistical office, Chitradurga 2013-14, the total SHGs groups (which is namely -Stree Shakti Sangh) were formed 5075 with 81,215 members, which of in taluka Challakere and Hiriyur are 725 and 905. Total 4440 no of SHG groups has linked with bank, in taluka Challakere and Hiriyur are 930 and 633 respectably. Some following SHGs promoting programme ongoing in the Karnataka state-

SWASHAKTI- Empowerment of women. No credit or subsidy component. Emphasis on training for Self-development.

STREE SHAKTI- Empowerment of women through savings and micro-credit, social awareness. Adequate budgetary provision for training. Grant of Rs.5000 per group as revolving fund.

SUJALA- The programme focus is on watershed development. SHGs are included to help the poor and the landless as a means to bring in a measure of equity into the programme. Budgetary provision made for SHG capacity building and to take up income generating activities.

KAWAD- The programme focus is on watershed development. SHGs are included to help the poor and the landless as a means to bring in a measure of equity into the programme. Budgetary provision made for SHG capacity building and to take up income generating activities.

Swarna jayanti Gram Swarozgar Yojana (SGSY) - The programme focus is on using the SHG approach for poverty reduction through channelling of bank loans and government subsidies. Budget is provided for training and working capital support to SHGs but efficiency of use varies with implementers.

SHGs promoted by Regional Rural Banks- Focus is on building up priority sector clientele for SHG-Bank linkage. Budgets for SHG capacity building vary from bank to bank. Efficiency of budget use can even vary from branch to branch of the same bank. During consultation it was observed that, Many Self Help Groups (SHGs) has formed in the study area as shown in Table 4.3. Some of the SHGs are doing micro financing business, some of associate with local Trust/NGO and some of them have taken responsibility for mid-day meal distribution in primary and middle schools.

TABLE 4-14: VILLAGE WISE SHGS

Sl. No.	Village Name	Mahila Mandal (Sangam)/ Women Self Help Groups	Activity
1	Kaparahalli	**17**	Microfinancing, and dairy
2	Jadekunte	**-**	
3	Khandikere	**5-6**	Microfinancing
4	Gollahalli	**3-4**	Microfinancing

Source: primary consultation

5.3.10. BPL Families and Vulnerability

As per District Statistical Office, Chitradurga 2013-14, total BPL (Below Poverty Line) card holders under Anthoydaya is 42,742 which of in taluka Challakere and Hiriyur are 9230 and 8243. During community consultation it was observed that, some vulnerable group like landless family, physically handicapped and widow are there in the study villages as shown in following **Table 5-12.** Government provides pension to those who falls in vulnerable category especially for widow and physically handicapped persons.

TABLE 4-15: VILLAGE WISE VULNERABLE GROUP

Sl. No.	Village Name	vulnerable group (lump sum)		
		Widows	physically handicapped	Landless HH
1	Kaparahalli	100	15	36
2	Jadekunte			
3	Khandikere		10	159

4	Gollahalli			

Source: primary consultation

The project proponent may be required to focus on providing employment opportunity to the vulnerable members and also the implementation of programme under CSR activity for them.

5.3.11. Amenities and Infrastructure

Village and district level integrated education, health amenities data available as per census 2011 (District Census Hand Book), it is described in following the below section. Village wise details amenities as per census 2011 provided in ***Annexure XXII.***

Education

As per census 2011 (District Census Hand Book), in the Chitradurga district there are 15 vocational training school/ITI, four Medical college, one special for disabled children, , 13 degree college, 67 senior secondary schools, 237 secondary schools, 668 middle schools and 882 primary schools available. As per census data 2011, villages having educational institutions, in the study area villages Kaparahalli, and Khandikere are equipped with primary, middle school and high school. Golahalli and Jadekunte villages have only primary school. Collages and vocational training institutes are located at more than 10 km of a distance from the study area villages.

Health

Chitradurga district has nine community health centre (CHC), 80 primary health centre (PHC), 201 primary health sub centre (PHSC), 80 T.B. clinic and 80 maternity and child welfare centre (Census 2011). With respect to Taluka (tehsil) Challakere and Hiriyur there are two community health centre in each places. Total 15 & 20 primary health centre available in both taluka.

Kaparahalli and Khandikere village have only Health Sub Centre (HSC) is available. Gollahalli and Jadekunte village have no health facility. Mostly PHC, HSC and other facilities like Maternity and child welfare centers, Nursing homes and Private medical practitioners are majority located between 5 kms and 10 kms or more than 10km of a distance from the villages (Ibid.). The details are presented in ***Annexure XVII.***

During consultation with Panchayat members it was observed that, one PHC at Kaparahalli village, however, health services are nod adequate, doctors are not available regularly. Drinking water is highly contaminated with fluoride in the study area villages. Due to fluoride contamination joint pain is common health problem among the villagers.

Drinking water facility

As per census 2011 (District Census hand books), hand pumps and tap water facilities are main source of drinking water for the four villages Kaparahalli, Khandikere, Jadekunte and Gollahalli as details has been provided as in ***Annexure XVII.*** Pond are available in the vicinity of the project site in the study area villages.

Tap water supply in Kaparahalli Village

During consultation it was observed that, tap water and hand pumps are found to be the only source of drinking water in four villages and these are reportedly sufficient to cater the drinking as well as other domestic water requirement of all the villagers. Tap water is supplied through the overhead tanks in each villages. Ground water depth is very low in the study area villages around 1000 ft. Drinking water is highly contaminated with fluoride.

Sanitation

According to Karnataka Human Development Report 2005, high 82.5% of rural households had no latrines in Karnataka. During community consultation, it was observed that, proper sanitation facilities are available to only 50% household in study area villages respectively. The rest of households practice open defecation. Sanitation scheme under Swachh Bharat mission is ongoing in the area. An amount of INR 12,000 per household for OBC and General and for the SC & ST family Rs. 15,000 being provided under this scheme.

Cooking source

According to Karnataka Human Development Report 2005, 79.8% of firewood, 6.2% of kerosene, .2 % of cow dung and around 6.2 % of LPG are domestic source in Karnataka.

It was observed that, fuel wood is preferred over the cooking gas in the consulted villages. Around 10-15% of LPG and more than 80% of fuel wood are reportedly used by the villagers for cooking and heating. Dried biomass, cow dung briquette are the other sources of energy being practiced by the villagers for cooking and heating.

Communication and Transportation facilities As per census 2011 (District Census hand books), transportation facilities are available in the two study area villages. And railway network is available at Challakere taluka and Chitradurga district, which is around 18-50 kms away from the project site. Local bus service is sole mode of transportation for the people of the study area villages and bus connectivity available for four villages Kaparahalli, Jadekunte, Khandikere and Gollahalli. Access roads

Village approach road

within the study area villages is both types: paved (Pakka) and Kacha. Post offices and phone connectivity are available in the study area villages except Gollahali. The details are presented in ***Annexure XVII.*** During consultation it was observed that, roads connectivity for study villages (Kaparahalli, Khandikere, Jadekunte and Gollahalli) is good. Local bus service is sole mode of transportation for the people.

Power Supply

As per final report on Rajiv Gandhi Gram Vidut Yojna, July 2013, power supply in the state Karnataka with an average duration of 16-18 hrs per day. However, as per census 2011 (District Census hand books), power supply in the study area villages with an average duration of 8-10 hrs per day. And electricity facility available for domestic and agriculture purposes. The details are presented in ***Annexure XVII.*** During consultation with Panchayat members it was observed that, power supply is inadequate in the study area villages. Only 4-5 hrs. Electricity available in a day.

5.3.12. Common Property Resources (CPR)

During consultation with Panchayat members and villagers, it was noted that every village has community ponds, cremation ground etc. as presented in **Table 5-13.** In terms of CPR, the likely impact from the project development was also discussed with the villagers.

TABLE 4-16: VILLAGE WISE COMMON PROPERTY RESOURCES

Sl. No.	Village Name	Common Property Resources (CPR)				
		Religious and cultural place	Community Ponds	Cremation ground	Community hall	Canal
1	Kaparahalli	3-4	1	1	-	-
2	Jadekunte					-
3	Khandikere	-	1	1	1	-
4	Gollahalli	-	1	1	-	-

Source: primary consultation

5.3.13. Archaeology sites in the District and study area

As per the Archaeological Survey of India (ASI) in the District Chitrdurga, state Karnataka, total seven protected monuments sites available in the district has been provided as an ***Annexure XXVIII***. During consultation with communities it was confirmed that, there is no protected monuments in the area.

5.3.14. Some important schemes in District

a. Employment Generation Programme

- ***Mahatma Gandhi National Rural Employment Guarantee Scheme-*** at least one hundred days of guaranteed wage employment in every financial year to every household whose adult members volunteer to do unskilled manual work
- ***Swarna Jayanthi Grama Swarojgar Yojana- (SGSY)*** - aims at alleviating the poverty among the rural poor. The programme covers all the aspects of self-employment such as organisation of the poorer sections into Self Help Groups.
- ***Chaitanya & Swavalambana Schemes of BC & MD Corporation-*** All backward classes under Chaitanya and all minority community under Swavalambana.
- ***PMEGP (Prime Minister's Employment Generation Programme)*** - eligible who above 18 years of age.
- ***Schemes of Karnataka SC/ST Dev. Corporation-*** eligible who belongs to SC/ST category.

b. Government Initiatives - Social Security Schemes

- ***Social Security and Pension-*** the Directorate of Social Security and Pension, Revenue Department of the Government is providing social security benefits to the old, widows and physically challenged.
- ***Indira Gandhi National Old Age Pension (OAP)*** - The scheme provided pensions only to destitute belonging to Below Poverty Line (BPL) households, earning less than Rs. 6,000 per annum.
- ***Sandhya Suraksha Yojna (SSA)*** - SSA is another old age pension programme in Karnataka implemented by the state government since 2007. SSA provides to households earning up to Rs. 20,000 per annum.
- ***Destitute Widow Pensions (DWP)***-The eligibility criteria are that she should belong to BPL household, husband is legally dead and income should not exceed Rs.6, 000 per annum.
- ***Physically Handicapped or Disability Pensioners (PHP)*** - Any child born with disability mentioned under or disability accrued due to accident with disability above 40% is eligible for pension.

- **Rastriya Swasthya Bima Yojana -** Rastriya Swasthya Bima Yojana is a prestigious health insurance scheme, implemented for the labourers of unorganized sector.

c. Special training programme

Apart from the above institutional and statutory vocational training schemes, the Department is conducting many special training programmes in ITI's with the objective of improving quality of industrial production and promoting self-employment among the youth.

- *Motor Driving Training Scheme (MDTS)*
- *Advanced Vocational Training System (AVTS)*
- *Hi-Tech Training Programme*

5.3.15. Stakeholder Consultation

Draft Community Engagement Plan was prepared and shared with the Project Company. Based on their feedback consultations were carried out keeping in consideration that land negotiations were ongoing. Consultations were held in a neutral venue. Stakeholder consultation was carried out which included land owners, land aggregators, village panchayat presidents from Kaparahalli, Kandikere and Golahalli, Panchayat Development officer, minor irrigation dept., and forest department etc. The list of stakeholder consulted for the proposed project is provided in **Table 5-14.** The list of detail stakeholders, MoM and list of participants during the primary survey are provided in ***Annexure XIX*.** The photographs are attached in ***Annexure XX*.** Outcomes of the consultations are included in the specific sections such as infrastructure, migration, occupation etc. Other issues are included in the section below.

TABLE 4-17: CONSULTATION WITH DIFFERENT STAKEHOLDERS

Sl. No.	Stakeholder type	Designation	Department/Address	Date
1	Community	Village vice president	Sanikere Panchayat	5/10/15
2		Panchayat members	Sanikere Panchayat	5/10/15
3		Village president	Khandikere	5/10/15
4		Panchayat members	Khandikere Panchayat	5/10/15
5	Land owners	Land owners	Kaparahalli village	6/10/15

Sl. No.	Stakeholder type	Designation	Department/Address	Date
6			Khandikere	6/10/15
7			Gollahalli village	6/10/15
8	Local Govt. Institution	Panchayat development officer	Bellagere Panchayat	6/10/15
9			Khandikere	6/10/15
10		AE	Minor irrigation department, Chitradurga	6/10/15
11		Asst. Sr. Environmental Officer	Karnataka Pollution Control board, Chitradurga	6/10/15
12	Advocate Azure	Advocate	Lawyer for land procurement	7/10/15
13	Land Aggregator	Land aggregator	Land aggr. For Azure project, Chitradurga	5/10/15
14	Project proponent	Azure project team	Azure project team, chitradurga	5/10/15

5.3.16. Consultation with Land Aggregator

Land aggregator is from the area and has a land bank due to purchase of land for airport some years ago. The airport location was shifted to another district. People approach the aggregator when they need cultivable land and aggregator works out an exchange for them. The difference works out at 50 %. He undertakes land transaction in Tumkur, Bellary and Chitradurga. In Davangere, Harihar, Chhenegiri the rates are higher due to irrigated area being available. Settlement records in the area are update every year. Aggregator also has an advocate on the team. He has also been approached by other companies (Patanjali, Dairy and other solar projects) for which land was not accepted due to water problems. Last three years the land rates have increased by 50 %. Dryland rates are low below Rs. 1 Lakhs.

5.3.17. Consultation with Panchayat President and Other Panchayat Members Sanikere

Five villages including Kaparahalli, Jadekunte are within the panchayat. They are aware about the Solar Project. There are a lot of infrastructure gaps within the villages. Most of the villages have a fluoride content in the water and there are no purification or filtration plants. Borewells are dry due to lack of rains. While overheads tanks are constructed for water supply two tanks have leakages. Medical facilities are not available in the village. Internal roads are kaccha and connectivity between the villages is also not good. While streetlight are there electricity is available for a very short time. They have proposed for a Government College in Kaparahalli village. Farmers take one crop mainly groundnut during the monsoon. Land rates vary widely ranging from Rs. 10 lakhs/acre near the main road to Rs. 1 lakh inside. There is an increase in the land rates in the last 5 years. Government gauchar land is not available in the villages. People mainly graze their livestock on private lands. 10 % of the population don't have land and 40 % don't have pucca houses. People work in the sponge iron factory. There is a dust problem due to the factory. Adjoining lands have some problems during cultivation especially for cotton crop. Crops cultivated in the village include jowar, groundnut and cotton. The most common health ailments are joint pain and asthma. Various SHGs are present in the village including WSHGs and Farmers group.

5.3.18. Consultation with Panchayat Development Officer, Bellagere, Ex Sanikere

One of the main problems in the area are is of Fluoride content in the water. Taluka wise decision for providing RO water on a payment basis is pending. Proposal has been sent to Panchayati Raj Engineering Dept PRED for providing water filtration through the Panchayat. There is a lake in Bellagere which is under minor irrigation and spread over 200 acres. A forum or Committee has been formed at the village level which manages the utilization and management of the water and activities centering on the lake. The water from the lake is used for domestic use, irrigation and fishing (tender for releasing fingerlings is in process). Check dams have been constructed on small nalas for recharging groundwater. Government centre for milk collection is Bellagere where milk is collected and sent onwards within one hour. The condition of the school buildings is unsatisfactory. Due to water recharge by lake the groundwater level in Bellakere is 300-400 feet.

5.3.19. Consultation with Advocate

Land aggregator provides the link documents to the advocate for the surveyed lands. They also provide the family tree as part of the documents. Coordination between the farmers and the land aggregator is time consuming as all interested parties are not available at the same time. They are unable to proceed if all link documents are not made available at the same time. In

the case of some the nomadic families, members go out for grazing their livestock and to communicate with them is time consuming.

Title search report is prepared within 15 days and filed after all link documents is obtained from the land aggregator. As per the advocates for all lands under process of purchase: lands belonging to SC/ST have not been purchased; none of the lands are under the command area of any irrigation project; the lands are not included in any town planning or area development scheme. Government land acquisition in the area has not been proposed or in effect through any notification. Some of the actions that are pending will be undertaken only after the application under Section 109 is filed. Other required documents are under process.

5.3.20. Consultation with Land Sellers Khandikere

There are four villages within Khandikere with a total population of 2500 households. In one of the village's temple for a specific goddess, animal sacrifice (mainly goats and sheep) is done on specific days considered significant for the deity and temple. Canals were observed near the villages which provides irrigation to some lands from the Feeder Canal connected to the Upper Bhadra Project. Khandikere does not get any waters from the canals. Most of the farmers in the village are small farmers. Livelihood options are either cultivation or labour. Crops grown include sunflower and groundnut. Less than 1 % are cultivating pomegranates. Dairy is one of the livelihood options in the village. Milk is sold to the collection centre of the Karnataka Milk Federation for Rs. 22 a litre. Main problem for the village is that of fluoride content. Water filtration is not available in the village. MLA has been approached for funds for such a scheme. There is a Dharamsthal Trust which supports some development activities in the village. Gauchar land is not identified or categorized separately for the village. The village pond is spread over 25 acres. Roads have been constructed from the MLA fund. There have some issues related to corruption in NREGA due to which they do not want to implement the same.

5.3.21. Consultation with Land Sellers Gollahalli

The population is mixed with various caste groups, SC and ST, Kurkas, Lingayats and others. The area is primarily dryland with some minor irrigation. Very less amount of land has been purchased by the project company in the village. The land purchased is for the approach section from the highway. The trend is the village and surrounding areas is to sell waste land and buy better quality lands. Half the people in the village are involved in labour and the rest in petty businesses or households industries such as blanket weaving, bidi rolling, dairy, etc. Three fourths of the households don't have latrines. 150 -200 people have left the village for work to Bangalore and Tumkur. The main crops cultivated are sunflower and groundnut. Money has been utilized for house construction, education, marriage and house construction which are

given on rent. People from the village work in the sponge iron factory. While people said that the land adjoining the factory was affected due to dust, most of the villagers did not seem to be concerned about it.

People are not willing to share how much land they own after land sale and purchase of other lands. Livelihood impact is less as most of the lands are left fallow due to lack of irrigation facilities and lands not being of good quality to generate satisfactory yields.

Key Findings of Consultation

- Stakeholder consultation has been carried out with land owners and Panchayat members of three villages Kaparahalli, Golahalli and Kandikere
- Sex ratio of consulted villages found to be higher than the district and state average
- Female literacy rate is lower than male literacy rate in the study area villages
- Groundnut and sunflower are the major crop grown in this region and other crops are being grown here include Soya bean and different type of pulses.
- Tube wells are main source of irrigation in the area.
- Economy of the region is mainly dependent on agriculture and main workers are engaged as cultivators and agriculture labour force
- Significance numbers of SHGs have been formed in consulted villages (Kaparahalli, Kandikere and Golahalli)
- More than 80% household have significance number of livestock and open grazing is prevalent in the area.
- Sanitation facilities are inadequate in the villages and majority of households practice open defecation.
- Tap water supplied through the overhead tanks in Kaparahalli, Khandikere and Golahalli villages
- Drinking water highly contaminated with fluoride in the area (Kaparahalli, Golahalli and Kandikere)
- Power supply is inadequate in the study area villages. Electricity is available only for 4-5 hrs in a day.
- Health facility is not adequate at Kaparahalli village.
- Public disclosure about the solar project has been done at Land sellers and Panchayat President level due to ongoing land transaction. Open disclosure is likely to impact the rate of land significantly for the Project Company. Land owners are aware about the upcoming Azure solar project.

5.3.22. Grievance Redressal Mechanism (GRM)

Grievance redressal mechanism system and grievance register has not in place at project site as land procurement is ongoing and related issues are addressed by Land Aggregator and Team and Azure Team. Azure Power has developed their own GRM Procedure and it incorporates procedures for lodging of grievances, processing of grievances, resolving grievances and closing of grievances. Azure needs to implement its grievance redressal system on site.

5.3.23. Public disclosure

Public disclosure about the solar project has not been done openly at village level through any medium like published in local newspaper and community consultation due to ongoing land purchase. Panchayat presidents and other members and land sellers are informed and know about the project. Project land team is also part of the team identification and selection of land and discussion with land owners/sellers.

5.3.24. Community Development Plan Under CSR

It was observed that, CSR activities and budget allocation needs to be initiated yet by the company. Recently, the site office management had contributed in renovating the village road as the local community requested them to do so.

5.3.25. Needs/Gap Assessment for CSR Initiatives

Analysis of above socio economics description and community consultation in project area villages reveals that concern of villagers are linked with the fulfilment of basic needs and improvement of some infrastructural facilities at school levels. On the basis of discussion with villagers, village president and Panchayat Members, following gaps have been identified which needs to be addressed:

Key Needs/Gaps identified and recommendation for CSR activity

Key Areas	Gaps identified	Recommendation for CSR
Education	• Low female literacy rate compared to male • Sr. secondary/collage are located at more than 10 km distance from the villages • Lack of vocational training in study area villages • Benches & chairs and computer education are not available in primary school, Kandikere, Kaparahalli and Golahalli village	• Awareness programme regarding female education at village level • Could be linked with vocational training programme of study area villages • Providing furniture (Chair/Benches) in the school • Providing computer literacy program at village level
Drinking water	• Water tap is main source in the area. • Drinking water is highly contaminated with fluoride	• Providing R.O. system at least 3000 lph capacity in four villages Kaparahalli, Jadekunte, Kandikere and Golahalli.

	• Due to fluoride contamination people are facing problem with Joint pains. • Panchayat Raj Engineering Dept. is responsible for water purification in the area. However, on ground villagers do not get benefited from the schemes. • Ground water depth is around 1000 ft. observed during consultation	• Clean or purified drinking water is expected to significantly affect the quality of life and health for the villagers.
Health	• 8 bed hospital available at Kaparahalli village but building is not properly maintained • Doctors and ANM are not available regularly reported by Panchayat members • Major diseases are observed – joint pain, Asthma general diseases, and seasonal problem.	• Organizing awareness camp on water contamination. • Health camps or mobile health clinics can be provided.
Infrastructure and sanitation	• Village main roads are good but entire access roads are unpaved in Kaparahalli village • Power supply is main problem in the area, only 4-5 hrs. Electricity available in the villages. • More than 50% of the population from the Kaparahalli, Kandikere and Gollahalli village practice open defecation. • Sanitation scheme are being implemented in these villages under Swachh Bharat mission.	• Organizing awareness camp on sanitation and to be linked with sanitation programme in the study area villages • Providing Solar street light in project affected villages Kaparahalli, Gollahalli, Jadekunte and Khandikere villages. • Low cost community toilets based on best practices to use less water can be worked out with the panchayats intervention.
Agriculture/ Irrigation	• Agriculture is dependent on rain-fed mostly. However, those farmers have irrigation facilities, they are they grow two times crops • Minor irrigation schemes running by state government in the area. However, on ground farmers are not more benefited from the schemes. • Tube wells are main source of irrigation	• Link with irrigation programme that can easy irrigation in the area • Rain Water harvesting wherever possible with the project site to improve groundwater recharge. • Deepening and widening of ponds, temple tanks and other surface water bodies for overall improvement of water recharge.to reduce water wastage and transmission losses.

		• Introduction of drip irrigation and similar schemes
Employment opportunities in the area	• Many SHGs (Self Help Groups) has been formed in the consulted villages (Kaparahalli, Gollahalli and Kandikere). However, some SHGs were associated with trust/NGO and engaged in microfinance activity. • House hold level small business activities is common in the area reported by community and Panchayat members like- Bidi making, Agarbatti making	• Organizing training/capacity building programme for SHGs regarding entrepreneurship and linkages with bank. • Introduction of processing of dairy and other produce related to livestock.

5.3.26. Social Impact

The site consists of dry, flat plain area supporting grassy sparse vegetation and wild growth. In the area adjacent to the project site there were cultivated and fallow lands. Land was covered with scanty bushes and vegetation. Few trees were observed and theses were mostly at the plot boundary and adjacent road. Kachha roads were observed which provided access to some of the lands. In some of the plots there were no access roads. Adjacent areas near some of the locations contain small patches of irrigated crops (onions), covered with shrubs and some trees. These features are similar to surrounding areas and have no significantly distinct feature.

5.3.27. Land and Land sellers

For the project private agricultural land has been procured. At present the land is mainly used for open grazing, collection of agricultural wastes, firewood collection etc. The lands observed during site visit were primary dry fallow/ cultural waste [6] located adjacent to the national highway. Nearby patches outside project area were observed that were being cultivated. Some

[6] This includes land available for cultivation, whether taken up or not taken up for cultivation once, but not cultivated during the last five years or more in succession including the current year for some reason or the other. Such land may be either fallow or covered with shrubs and jungles which are not put to any use. They may be accessible or inaccessible and may lie in isolated blocks or within cultivated holdings.

of the plots were irrigated most were not irrigated. Crops such as sunflower and groundnut are cultivated during monsoon.

Structures were not observed on site visited, therefore displacement is not anticipated. The land sellers interviewed were paid more than government and market rates for the project. Most of the land owners have used the money to purchase better lands within the village on in adjoining villages. This was referred by the farmers as exchange of the waste lands sold to the project for better lands elsewhere. Most land sellers had land but did not want to share the amount of land they still retained. Based on interviews with some land sellers, it was understood that roughly 50 % of land owned was retained by the land seller[7].

5.3.28. Livelihood

Most of the land sellers have invested the money received from sale of land in better quality lands, the others have spent the money on other purposes such as marriage, house construction and education. Cultivation on dryland is not always productive as it is completely dependent on rainfall. In years of low rainfall investments in agriculture are not recovered. People go to Tumkur, Bellary and Bangalore for work and labour opportunities. People in the villages are also dependent on other livelihoods such as household industries such as bidi rolling, agarbatti, weaving blankets, diary and rearing small livestock such as goats and sheep for commercial purposes. Impact on livelihood is limited as livelihood is more diversified and people have reinvested in better quality lands for agricultural purposes.

5.3.29. Local Employment and Procurement

The project will provide direct employment in the form of casual labour, skilled labour, and procurement opportunities primarily during project construction thus improving local economic conditions. Project Company is committed to providing employment to locals in the project wherever possible. During operation phase employment and procurement opportunities will be lesser as for solar projects the manpower requirement is limited and is largely for skilled work. Unskilled work will be limited to labour at construction sites and security. Employees will be recruited from the local area and the construction period will be short. Wherever possible locals will be extended opportunities emerging for procurement in goods and services and employment directly or indirectly.

[7] Evidence to corroborate the same is not available. Information cannot be shared in public domain as permission of the land sellers has not been received for allowing details to be displayed in the public domain.

5.3.30. Perception of the People about the Project

During the consultations, land sellers said that they do not have much of an idea of solar projects as renewable energy projects have not come up in the vicinity of the villages. The only aspect they are aware about is that the project will not generate dust or pollution. Land sellers said that they would get to know more about solar power once the project was established.

5.3.31. Dust and Noise

The project area observed were not adjacent to any settlement therefore limited impact is envisaged. The access to the project area will be from the national highway which is away from the settlements. Private lands observed were mostly devoid of settlements nearby. A sponge iron factory has been observed which is nearest to the proposed project site.

The traffic volume on the national highway is expected to be varied and comprising of large and heavy vehicles. Since access to the site is directly off the highway traffic management plan is required to be planned and implemented to minimize risks, violations and accidents during traffic movement for the project activities. Signage, traffic wardens, construction of service road or turn off junction to prevent traffic congestion at the entry and exit gates for the project, diversions and prior intimation to the highway authorities will be required and mandatory. Requisite permissions and approvals, if required may be planned for and obtained before construction activities are initiated.

5.3.32. Archaeological/Historical Importance Site

The site does not contain any archaeological monuments or sites as per the Archaeological Survey of India. No historical and cultural monuments will be affected by the project. Chance Find Procedure is required to be planned and implemented in case of accidental discovery of artefacts during construction activities.

6. Analysis of Alternatives

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

- Current or No project Scenario
- Location/Site Alternatives during section of site
- Alternative Methods Of Power Generation

6.1. CURRENT OR NO PROJECT SCENARIO

6.1.1. Power Scenario in India

The all India gross electricity generation from utilities, excluding that from the captive generating plants, was 6,23,819 Giga Watt-Hours (GWh) during 2005-06. It rose to 1,022,614 GWh during 2013-14. The production of electricity from utilities has increased from 9,63,811 GWh during 2012-13 to 1,022,614 GWh during 2013-14, registering an annual growth rate of about 6.10%.

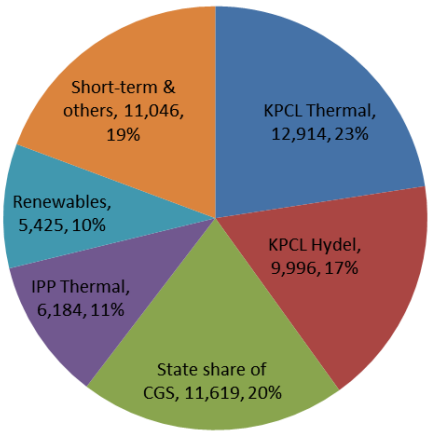
The total potential for renewable power generation in the country as on 31.03.14 is estimated at 147615 MW. This includes wind power potential of 102772 MW (69.6%), SHP (small-hydro power) potential of 19749 MW (13.38%), Biomass power potential of 17,538 MW (11.88%) and 5000 MW (3.39%) from bagasse-based 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.

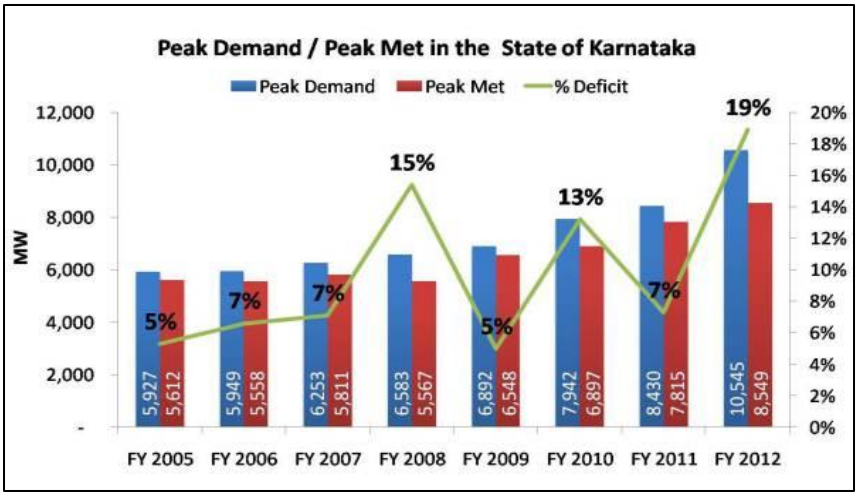
During 11th Five Year Plan nearly 55,000 MW of new energy generation capacity was created, yet there continued to be overall energy deficit of 8.7% and peak shortage of 9.0%. Thus to cater to increasing demand of power, renewable energy projects are favoured and various states are coming forward with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

6.1.2. Power Scenario in Karnataka

Karnataka is located in the southern region of India with installed electricity generation capacity of 13,596 MW (As on 31st January 2013). Karnataka constitutes 6% of the total installed electricity generation capacity of India which is mainly from fossil fuels such as coal and natural gas. Private sector has a 35% share in the total installed capacity, implying a healthy investment environment. Renewable power forms 10% of the total installed capacity.



As per database of Central Electricity Authority, in FY 2012 peak electricity demand was 10545 MW out of which only 8549 MW was available indicating 19% of deficit. Peak demand deficit in the state has increased from 5% in FY 2005-06 to 19% in 2011-12. The reason for the increasing deficits can be mainly traced to the inability of the state to increase electricity generation. Between 2005-06 and 2011-12, electricity requirement grew at a compound annual growth rate (CAGR) of 8%, while availability only grew at around 7% leading to increasing electricity deficits. The peak demand- peak met deficit is represented in the ***Fig*** below.



Source: Central Electricity Authority Database

It is expected that the power deficit post 2012 will continue to increase as the demand for power is continuously surpassing supply. Increasing coal supply shortages and unfavourable climatic conditions resulting in reduced water levels have been the main causes of energy deficits.

As per Karnataka's Power Sector Roadmap for 2021-22 report by Center for Study of Science, Technology and Policy (CSTEP), by FY 2022 the residual peak demand will be short by 8%.

PEAK SUPPLY AND PEAK SHORTAGE ESTIMATION

Power	FY-14	FY-15	FY-16	FY-17	FY-18	FY-19	FY-20	FY-21	FY-22
Projected Peak demand	10899	11542	12234	12979	13781	14727	15751	16860	18063
Estimated Peak Supply	9355	10203	10936	12459	13032	15556	17856	19180	19569
Residual Peak demand (%)	14%	12%	11%	4%	5%	-6%	-13%	-14%	-8%

6.1.3. Promotion of Renewable Energy in Karnataka

To improve this power shortage scenario, state government has provided financial support of INR 10,289 Crores[8] for power sector mainly for coal-based capacity. However projects based on coal are expected to get delayed due to environmental concerns and coal shortages. To overcome this, the state government is aggressively exploring accelerated capacity addition of renewable projects in the state. The Karnataka Renewable Energy Development Limited (KREDL) is an organization working to promote renewable energy in the state. The Karnataka Renewable Energy Policy was announced by KREDL for the period of 2009-14. This policy aims at adding 1000 MW capacity each year from renewable energy resources. Currently (By Jan 2013) the state of Karnataka has total installed capacity of 3,599 MW for small hydro and 3,385 MW of installed capacity for renewable energy sources like Wind, Solar and Biomass. As per Karnataka Power Sector Road Map Report for 2021-22 solar energy capacity addition is expected to increase annually, reaching 250 MW in FY 2018.

RENEWABLE CAPACITY ADDITION

Year	Solar capacity addition in year (MW)	Wind capacity addition in year (MW)	Small Hydro and biomass Capacity addition (MW)	Total Renewable Capacity under PPA- Including existing capacity (MW)
FY-14	50	500	50	3,420
FY-15	100	1,500	100	5,120

[8] In order to reduce the demand-supply gap, Government of Karnataka has taken initiatives to improve the generation capacity of the state. The government through its state annual budget 2012-13 has provided an outlay of 10,289 crore INR for the sector. (PWC report, CII Karnataka Conference on Power 2012).

FY-16	100	1,500	100	6,820
FY-17	200	1,500	100	8,620
FY-18	250	1,500	100	10,470

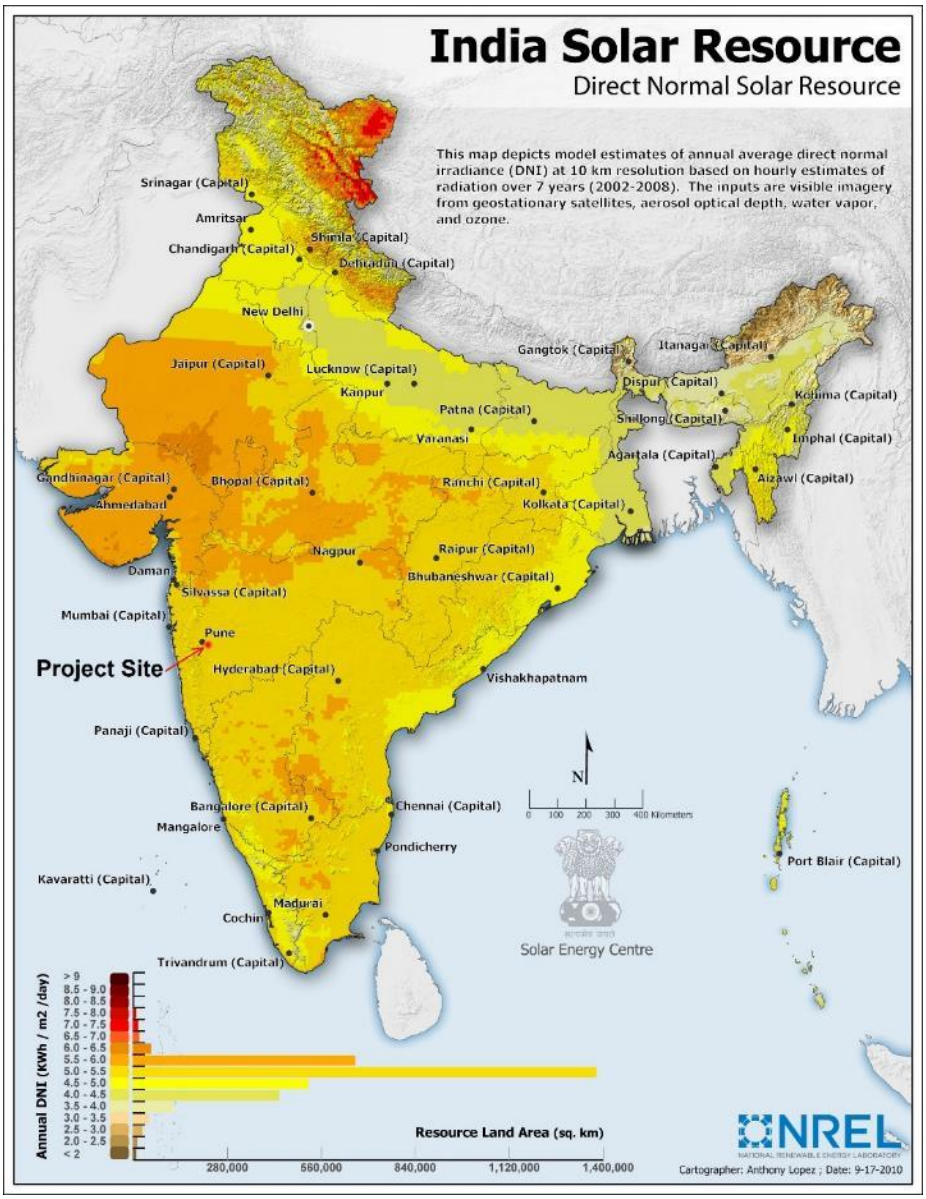
In addition to this, the State also supports Renewable Energy Certificate (REC) mechanism under renewable energy project developer can commercialize the green component of the electricity generated from its renewable energy projects. State Electricity Distribution Companies and other big electricity consumers have Renewable Purchase Obligations (RPO). It mandates a particular category of consumers to purchase part of their electricity from Renewable Energy sources or they can buy REC generated from registered renewable energy project to fulfil their RPO. All these measures will help to reduce the burden on conventional energy that uses fossil fuels. With decreasing cost of generation from renewable energy sources and the advancement in renewable energy technologies, the state as well as the country can reduce reliance on fossil fuels.

6.2. LOCATION/SITE ALTERNATIVES DURING SECTION OF SITE

Selection of project location for solar energy project is very critical with solar intensity playing a key role. Karnataka receives moderate solar radiation intensity in India. In addition the average rainfall is low in the state. For selection of project location for this project, direct normal insolation (DNI) values estimated using METEONORM data base and values obtained using IMD data as well as with the NASA satellite data for Pune were studied.

The global solar radiation map of Karnataka, which is based on the measured data of Nation Renewable Energy Laboratory (NREL) and satellite data through NASA, indicates that the various parts of State receives good amount of annual average solar radiation, with project area receiving around 5 - 5.5 kWh/sq.m/day.

National Renewable Energy Laboratory (NREL), Us - Solar Resource Map Of India



Source: Nation Renewable Energy Laboratory (NREL)

Other key factors for deciding location of project area are as follows:

- Distance of nearby settlements from project area
- Avoidance of sensitive areas such as school, medical facilities, settlements, etc. in immediate vicinity of project area
- Minimum effect due to land – selection of dry agricultural land
- Absence of any ecologically sensitive area in near vicinity like national park, wildlife sanctuary, forest areas
- Absence of archeologically important site near project area

6.3. ALTERNATIVE METHODS OF POWER GENERATION

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

Source of Energy	Advantages	Disadvantages
Coal	• Relatively cheap form of energy • Availability in large scale worldwide • Easily transported to power stations • GHG emission as low as 756 tonnes CO_2e/GWh[9]	• Non-renewable energy source • Large water requirement • High emission and generation of fly ash • When burned, coal releases lots of greenhouse gases • Mining of coal causes impacts on land and surrounding environment.
Oil & Gas	• Oil and natural gas are found in lots of places around the world. • Oil and gas can be easily transported by pipes or ships. • Natural gas is the "cleanest" of the fossil fuels • GHG emission as low as 547 and 362 tonnes CO_2e/GWh for oil & gas	• Non-renewable energy source • Working environment risks to staff and environment • Burning oil and gas releases can cause pollution & health impacts
Nuclear	• Nuclear fuel does not create greenhouse gases when making energy. • Only a very small amount of nuclear fuel is needed to make a lot of energy. • Does not produce significant atmospheric pollutants. • GHG emission as low as 2 tonnes CO_2e/GWh	• Expensive, especially in capital costs, maintenance costs • The waste produced from nuclear energy is radioactive and Safe long-term disposal of nuclear waste can be difficult.
Solar	• Energy from the sun is free. • Solar energy does not create greenhouse gases.	• Solar power stations are expensive to build at the moment. • Only certain places are right for solar power.

[9] WNA Report - Comparison of Lifecycle Greenhouse Gas Emissions of Various Electricity Generation Sources

Source of Energy	Advantages	Disadvantages
	• GHG emission as low as 13 tonnes CO_2e/GWh	• Solar energy cannot be made at night
Wind	• Wind power does not create greenhouse gases. • The energy used to build one of the large turbines is repaid in 3-6 months. They last for 25 years. • GHG emission as low as 6 tonnes CO_2e/GWh	• Need a lot of turbines to make electricity. • Wind turbines can only be used where it is windy. On days where there is little wind, less energy will be made.
Hydroelectric	• Hydroelectricity creates no greenhouse gases. • Energy from water is free and will not run out. • Hydroelectric energy is more reliable than wind or solar power. • GHG emission as low as 2 tonnes CO_2e/GWh	• Hydroelectric power needs enough water to turn the turbines. • Dams are expensive to build. • Building large dams can cause damage to water courses which affects people and wildlife and it can be difficult to find the right site. • Small dams for local buildings on weirs do not have these problems.
Biomas	• Biomass fuel is cheap and could use rubbish that we might otherwise throw away. • Biomass fuels will not run out. • Biomass crops that are grown absorb the same amount of pollution whilst they are growing as they release when they are burned, so do not create extra greenhouse gases in the atmosphere. • GHG emission as low as 10 tonnes CO_2e/GWh	• Growing biomass crops needs a lot of space and could replace growing valuable food crops. • Biomass fuels that are not grown (such as waste products) create greenhouse gases when burned.

After going through all the alternative options of energy generation viz non-renewable sources it is obvious that going with the project is the best option than having no project option. The power generation with solar energy is a clean power with no emissions and feasible for the proposed project area keeping in mind the good solar insolation that Karnataka receives throughout the year.

7. Anticipated Environment & Social Impacts & Mitigation Measures

7.1. INTRODUCTION

The proposed project may have impact on the environment during construction & operation phases. During the construction phase, the impacts may be regarded as temporary or short-term; while long term impacts may be observed during the operation stage. Spatially the impacts have been assessed over the study area of 5 km radius of the project site. The project has overall positive impacts by providing a competitive, cost-effective, pollution free reliable mode of Solar PV power. It will certainly meet the ever increasing Demand of Power and to bridge the Gap between Demand and Supply of Power.

7.2. APPROACH & METHODOLOGY

The social and environmental impact assessment process has taken into consideration the risks and impacts of the proposed solar power project on the social and physical environment. To study the environmental and social impact, study area of 2 km radius has been defined based on the extent of influence of project activities. Primary impacts are assessed for a radius of 2 km around the project site and secondary impacts are assessed beyond this radius for the proposed project. Also, 100 m RoW along the transmission line route is also considered for impact assessment.

- Project Site and 5 km surrounding of project site
- 100 m ROW along the transmission line route

The study team adopted following methodologies to identify and understand the possible environmental and social impact of the proposed project:-

- Detailed discussion with project team to understand project schedule, technical features, and plans/procedures in construction and operation phase;
- Desk study of the environmental sensitivities & socio-environmental profile of the project area;
- Site / facility visits to assess the impacts on the environment
- Consultation with community, gram panchayats and other government officials to collect and verify the information on environmental and social sensitivities.
- Field environmental monitoring to establish the baseline environment quality in the locality of the project area.

7.3. POTENTIAL IMPACT GENERATION ACTIVITIES

Potential impacts have been identified by analysing activities associated with construction, operation and decommissioning with respect to their potential interaction with physical, socioeconomic, ecology and health and safety aspect as given in Table 7-1.

TABLE 7-1 IMPACT ASPECT MATRIX FOR THE PROPOSED PROJECT

SCHEDULED PROJECT ACTIVITY														
Project Phase	**Activity**	**Physical**					**Socio Economic**					**Ecology**		**OHS**
		Topography	Air Quality	Noise Impact	Ground Water	Soil	Community Health and Safety	Employment	Traffic and safety	Infrastructure	Cultural Heritage	Vegetation	Wildlife	
Construction Phase	Site clearance	●	●			●						●	●	
	Hauling of earth materials within site		●	●		●	●		●					
	Storage of construction material					●	●							
	Movement of heavy vehicles carrying construction material		●	●			●		●					●
	Access road creation	●	●				●			●		●		

SCHEDULED PROJECT ACTIVITY														
Project Phase	**Activity**	**Physical**					**Socio Economic**					**Ecology**		**OHS**
		Topography	Air Quality	Noise Impact	Ground Water	Soil	Community Health and Safety	Employment	Traffic and safety	Infrastructure	Cultural Heritage	Vegetation	Wildlife	
	Setting up of labour camp				●			●						
	Storage of waste from labour camp					●	●							
	Waste generation from site					●	●							
	Hazardous waste generation and storage onsite					●	●							●
	Waste water generation from site and labour camp				●		●							●
Operation Phase	Movement of Site vehicles for plant inspection		●	●					●					
	Storage of hazardous									●				

SCHEDULED PROJECT ACTIVITY														
Project Phase	**Activity**	**Physical**					**Socio Economic**					**Ecology**		**OHS**
		Topography	Air Quality	Noise Impact	Ground Water	Soil	Community Health and Safety	Employment	Traffic and safety	Infrastructure	Cultural Heritage	Vegetation	Wildlife	
	material onsite													
	Disposal of hazardous material						●							
	Waste disposal						●							
Decommissioning	Dismantling and Demolishing of structures	●				●								●
	Excavation and Backfilling	●												
All Phases of Project														
	UNNATURAL OCCURENCE													
	Floods	●			●	●	●	●		●	●	●	●	●
	Earth quake	●	●	●			●	●	●	●	●	●	●	●
	Storm	●	●	●		●	●	●	●	●	●	●	●	●
	Fire		●	●			●	●	●	●	●	●	●	●

Screening Criteria for Environmental and Social Impact Assessment

(A) Distribution of impact: based on the extent of impact's influence, distribution is classified into ***Low, Medium and High***.

- *Low distribution* represents influence of impact within the footprint of the project i.e. within the project site boundary and ROW of Transmission line
- *Medium distribution* represents spread of impact within 2 km from the boundary of the project site.
- *High distribution* represents influence of impact between 2 km – 5km from the project site boundary

(B) Duration of Impact: classification of impact duration is based on the timeframe within which effect of impact persist. It is categorized into three category viz., ***Short, Medium and Long***

- *Short Duration:* effect of impact is limited for duration of less than 1 year.
- *Medium Duration:* effect of impact may extends up to 2 years
- *Long Duration:* effect of impact extends beyond 2 years

(C) Intensity: This refers to the severity of impact. Intensity of impact depends on the degree (low, medium, high) to which the activity may adversely affect health of the environment, health of the affected community or to the health of the natural ecosystem and biodiversity of the project area. To determine significance, the severity of the impact must be examined in terms of the type, quality and sensitivity of the resource involved; the location of the proposed project; the duration of the effect (short- or long-term) and other consideration of context. Significance of the impact will vary with the setting of the proposed action and the surrounding area (including residential, industrial, commercial, and natural sites).

Significance Evaluation Matrix

Significance evaluation matrix as shown in **Table 7-2** has been used to evaluate the significance of identified potential environmental impacts. This matrix includes criteria as discussed above to analyze the significance of impact. As the proposed project is solar power project and considered in clean category with no release of pollutant, major significant environmental impacts are not anticipated. However, considering the involvement of community during land purchase and project execution, social issues and impact in the proposed solar power project are also anticipated and shall be managed through the mitigation measures as recommended in this report. Social impacts in the proposed project have also been evaluated based on the criteria of impact intensity to affect the people, duration of impact and acceptance level of community. A criterion of acceptance level is subjective and may vary from person to person due to its dependency on human behaviour.

TABLE 7-2 IMPACT SIGNIFICANCE MATRIX

Distribution	Duration	Intensity	Significance
Low	Short	Low	**MINOR**
Low	Short	Medium	
Low	Medium	Low	
Local	Medium	Medium	
Medium	Short	Low	
Local	Long	Low	
Local	Short	High	**MODERATE**
Local	Medium	High	
Local	Long	Medium	
Medium	Short	Medium	
Medium	Medium	Low	
Medium	Medium	Medium	
Medium	Long	Low	
Medium	Long	Medium	
High	Short	Low	
High	Short	Medium	
High	Medium	Low	
High	Medium	Medium	
High	Long	Low	
Low	Long	High	**MAJOR**
Medium	Short	High	

Distribution	Duration	Intensity	Significance
Medium	Long	High	
High	Short	High	
High	Medium	High	
High	Long	Medium	
High	Short	Low	
High	Short	High	

7.4. SOCIAL IMPACTS IDENTIFICATION

Key Social Impact

To assess and understand the social impacts associated with the project, social indicators have been identified and analysed. Analysis of these indicators also indicates the nature of impact as discussed in **Table 7-3.** Because of clean category projects and absence of pollutant emission from the proposed project, limited social impacts are anticipated and can be controlled through mitigation measures as suggested in the following section.

TABLE 7-3 SOCIAL IMPACTS INDICATORS AND ANALYSIS

S No	Project Activities	Indicators	Social Impact	Nature of Impact	IFC PS	Applicability
(A)	**Pre-Construction Phase**					
1	Land Procurement	Physical and economic displacement	Involuntary Resettlement	No Impact	PS-5: Land Acquisition and Involuntary Resettlement	Not Applicable
(B)	**Construction Phase**					

S No	Project Activities	Indicators	Social Impact	Nature of Impact	IFC PS	Applicability
2	Engagement of local and migrant labour	• Abolition of child and forced or compulsory labour • Gender Equity and non-discrimination in employment and opportunity • Freedom of association and right to collective bargaining	Conflicts between labour and contractor	High	PS-2: Labour working condition	Applicable
3	Labour Accommodation (Onsite and offsite Labour camp)	• Non availability of kitchen, crèches, rest room, drinking water and adequate sanitation facility • Interaction with local community	Conflicts between labour and local community	High	PS-2: Labour working condition	Applicable
4	Access to Common Property Resources	Restriction on free movement or approach to common property resources	Conflict between project developer and community	Medium	PS-7: Indigenous Community	Not Applicable

S No	Project Activities	Indicators	Social Impact	Nature of Impact	IFC PS	Applicability
5	Dislocation or damage of physical cultural resources	Existence of ASI declared cultural resources Existence of physical resources with historical, religious, aesthetics, paleontological and any other cultural significance	Community protest	No impact	PS-8 Cultural Heritage	Not Applicable

Socioeconomic Impact and Mitigation Measures

In this section, social impacts associated with various project activities have been analysed through the identified social indicators. On the basis of analysis findings, mitigation measures are identified and recommended for implementation.

(a) Land Procurement

The social impact associated with the land procurement and land acquisition is involuntary resettlement. Generally, land acquisition causes physical and economic displacement which in turn results in involuntary resettlement. In the proposed solar power project, land has been acquired on willing to sell and willing to buy basis and does not involve involuntary acquisition of land. Land team of Azure has identified land parcels to setup the proposed project and approached the land owners through a land aggregator for partly procurement of land and rest of the land has been purchased directly. After negotiation, identified land parcels were sold for the proposed project by land owners on a negotiated and mutually agreed price. The negotiated price was higher than the circle rate and market rate. The land parcels identified for the proposed project were agricultural land which is unirrigated land. Selling of such land may induce economic displacement to the land owners. However, compensation in terms of agreed price nullified the impact. Type and amount of compensation were mutually agreed and it was

also verified with the land owners during stakeholder consultation. Consultation with the land owners also revealed that agricultural is one of the source of livelihood in the area and people who accepted monetary compensation will also use compensation money to buy more fertile land parcels in some other places to continue with the agricultural practices. Other sources of income include cattle rearing, working as labourers in nearby towns and dairy. Considering the following factors adverse socioeconomic impact on land owners and cultivators due to land selling is anticipated to be minor. Till now Azure has purchased 184 acres of land out of which 181 acres is agriculture land and 3 acres is kharab land.

- Absence of involuntary land acquisition due to willing to sell and willing to buy basis of land procurement
- Adequate monetary and land compensation provided by the developer to the land owners nullified the adverse effect of economic displacement
- During public consultation it was also verified that these land parcels were not being used as common property resources.

(b) Engagement of Local and Migrant Labour

The social impact associated with the engagement of local and migrant labour in the proposed project is conflict between labour and contractor or developer which in turn may result in suspension of project and reputational risk on project developer. Indicators as discussed in **Table 7.3** and discussed here have been used to assess the social impact. Considering the project in designing phase and construction phase yet to be started, indicators have been discussed to provide sense of what should not be done with respect to labour engagement. The issues discussed here in the form of indicators IFC PS 2 and Indian Labour Act.

Indicators in Labour Engagement:

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

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

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

Impact Significance:

Considering the sensitiveness associated with the engagement of child, forced labour & not maintaining gender equity, the impact considered will be of major significance. Azure has laid down policies through which it demonstrates compliance to all of the above factors. Its contractors should be made aware of all its policies for labour requirements and incorporated in their contracts prior to the starting of the project. Azure need to monitor the implementation of the policies on regular basis.

Mitigation Measures:

- Azure should include clause or provisions related with non-engagement of forced and child labour, gender equity, non-discrimination on employment in contractors agreement and HR policy.
- Azure through its contractors should inform the labour about the grievance redressal mechanism by which they can inform about any grievances
- Grievances related with non fulfilment of labour welfare measures shall be monitored by the contractor employed by Azure.
- It will be the responsibility of principal employer to get it ensure through its contractors. Azure is not going to employ labours directly for the project activity.
- Azure needs to ensure that labour is being adequately paid by contractors. The contractor should ensure that wages is being paid as per the requirement of minimum wages act.
- Azure needs to ensure the compliance of labour law and availability of facilities mentioned their by reviewing muster roll, wages register, attendance register through its contractors.
- Azure shall conduct internal audits to monitor the performance of contractor.
- Azure through its contractor should ensure that labour receives training on health and safety issues during the construction and operation of the project.

Labour Accommodation

The social impact associated with the labour accommodation or setting up labour camp (offsite or onsite) is anticipated in the form of conflict between labours and contractors /community. Indicators as mentioned in **Table 7.3** and described below indicate the reasons which can cause conflicts of labour with contractors and community.

Absence of basic amenities or facilities

Absence of basic amenities such as kitchen, good quality drinking water, clean and inadequate sanitation facilities, rest room and crèches for children may cause dissatisfaction between labours which in turn result in conflict with contractors.

Interaction with Local Community

Migration of considerable number of labour due to proposed project and interaction with local community may cause conflict with community due to different cultural behaviour and sharing of local resources. Local resources which are presently being used by the community people are expected to be shared by migrated labour and it may cause strain on community. Interaction of migrant labour with community people in different cultural behaviour may also cause conflict with indigenous people. However, considering the migration of labour to be limited till construction phases only, this impact is of manageable nature and can be reduced to the acceptance level of community after incorporation of recommended mitigation measures.

Mitigation Measures:

- If possible setup onsite labour camp to restrict the interaction of migrated labour with local community that may lead to direct conflict.
- Ensure availability of all the basic amenities such as kitchen, drinking water , crèches, rest room and adequate toilets

Access to Common Property Resources

Another issue which may cause social impact on indigenous people in terms of conflict between project developer and local community is restriction on community to access the common property resources. However, absence of any common property resources on and near the project site makes this impact not applicable in the proposed project.

(c) Dislocation of Physical Cultural Resources

The social impact associated with the dislocation and damage of physical cultural resources is community protest or oppose of project by community which in turn have reputational risk and project may be obstructed.

During the baseline study, any physical structure declared by Archaeological Survey of India (ASI) was not found in and around the project site. Further, any physical structure with historical, religious and aesthetic significance was also not found in and around the project site. Considering the absence of resources with cultural significance, disturbance to physical cultural resources and impact associated with it is not anticipated. After adopting the suggested mitigation the residual impact will be insignificant.

7.5. ENVIRONMENTAL IMPACTS IDENTIFICATION

Potential Impact Generation Activities

The construction and operation phase of the proposed project comprises various activities each of which may have an impact on environmental parameters. The impacts of the project are envisaged during the design and planning, during pre-construction phase, construction phase.

During the construction phase, the following activities may have impacts on environment:

- Site Preparation
- Minor excavation and levelling
- Hauling of earth materials and wastes
- Cutting and drilling
- Erection of concrete and steel structure
- Road construction
- Painting and finishing
- Clean up operations
- Landscaping and afforestation

The activities can be divided into two categories, viz. sub-structural and super-structural work. Moreover, construction work will involve cutting of trenches, excavation, concreting etc. All these activities attribute to dust pollution. The super-structural work will involve steel work, concrete work, masonry work etc. and will involve operation of large construction equipment like cranes, concrete mixers, hoists, welding sets etc. There may be emission of dust and gases as well as noise pollution from these activities. Mechanical erection work involves extensive use of mechanical equipment for storage, transportation, erection and on-site fabrication work. These activities may generate some air contaminants and noise pollution. The electrical activities are less polluting in general.

The environmental impacts associated with the project activities have been identified and analysed to evaluate their significance. Because of clean category projects, environmental impacts are very few with minor significance and can be controlled through mitigation measures as suggested in the following section. Significance of environmental impact has been analysed and presented in **Table 7-4.**

Impact Analysis and Mitigation Measures

IMPACT ON AIR ENVIRONMENT

(A) Fugitive Dust Emission

The impact on ambient air quality is anticipated due to the various project activities. As found during the environmental monitoring, concentration of particulate matter is high but within the

limit of standards prescribed by CPCB for ambient air. Analysis of project activities, significance of associated impact on ambient air quality and mitigation measures are described below:

Construction Phase:

Activities such as operation of DG sets, movement of project vehicles and other construction activities are expected to cause impact on ambient air quality in the form of emission of NOx, SOx and fugitive dust. However, most of these project activities are expected to be restricted within the project boundary. Impact associated with these activities such as increased concentration of SOx, NOx and particulate matter particularly is assessed as moderate significant because of medium distribution, short duration, temporary and reversible in nature and moderate intensity of impact. Also, movement of project vehicles on unpaved area within the project site and on access road is anticipated to cause fugitive dust emission and may extend to surrounding of project site therefore distribution of impact is assessed as medium. There are no settlements in the immediate direct vicinity of the proposed project site and the nearest receptor is about 3kms away from the site. The intensity of impact is moderate.

Following mitigation measures are recommended to control the moderate significance impact on air quality during construction phase:

Mitigation Measures:

- Vehicles speed to be restricted to 20-30 km/hr on unpaved road. This will reduce dust emission
- Raw material should be covered with tarpaulin sheet where ever required during transportation and in storage area
- Practices water sprinkling wherever required on unpaved area but ensure use of tanker water purchased form suitable vendor only
- All the project vehicles shall have valid PUC certificate
- Ensure regularly maintenance of project vehicles during construction and operational phase
- Turn off the machineries which are not in use
- Labour camps should be placed far away from the project activity area.

Construction of transmission lines (about 16 kms) will result in generation of fugitive dust emissions. The transmission line will include a ROW of about 5-10 meters on both sides and may involve clearing of ground vegetation. Use of machineries and movement of vehicles will generate dust for a short period at a single point as laying of transmission line will be completed within a week. The transmission line is passing through land parcels far away from settlement area. Hence impact on air environment is anticipated to be minor.

Operational Phase:

During operational phase, source of emission is absent except operation of 2-3 project vehicles for commuting purpose. Considering the absence of multiple emission sources, impact on ambient air quality is not anticipated during operational phase. The intensity of anticipated impact is minor.

IMPACT ON LAND

(B) Top Soil Loss and Soil Contamination

The environmental impact anticipated in the proposed project is top soil loss and soil contamination. These impacts are associated with the project activities such as piling of module mounting structure and storage of diesel, spent oil, generation of used oil from running of DG sets during construction period. Analysis of project activities, associated impacts, their significance in construction and operational phases and mitigation measures are described below:

Construction Phase:

(a) **Top soil loss**:

The project has been proposed on agricultural land where top soil is of medium quality and fertile in nature. Excavation on project site for piling of module mounting structure and site levelling are planned as important project activity. As a result of these activities, loose top soil will be generated. The impact anticipated here is loss of top soil because of inappropriate storage. However, these activities and associated impacts are limited to be within the project boundary and during construction phase only. The intensity of the impact can be considered as low because topography in the area is almost flat with very low requirement of levelling. Considering the local distribution, short duration of construction phase and low intensity, significance of impact is evaluated as minor and can be controlled with the recommended mitigation measures:

Mitigation Measures:

- Provide appropriate storage of top soil in an isolated and covered area to prevent its loss in high wind and runoff.
- Allow only covered transportation of top soil within the project site.
- Use top soil at the time of plantation and it can be given to nearby agricultural field after taking consent with the landowners/farmers.

(b) **Soil Contamination**:

Soil contamination may result due to accidental spillage and inappropriate storage of diesel, used oil or transformer oil during construction phase.Improper disposal of hazardous waste like used though generation would be minimal can lead to contamination of soil at the spillage location. However, distribution of impact within the project boundary, short duration of construction phase and low requirement of these

chemicals in the solar power project makes impact of minor significance. These impacts can be controlled by implementation of recommended mitigation measures.

Mitigation Measures:

- Store hazardous material like diesel, used oil and transformer oil in isolated room and on impervious surface to prevent seepage into project site soil
- Filling and transfer of oil to and from the container shall be on impervious surface

Operational Phase:

During operational phase, project activities such as excavation and usage of chemicals such as diesel and spent oil will be absent therefore impact associated with these activities such as top soil loss and soil contamination are not anticipated in operational phase of the project. However, storage of broken solar module on soil is expected to cause soil contamination because of usage of hazardous material in solar module. Storage of broken solar module on impervious surface in an isolated area and its proper disposal through authorized vendor/recycler/manufacturer is recommended. The impact intensity will be minor/insignificant with the application of suggested mitigation measures.

IMPACT ON NOISE

(C) Ambient Noise Level

The environmental impact anticipated in the proposed project is the increment in ambient noise level due to various project activities. The section given below describes the source of noise, presence of receptors and analysis of impact significance. Mitigation measures have also been recommended here.

Construction Phase:

The major noise generating sources in the proposed project are operation of vehicular traffic, and construction equipment like dozer, scrapers, concrete mixers, generators, pumps, compressors, rock drills, pneumatic tools, vibrators etc. The operation of these equipment is expected to generate noise in a range of 75 – 90 dB (A). During the environmental monitoring, ambient noise level was found within the noise limit prescribed by CPCB for residential land use therefore impact of increased noise level on nearby settlements of project site is anticipated.

However, operation of these equipment only in construction phase makes impact as short duration. Further, large project site and mobile source of noise such as project vehicles and equipment will alter the distance between noise source and receptor (stationary here). Alteration of this distance will also cause variation in noise level and impact on receptors. Since extent of increased noise level is linked with distribution of impact therefore distance was estimated through equation (1) on which noise level will be attenuated to the ambient noise level.

$$L_p = L_w - 10 \log_{10} (2\pi R^2) - \alpha R \quad \text{--------} \quad \textit{(Equation -1)}$$

Here, Lp = sound pressure level (dB) at a distance of R from a noise source radiating at a power level,

Lw= sound pressure level (dB) at source

R = distance of receptor from source

α = frequency dependent sound absorption coefficient.

The above given equation can be used with either broadband sound power levels or a broadband estimate of the sound absorption coefficient (α = 0.005dB (A)/meter).

Using the above given equation, it is estimated that at a distance of 50 m from the source of sound power level 90 dB(A) the estimated sound intensity level would be 47 dB(A) which is equal to the ambient noise level in the project region. The estimated distance of 50 m indicates that distribution of impact will be local i.e. limited within the project boundary only, provided if source is located more than 50 m from the nearby settlements. Further, if source is located at a distance more than 50 m then baseline value of ambient noise will not get altered. The settlements are located at least 3 kms from the proposed project boundary. Considering the short duration, localized distribution and low intensity, impact has been assessed as minor significance. However, at ground situation may vary in terms of location of source and operation of many equipment and machineries at a time simultaneously therefore mitigation measures are recommended to reduce the increased noise level and the impact will be reduced to minor impact.

Mitigation measures

- The contractor employed for Azure should ensure that stationary source of noise such as DG sets are placed at farthest point from labour camp
- Restrict major noise generating activities during night time 10:00 pm to 6:00 am
- Provide personal protective equipment to workers wherever noise is generated due to machinery operation.
- Regular maintenance of project vehicles should be ensured by the contractors.

Operational Phase:

Any significant noise generating activity during operation of solar power plant is absent therefore impact in terms of increment in ambient noise level is not anticipated in operational phase of the project. No impact is anticipated.

IMPACT ON WATER ENVIRONMENT

(D) Alteration of Natural Drainage Pattern

Although, topography of the project site is almost flat land but minor levelling or filling is expected to cause change environmental impact in terms of natural drainage pattern due to alteration in contour level. Detail analysis of cause of environmental impact and its significance is presented below with the recommendation of mitigation measures to control the impact.

Construction Phase:

Project site is having flat topography and because of this major requirement of site levelling and back filling does not exist. As a result of this major changes in contour level and natural drainage pattern is not anticipated in the proposed project. Further, absence of any drainage (natural and artificial) within and around the project site also reduces sensitivity with respect to alteration in drainage pattern. However, it shall also be ensure that levelling of project site will not cause accumulation of surface runoff in adjacent agricultural fields. Considering the local distribution of impact (within the project boundary), short duration of activities and flat topography of site, significance of impact is assessed as minor.

Mitigation Measures:

- Design of contour level with minimum alteration to be considered for the project site.
- Provide alternatives to collect surface runoff from the project site during the monsoon period like building of check dams keeping the slope of the site in mind.
- Don't allow exit of runoff from the project site in the adjacent agricultural field.
- Storm water drain to be proposed for the proposed site for prevention of runoff from the site and ground water recharge.

Operational Phase:

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

(E) Ground Water Depletion

Water consumption is an important aspect of solar power project. Both the phase of solar power project i.e. construction and operation phase, requires water for various project activities. Fulfilment of this water requirement through ground water may have impact in terms of ground water depletion. However, severity of impact depends on the ground water potential. Analysis of water requirements, impact associated with the usage of ground water and significance of the impact is described below:

Construction Phase:

As per Central Ground Water Board Report 2007, ground water in the two blocks (Hiriyur & Challekera) is partly over exploited and partly categorized as semi critical zone. Our project site is designated as semi critical zone for ground water extraction by CGWB. Ground water is

found at a depth of 5-10 m bgl. In the construction phase, total water requirement for construction activities and requirements of labours on site and labour camp is estimated about 59 KLD. Considering the duration of construction period of 3 months, maximum water of 5310 KL will be required through entire construction period. The impact anticipated is moderate and if suggested mitigation measures are applied the impact will be reduced to minor.

Mitigation Measures:

- Alternative option like sourcing of ground water from surface water bodies like Bellagere Lake or Senekare Lake is recommended instead of extracting ground water from village bore wells via tankers. Even, if ground water is required, the same should be sourced from the authorised tanker water supplier, who are falling beyond the region of over exploited zones.
- Maximum recycling of water should be adopted during the construction phase.

Operational Phase:

Typically, ground water consumption during operation of solar power plant is high because of module cleaning requirement throughout the project life cycle. In operational phase, no water will be required for module washing purpose. Considering total 100 security guards and 8 technicians per site for 24 hours shift during operation phase the water requirement estimated for manpower is 5.5 KLD. The impact anticipated on ground water is anticipated to be minor/insignificant during operation phase.

Mitigation Measures:

- Ensure optimal usage of water viz., storage and reuse of wash water after module washing and plantation of low water requirement species
- Construct rain water harvesting tank on the project site to promote recharge of ground water in the area.

IMPACT ON HEALTH & SAFETY

7.6. OCCUPATIONAL HEALTH & SAFETY IMPACT

Occupational Health and safety hazard associated with project activities (during construction and operational phase) in solar power plant are identified as follows:

- Electrocution
- Firing due to short-circuit
- Accidents during cutting, chipping and piling
- Diseases due to unhygienic condition

Measures are suggested below to mitigate the impact:

- Provide and ensure wearing of personal protective equipment viz., gloves, helmets, ear plug, safety belt etc.

- Ensure effective work permit system for critical activities viz., electrical work, civil work etc.
- Prepare emergency communication system and emergency preparedness plan
- Ensure proper sanitation facilities for all workers

Community health & safety

Construction Phase

Health and safety risk to the community is associated with the movement of considerable project vehicles including heavy vehicles during construction phase of the project. Proposed project will engage vehicles including heavy vehicles viz., truck, JCB, Site compactor, Hydra etc. on project site and access road. Village settlements near the project site is more than 2 kms away but the project vehicles will use the Hiriyur Bellary road for transportation of materials and manpower which is having high frequency traffic. The road would be crossed diagonally to enter the project site which would create high risk zone and proper management of traffic would be required for avoiding any accidents. Following measures are recommended to mitigate the impact:

- Identify route for movement of project vehicles which should not include any narrow village roads
- Diversion of traffic near the entry gate should be managed by dedicated personnel all day and night to guide the movement of project vehicles.
- Depute traffic escorts within the project site and proper marking and signages should be in place for smooth operation of the traffic and avoid any accidents within the project site
- Provide necessary training to the drivers for speed restrictions and on do's and don'ts during construction phase

Operational Phase

In operational phase very few (2-3 nos.) of vehicles will be required for commuting from home to site office therefore impact associated with movement of project vehicles is not anticipated. However, risk of electrocution is anticipated in the operational phase of the project and shall be mitigated through boundary wall, barricading and restricted entry in project site. The anticipated impact is minor.

7.7. CUMULATIVE IMPACT

There are other two solar power projects located about 10 km from the proposed project site. Considering the availability of land and good solar intensity, establishment of some other solar power project in near future cannot be ruled out. Also, there are many wind farms present in Chitradurga about 45 kms away from the proposed project site. As the proposed solar power project do not involve forceful acquisition of land and the settlements are located far away

(approx. 2-3 kms) as such no resettlement issues are there. Also, the other solar power projects are located about 10 kms from the proposed project site as such visual impacts are not anticipated in the area and no obstruction to common property resources are anticipated.

7.8. IMPACTS DURING DECOMMISSIONING PHASE

Dismantling operation, however will have impact on environment due to noise and dust arising out of it. During de-installation, a specific strategy shall be adopted in order to handle the each type of item to keep the impacts bare minimum during the actual activity. The decommissioning will also have social impact. The decommissioning of the power house, which was a part of the local social fabric for many years will certainly create vacuum in the lives of the people directly and indirectly connected with it. The impact due to decommissioning on power, social and environmental scenario will be guided by applicable laws and guidelines. These will be addressed appropriately.

TABLE 7-4 SIGNIFICANCE EVALUATION OF IDENTIFIED ENVIRONMENTAL IMPACTS

S.No.	Project Activities	Environmental Impacts	Applicable IFC PS	DISTRIBUTION	DURATION	INTENSITY	SIGNIFICANCE OF IMAPCT
(A)		**Construction Phase**					
1	Hauling of earth materials and wastes	Fugitive Dust emission	PS -3: Resource efficiency and Pollution Prevention	**Low**	**Short**	**Moderate**	**Minor**
2	a) Excavation on project site for piling of module mounting structure b) Onsite storage of hazardous material viz., transformer oil, diesel, spent oil etc.	a) Top soil loss b) Soil c) contamination	PS -3: Resource efficiency and Pollution Prevention	**Low**	**Short**	**Low**	**Minor**

S.No.	Project Activities	Environmental Impacts	Applicable IFC PS	DISTRIBUTION	DURATION	INTENSITY	SIGNIFICANCE OF IMAPCT
3	Cutting, drilling and access road construction	Increment in ambient noise	PS -3: Resource efficiency and Pollution Prevention	**Low**	**Short**	**Low**	**Minor**
4	Site levelling and filling	Alteration of natural drainage pattern	PS -3: Resource efficiency and Pollution Prevention	**Low**	**Short**	**Low**	**Minor**
5	Ground Water extraction for construction phase requirement (water is sourced via local tankers engaged by contractors	Ground water depletion	PS -3: Resource efficiency and Pollution Prevention	**Moderate**	**Short**	**High**	**Moderate**

S.No.	Project Activities	Environmental Impacts	Applicable IFC PS	DISTRIBUTION	DURATION	INTENSITY	SIGNIFICANCE OF IMAPCT
	through village bore wells)						
(B)		**Operational Phase**					
6	Ground Water extraction for domestic purposes	Ground water depletion	PS -3: Resource efficiency and Pollution Prevention	**Low**	**Long**	**Low**	**Minor**
7	Fugitive emissions due to movement of project vehicles	Air quality depletion	PS -3: Resource efficiency and Pollution Prevention	**Low**	**Long**	**Low**	**Minor**
8	Changes in the drainage pattern of site	Surface run off and deterioration of water quality	PS -3: Resource efficiency	**Low**	**Long**	**Low**	**Minor**

S.No.	Project Activities	Environmental Impacts	Applicable IFC PS	DISTRIBUTION	DURATION	INTENSITY	SIGNIFICANCE OF IMAPCT
			and Pollution Prevention				
9	Disposal of hazardous wastes (broken solar panels, used oil and transformer oil)	Surface run off and deterioration of water quality	PS -3: Resource efficiency and Pollution Prevention	**Low**	**Long**	**Low**	**Minor**

7.9. ENVIRONMENTAL & SOCIAL MANAGEMENT PLAN

Outcomes of the Social and Environmental Impact Assessment of the proposed project is used to formulate specific Management and Monitoring Plans for the project, presented in **Table 7-5, 7-6** and discussed in subsequent section. The Plan specifies measures for addressing the limited negative risks and impacts and for enhancing the beneficial impacts. In addition, organizational capacity and training requirements, required to check and ensure effectiveness of the plan throughout the lifecycle of the project, have also been discussed. Azure has its own Social, Health, Environment and Safety Policy in Place. Also Azure's Environment, Health and Safety Manual with define procedures should be implemented during both construction and operation phases of the project. The various section of the manual which covers the following:

- Applicable EHS's laws and regulations
- Social and Environment Systems
- Environment and Social Impacts and Mitigation Monitoring Plan
- SHES and Activities
- Accident Reporting and Investigation Procedure
- Implementation of Management Plan
- Training and Awareness

The Social, Health, Environment and Safety Policy is attached as ***Annexure XXI.***

7.10. ORGANISATIONAL STRUCTURE AND RESPONSIBILITIES

The organizational structure for the project designates the Project site head as an In Charge of the project supported by senior engineer, staff site engineer and super visors. In addition to the implementation of technical component of the project this team will be responsible for the implementation and supervision of Social and Environment Management and Monitoring Plans. The responsibilities of the incumbent can be as follows:

- Implementation of Social and Environmental Management Plan
- Conducting and coordinating meetings as required with local communities
- Conducting and facilitating EHS awareness and management trainings to the project and operations teams.
- The organization structure for managing EHS on site during the construction and operation phase of the project is presented in Chapter 3 of this report.

TABLE 7-5: ENVIRONMENT AND SOCIAL MANAGEMENT PLAN

(CONSTRUCTION PHASE)

Sl. No.	Aspect	Impact	Mitigation	Timeframe for inspection	Responsibility
A	**Environmental Management Plan**				
1	**Air Quality**	Fugitive Dust due to movement of project vehicles Emission from Diesel Generators	• Vehicles speed to be restricted to 20-30 km/hr on unpaved road. This will reduce dust emission • Raw material should be covered with tarpaulin sheet during transportation and in storage area • Practices water sprinkling wherever required on unpaved area. • All the project vehicles shall have valid PUC certificate • Ensure regularly maintenance of project vehicles during	Weekly	EPC contractor and sub-contractors under the supervision of Azure's Personnel

Sl. No.	Aspect	Impact	Mitigation	Timeframe for inspection	Responsibility
			construction and operational phase • Turn off the DG sets & machineries, which are not in use • DG sets preferably should be placed away from settlement area.		
2	**Soil**	Top Soil Loss	• Provide appropriate storage of top soil in an isolated and covered area to prevent its loss in high wind and runoff. • Allow only covered transportation of top soil • Use top soil at the time of plantation and it can be given to nearby agricultural field after taking consent with the landowners/farmers	Once a month	EPC contractor and sub-contractors under the supervision of Azure personnel

Sl. No.	Aspect	Impact	Mitigation	Timeframe for inspection	Responsibility
		Soil Contamination	• Store hazardous material (like used oil) in isolated room with impervious surface. • Filling and transfer of oil to and from the container shall be on impervious surface.	Once a month	EPC contractor and sub-contractors under the supervision of Azure personnel
3	**Noise**	Disturbance to workers and general public	• Keep stationary source of noise such as DG sets (during construction phase) at farthest point from the labour camp • Restrict major noise generating activities during night time 10:00 pm to 6:00 a.m • Provide personal protective equipment to workers working near DG sets and other high noise source	Weekly	EPC contractor and sub-contractors under the supervision of Azure's Personnel

Sl. No.	Aspect	Impact	Mitigation	Timeframe for inspection	Responsibility
4	**Change in local topography**	Alteration in natural drainage pattern	• Don't allow the considerable alteration of contour level • Provide alternatives to collect surface runoff from the project site during the monsoon period through proper storm water drain with recharge pits • Don't allow exit of runoff from the project site in the adjacent agricultural field	Once a month	EPC contractor under the supervision of Azure's Personnel
5	**Ground Water Extraction**	Ground water depletion	• Ensure optimal usage of water viz., storage and reuse of wash water and plantation of low water requirement species • Rain water harvesting can be carried out at site to recharge the ground water table.	Once a month	Azure On site personnel
6	**Health and Safety**	Disposal of wastes	Wastes from labour camp and onsite should be collected in proper dustbins and disposed off regularly.	Weekly	Project Head along with Site HSE

Sl. No.	Aspect	Impact	Mitigation	Timeframe for inspection	Responsibility
7	**Health and Safety**	Hazardous Wastes Disposal	Hazardous wastes should be collected separately and disposed through an authorized vendor.	Monthly	Project Head along with Site HSE
(B) **Social Management Plan**					
6	**Engagement of local and migrant labour**	Conflicts between labour and contractor	• Azure should include clause or provisions related with non-engagement of forced and child labour, gender equity, non-discrimination on employment and opportunity and freedom to express their view in contractors agreement and HR policy • The contractors employed by Azure should inform the labours about the grievance redressal mechanism by which they can inform about any grievances • Grievances related with non-fulfilment of labour welfare	Once every week	EPC contractor and sub-contractors under the supervision of Azure

Sl. No.	Aspect	Impact	Mitigation	Timeframe for inspection	Responsibility
			measures shall be monitored by Azure. • Azure through its contractors should ensure that labour is being adequately paid by contractors. Also ensure that wages is being paid as per the requirement of minimum wages act • Azure shall conduct internal audits as when required to monitor the performance of contractor. • Azure through the contractor inform the labour about emergency preparedness plan and communication system to be followed during emergency situation • Azure through contractor should ensure that labour receive training on health and		

Sl. No.	Aspect	Impact	Mitigation	Timeframe for inspection	Responsibility
			safety issues involved in the proposed project.		
7	**Labour Accommodation (Onsite and offsite Labour camp)**	Conflicts between labour and local community	• Onsite labour camp should be set up for labours employed through contractors to restrict the interaction of migrated labour with local community as to avoid any conflict. • Azure shall ensure availability of all the basic amenities such as kitchen, drinking water , crèches, rest room and adequate toilets in labour camps	Once a month or as when reported	EPC contractor under the supervision of Azure's Personnel
8	**Corporate Social Responsibility**	Community empowerment	• Azure has its own CSR policy under which it will identify the activities for undertaking CSR towards the community.	Continuously	Azure's CSR Team

Sl. No.	Aspect	Impact	Mitigation	Timeframe for inspection	Responsibility
			• Gap assessment done in ESIA should be considered for designing CSR plan.		
9	**Occupational health and safety of workers**	• Electrocution • Firing due to short-circuit • Accidents during cutting, chipping and piling • Diseases due to unhygienic condition	• Provide and ensure wearing of personal protective equipment viz., gloves, helmets, ear plug, safety belt etc. • Ensure effective work permit system for critical activities such as electrical work. • Prepare emergency communication system and emergency preparedness plan • Ensure proper sanitation facilities.	During construction and operation stage	EPC contractor under the supervision of Azure's Personnel
10	**Community health & safety**	• Accidents due to negligence driving	• Provide training to the driver • Implement traffic management plan	During construction stage	EPC contractor under the supervision of Azure's Personnel

Sl. No.	Aspect	Impact	Mitigation	Timeframe for inspection	Responsibility
Cultural Resources					
11	**Cultural resources and heritage**	Impact on destruction of any archaeological reminiscent or any item associated with cultural heritage during the construction activity.	• Stop work immediately. • Chance find procedure to be initiated	As when reported	EPC contractor under the supervision of Azure's Personnel

TABLE 7-6: ENVIRONMENT AND SOCIAL MANAGEMENT PLAN (OPERATION PHASE)

Sl. No.	Aspect	Impact	Mitigation	Timeframe for inspection	Responsibility
A	**Environmental Management Plan (Operation Phase)**				
1.	**Air Quality**	• Fugitive Dust due to movement of project vehicles	• Vehicles speed to be restricted to 20-30 km/hr on unpaved road. This will reduce dust emission • All the project vehicles shall have valid PUC certificate • Ensure regularly maintenance of project vehicles during operational phase	Once a month	Project Head along with Site HSE
2.	**Change in local topography**	• Alteration in natural drainage pattern	• Maintenance of storm water drain with recharge pits • Don't allow exit of runoff from the project site in the adjacent agricultural field	Once before on set of monsoon	Project Head

Sl. No.	Aspect	Impact	Mitigation	Timeframe for inspection	Responsibility
3.	**Community**	Community empowerment	• The implementation of the identified CSR activity by Azure.	Quarterly	Project Head
4.	**Health and Safety**	• Electrocution • Firing due to short-circuit	• Provide and ensure wearing of personal protective equipment viz., gloves, helmets, ear plug, safety belt etc. • Ensure effective work permit system for critical activities such as electrical work. • Prepare emergency communication system and emergency preparedness plan • Ensure proper sanitation facilities.	Monthly	Project Head along with Site HSE

7.11. ENVIRONMENTAL MANAGEMENT ACTION PLANS

The company should designate Head – Plant supported by EHS coordinator, as an In Charge of implementation of Social and Environment Management and Monitoring Plans. Responsibilities of the incumbent can be as follows:

- Implementation of Social and Environmental Management Plan
- Conducting and coordinating meetings as required with local communities
- Conducting and facilitating EHS awareness and management trainings to the project and operations teams

The ESMP is comprised of some site specific management plans viz. Emergency Management Plan, Waste Management Plan, Storm Water Management Plan, Environmental Monitoring Plan, Traffic Management Plan and Social Development Plan for 130 MW Solar PV Power Plant at Chitradurga. The management plans will be executed through Environmental Social Management System.

Emergency Preparedness and Response Plan (EPRP)

Azure need to prepare a site specific Emergency Management Plan for implementation at the project site in the event of an emergency situation so that the loss of life and damage to the properties and natural resources are minimized. This plan will outline a series of emergency actions that will be executed by Azure and its contractors to ensure preparedness and response to emergency situations throughout the life-cycle of the project EPRP.

Grievance Redressal Mechanism

A grievance redressal mechanism (GRM) has been developed to record and resolve grievances of affected communities and employees. This GRM provide understandable and transparent process in culturally appropriate and readily accessible manner to all segments of the affected communities, and at no cost without retribution. This GRM shall serve as one of the component of Azure's Environmental and Social Management System (ESMS) for managing social performance of its projects as well as providing more accountability to its stakeholders. The GRM is based on four guiding principles of the company which include: Transparency, Fairness, Respect, and Accountability.

The disclosure for GRM should be done with the community, employees and various stakeholders. The disclosure will be done through website and other potential opportunity of communication with display of relevant information at the entry gate of the site and other working areas at the site. It can also be done especially to the external stakeholder at the various stages of project screening and impact assessment studies at the project level and to be continued during the operations stage.

Waste Management Plan

Scope

The Waste Management Plan (WMP) will be applicable to the wastes arising during commissioning and operation of the proposed Solar Power Plant of Azure. Major waste streams from the project include non-hazardous solid waste, wash water generated from panel washing and sewage.

Purpose

WMP is intended to serve as a guideline for Azure and the contractor(s) to manage wastes effectively during the project life cycle. The WMP describes how wastes will be managed during the project life cycle and how the project will:

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

Solid Waste Management

Management of Solid Waste during Construction and Operation Phase

The EPC contractor will manage the waste generated during construction phase like construction debris, packing material, paint containers and filters.

The management measures of the aforementioned solid wastes and the hazardous wastes are discussed in details below:

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

Liquid Waste Management

Liquid Waste Management during Operation

The liquid wastes likely to be generated during the operational phase include:

Domestic Waste Water – Domestic Waste Water likely to be generated from toilets/urinals within the proposed plant and associated facilities will be treated in combined septic tank-soak pit system.

Storm Water Management Plan

The Storm Water Management Plan (SWMP) refers to the proper management of surface run-off generated during monsoon from Solar Power Plant area. The purpose of Storm Water Management Plan (SWMP) is to ensure prevention and control of any adverse impact caused by un-regulated storm water runoff from the main plant to the nearby natural drainage channels, surface water bodies, public and private properties. Following measures will be taken as part of the Storm Water Management Plan:

- The peripheral drains will be provided outside the plant boundary during construction phase, which will prevent the silt contaminated surface run-off from site to enter into the adjoining lands.
- No surface run-off from within the solar power plant site will be directly discharged into any *nallah*/water body.
- Rain water collected from the project site will be used to recharge the ground water through onsite rain water harvesting tank/pits.

Occupation Health and Safety Management Plan

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

Construction Phase

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

- The workers will be provided with proper personal protective equipment (PPEs) i.e. safety shoes and goggle, helmet, coverall, gloves, ear plugs etc. during construction related activities to ensure health and safety of workers at workplace.
- Ensure provision and maintenance of drinking water and sanitation facilitation for construction workers in accordance with the provision of Contract Labour Act and Building and Other Construction Workers Act.
- Periodic cleaning of work areas will be undertaken and supervised by the contractors to ensure hygienic conditions on site.
- Workers will stop working in extreme natural climatic conditions i.e. heat wave, heavy rain etc.

- All work places will have adequate fire alarms and firefighting equipment to handle any outbreak of fire in O& M.
- Adequate drinking water will be supplied at workplace for workers onsite and water quality meets drinking water quality standards. Azure needs to ensure it through its contractors.
- Sufficient light and ventilation will be provided for workers working in confined space.
- Periodic health check-up camps for workers onsite will be organized to ensure prevention of occupational health hazards.
- All work areas should have First Aid kits to manage injuries occurring in the area.

Operational Phase

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

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

Road Safety and Traffic Management Plan

Solar power plant will involve vehicular movements across main plant site and access roads, which may lead to impacts on existing road users and sensitive receptors located close to the site and approach road. This Road Safety and Traffic Management Plan identify potential impacts and their appropriate mitigation measures to avoid any unforeseen traffic accident and other disturbance to local communities during construction and operation phases of the project.

Traffic and Road Safety Measures during Construction Phase:

Key issues addressed by TMP in terms of management measures include:

- Diversion of the Hiriyur Bellary road to enter the project site should be planned meticulously to avoid accidents.
- Temporary access roads leading to construction sites be sprinkled with water for dust suppression to reduce emission of dust , if required
- Restricted use of horns for vehicles plying within habitat heartland.
- Communicating to local villagers on peak vehicular movement during the construction phase.
- Bearing of warning signage be provided during movement of heavy vehicles carrying equipment and machinery; all vehicles entering access roads is mandated to have Pollution under Control (PUC) Certificates.
- The contractor to comply with all statutory vehicular limits (width, height, loading, gross weight) and other statutory requirements.
- Use of seat belts for both drivers and passengers be made compulsory to minimize death and injuries in the event of an accident.
- Periodic Road Safety campaigns and awareness sessions be carried out among villagers and site workers
- Regular inspection of vehicles and drivers be conducted to ensure minimum HSE risks.
- A "No Tobacco No Alcohol" Policy to gain control to prevent road accidents/incidents.

Traffic and Road Safety Measures during Operational Phase:

Key issues addressed in terms of management measures include:

- Access roads to main plant site and internal roads (within the plant) be black-topped with road dividers.
- Reduction in use of horns near villages, main plant and internal roads. All vehicles entering in access roads and plant will have Pollution under Control (PUC) certificates.
- Speed limit in internal roads will be restricted to 25 km/hr.
- Proper warning icons and road safety awareness posters should be displayed to create traffic safety awareness among personnel accessing solar power plant.
- Periodic Road Safety and Traffic Management campaigns and awareness sessions if required are carried out among villagers and plant workers to develop road safety awareness among people likely to be impacted by the project.
- An emergency road safety plan will be framed by the proponent to combat emergency conditions/accidents along highways, access roads and within plant area.
- "No Tobacco No Alcohol" policy to prevent accidents/incidents.

- Use of seat belts for both drivers and passengers be made compulsory to all company travellers in cars

7.12. ENVIRONMENTAL MONITORING PLAN

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

TABLE 7-7: ENVIRONMENT MONITORING PLAN

Monitoring Parameter / Activity	Anticipated Impacts	Implementation agency	Monitoring method / Tool	Frequency	Monitoring entity	Documentation
CONSTRUCTION PHASE						
PS I: Assessment and Management of Environment and Social Risks and Impacts						
Dumping of construction material on site and adjacent agriculture fields	Soil compaction and contamination	Contractor appointed by Azure for civil work Sub-contractor Contractor appointed by Azure for civil work	Observation and site inspection	Once a week	HSE Manager onsite and corporate	To be incorporated in monthly report
Disposal of waste construction materials, debris, metal cuttings etc.	Soil contamination		Visual Inspection and record keeping		HSE Manager onsite and corporate	Reporting to be done every week
Onsite storage and disposal of hazardous material/wastes like used oil, broken solar panels on impervious surface with secondary containment	Soil and ground water contamination		Observation and site inspection		HSE Manager onsite and corporate	To be incorporated in monthly report

Monitoring Parameter / Activity	Anticipated Impacts	Implementation agency	Monitoring method / Tool	Frequency	Monitoring entity	Documentation
Training for work at height, use of PPEs and health and safety on site for workers and client personnel	Rise of emergency conditions and accidents. Forms integral part of Occupational H & S Management system	Project Head along with HSE Manager and Contractor on site	Record keeping and proper planning	Once a month	HSE Manager and head at corporate	Monthly report to be submitted
Audits of the contractors and sub-contractors	Integral part of Management System and occupational health and safety		Record keeping and grievance recording	Once a month	HSE Corporate manager/head	Once a month
PS 2: Labour and Working Conditions						
Labour camps to be established in hygienic conditions with proper	Health conditions of labourers	Onsite HSE manager of Azure and sub-contractor	IFC Guidelines and verification	Once a week	Project Head along with Site HSE	Weekly documentation

Monitoring Parameter / Activity	Anticipated Impacts	Implementation agency	Monitoring method / Tool	Frequency	Monitoring entity	Documentation
rooms and cretches, drinking water supply and sanitation facilities		Project Head along with Onsite HSE manager of Azure and sub-contractor	of local condition			
Awareness about various communicable diseases like AIDS, malaria etc should be carried out for workers	Health conditions of labourers		Health office records and local conditions	Once a month		To be included in monthly report
Keeping of employment records of workers and provision of minimum wages	Economic conditions of labourers	Civil contractor and Onsite engineer/accountant of Azure	Government regulations and record keeping		Onsite engineer and accountant	To be included in monthly report
DG sets to have acoustic enclosures and placed far from labour camp	Noise pollution and impacting health of workers	Contractor appointed by Azure for civil work	Record keeping and inspection of vehicles	Twice a week	HSE Manager	Bi-Weekly report to be submitted
Facility to record grievances onsite both by labourers and contractors	If no grievance mechanism in place it	All contractors appointed by Azure for various	Record keeping and inspection		Project Head along with Site HSE	Bi-Weekly report to be submitted

Monitoring Parameter / Activity	Anticipated Impacts	Implementation agency	Monitoring method / Tool	Frequency	Monitoring entity	Documentation
	violates PS 2 requirement	activities of the project				
Equal opportunity to be provided while providing employment and no child labour should be allowed.	Agitation and disruption of operation of the project	HR manger	Management system procedures and Employment policy of Azure	Once in six months	HR Manager and head	To be reported for annual performance report of the project
PS 3: Resource Efficiency and Pollution Prevention						
Clearing of land for the construction of the proposed project	Change in land use due to removal of any trees, shrubs and grasses	Contractor appointed by Azure for civil work along with Project Head of Azure	Observation and site inspection	Once in two weeks	Project Head along with Onsite HSE manager of Azure	To be incorporated in monthly report
Site levelling and removal of top soil	Soil Erosion		Observation and site inspection	Once a week	Project Head along with Onsite HSE manager of Azure	To be incorporated in monthly report

Monitoring Parameter / Activity	Anticipated Impacts	Implementation agency	Monitoring method / Tool	Frequency	Monitoring entity	Documentation
Piling up of the top soil at one location on site to be reused for landscaping	Erosion due to strong wind and run off during rain		Observation and site inspection		Project Head along with HSE Manager onsite and corporate	To be incorporated in monthly report
Change in site sloping and levelling	Obstruction to natural drainage pattern		Observation and site inspection		Project Head along with Site HSE	To be incorporated in monthly report
Hiring and maintenance of project vehicles having proper PUC Certificates	Pollution of ambient air quality		Record keeping and inspection of vehicles	Twice a week	Project Head along with Site HSE	Weekly report to be submitted
DG sets to have acoustic enclosures and placed far from labour camp	Noise pollution and impacting health of workers		Record keeping and inspection of vehicles		Project Head along with Site HSE	Bi- Weekly report to be submitted

Monitoring Parameter / Activity	Anticipated Impacts	Implementation agency	Monitoring method / Tool	Frequency	Monitoring entity	Documentation
Widening of road and creation of new access roads	On local infrastructure and use of common property resource	Project Head along with Onsite HSE Manager	Visual inspection and revenue records	Twice a week	Project Head along with Site HSE	Bi-Weekly report to be submitted
Use of ground water for construction purposes.	Resource extraction and use	Project Head along with HSE Manager and contractor	Records review and site inspection	Once a week	HSE Manager onsite and corporate	To be incorporated in monthly report
Generation of waste water from labour camps and construction site	Contamination of soil and ground water	Project Head along with HSE Manager and contractor	site inspection	Once a week	HSE Manager onsite and corporate	To be incorporated in monthly report
PS 4: Community Health Safety and Security						
Movement of project vehicles for carrying manpower and construction material	Freaky accident and endangering life of public and project workers	Project Head along with HSE Manager	Record keeping and proper planning along with deploy of traffic escorts 24 hours	Daily	HSE Manager and head at corporate	Weekly report to be submitted

Monitoring Parameter / Activity	Anticipated Impacts	Implementation agency	Monitoring method / Tool	Frequency	Monitoring entity	Documentation
Placing of proper signages in English and local language for diversion of traffic and movement of vehicles	Freaky accident and endangering life of public and project workers		Record keeping and proper planning with implementation			Weekly report to be submitted
Spillage of domestic and hazardous waste due to project activity	Hindrance to access and emergency services	HSE Manager and Contractor	Record keeping and proper planning	Once a week		Weekly report to be submitted
Training for work at height, use of PPEs and health and safety on site	Rise of emergency conditions and accidents		Record keeping and proper planning	Once a month		Monthly report to be submitted
Killing of livestock due to accident or for food	Agitation and disruption of work		Record keeping and training of contractors and workers	Once a month		Monthly report to be submitted
OPERATION PHASE						

Monitoring Parameter / Activity	Anticipated Impacts	Implementation agency	Monitoring method / Tool	Frequency	Monitoring entity	Documentation
PS I: Assessment and Management of Environment and Social Risks and Impacts						
Ensure health and safety and security through E & S plan during the operation of the plan	Occupational health and safety	O& M Head HSE Manager	Record keeping	Quarterly	HSE Head at corporate level	Quarterly report to be submitted
Authorized persons to enter the site	Occupational health and safety	Security In charge	Verification of records and personal identification	Daily	Onsite Manger	Weekly report to be submitted
Ensure smooth working conditions with written procedures	Occupational health and safety	O& M Head HSE Manager	Implementation of EHS Management system	Quarterly	Head ESH Manager	Quarterly reporting to be carried out
Periodic monitoring of storage and disposal of hazardous wastes like broken solar panels and metal cuttings if any	Occupational health and safety		Implementation of EHS Management system	Quarterly	Head ESH Manager	Quarterly reporting to be carried out

Monitoring Parameter / Activity	Anticipated Impacts	Implementation agency	Monitoring method / Tool	Frequency	Monitoring entity	Documentation
through proper registered vendor.						
Equal opportunity to be provided while providing employment and no child labour should be allowed.	Agitation and disruption of operation of the project	HR manger	Management system procedures and Employment policy of Azure	Once in six months	HR Manager and head	To be reported for annual performance report of the project
PS 2: Labour and Working Conditions						
Employment of local people as security guards, cooks and office attendant	Employment generation due to the proposed project	Onsite engineer and HR manager	Educational qualification of the local people and project requirement	Once in six months	Head HR Manager	To be reported for annual performance report of the project
PS 3: Resource Efficiency and Pollution Prevention						
Conservation of water usage onsite and site office through prevention of water	Loss of water	O& M Head HSE Manager	Record Keeping	Quarterly	HSE Head	To be reported in quarterly report

Monitoring Parameter / Activity	Anticipated Impacts	Implementation agency	Monitoring method / Tool	Frequency	Monitoring entity	Documentation
wastes, leaks and fixing of fissures in urinals						
Conservation of water through rain water harvesting and recharge of ground water	Water Scarcity					To be reported in quarterly report
PS 4: Community Health Safety and Security						
Placing of proper signage in English and local language at different point of the project site near boundaries clearly mentioning the danger of trespassing into the site	Freaky accident and endangering life of public and project personnel	O& M Head HSE Manager	Record keeping and proper planning with implementation	Once a month	HSE Manager and head at corporate	Quarterly report to be submitted
Signage for passing of Transmission line	Electrocution	O& M Head HSE Manager on site	Visual Observation and planning		HSE Manager	Monthly report
DECOMMISSIONING PHASE						

Monitoring Parameter / Activity	Anticipated Impacts	Implementation agency	Monitoring method / Tool	Frequency	Monitoring entity	Documentation
Decommissioning plan to be put in place for the entire structures (below ground and above ground), restoration of top soil and remediation if required	Site restoration	Onsite HSE Manager and Technical personnel	Onsite inspection	As required	Heads technical and HSE	Final project reporting
Informing stakeholders	Project Completion	Onsite HSE Manager and Technical personnel	Onsite inspection	Prior decommissioning	Heads technical and HSE	Final project reporting
Loss of job for local employers	Economic conditions of the employed	HR manager	Record inspection	Once	HR Head	Final project reporting
Report of grievances	Employee welfare	HR manager	Record inspection	Once	HR Head	Final project reporting

8. Conclusion

The proposed solar power project is having moderate impact due to ground water utilization and issues related to community safety during the construction period, insignificant impact due to generation of dust and fugitive emissions during construction phase only (short duration) and minor impact on resource utilization like land and socio economic conditions of project area villages. There is no impact on cultural resources as well as indigenous people due to their absence in the study area. The impacts anticipated during the operation phase is fugitive emissions from movement of project vehicles within the site (air environment), surface run off and onsite drainage of storm water (water environment) and impact on soil due to storage and spillage of hazardous wastes like broken solar panels, used oil and transformer oil (land environment) which can be mitigated by adopting suggested mitigation measures. Based on the conclusion drawn from the ESIA study with respect to the kind of impacts of the project on environment, resources, biodiversity, labours and community, the proposed project is categorized as Category B (as per IFCs categorization of projects), which specifies that this project is expected to have limited adverse environment and social impacts which can be mitigated by adopting suitable mitigating measures.

ANNEXURES

Annexure I

Sample Record to Conversion (RTC) in Kannada

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ರೆಕಾರ್ಡ್ ಆಫ್ ರೈಟ್ಸ್, ಗೇಣಿ ಮತ್ತು ಪಹಣಿ ಪತ್ರಿಕೆ (R.T.C) ಫಾರಂ ನಂ. 16

Valid from 30/10/2014 16:03:27 To Till Date

Village Account Form No. 2

ತಾಲ್ಲೂಕು ಮೊಹರು | ತಾಲ್ಲೂಕು : ಹಿರಿಯೂರು | ಹೋಬಳಿ : ಐಮಂಗಲ | ಗ್ರಾಮ : ಕಂದಿಕೆರೆ | ಪುಟದ ಕ್ರಮ ಸಂಖ್ಯೆ :

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70	ಒಟ್ಟು ವಿಸ್ತೀರ್ಣ ಪೋಟ್ ಖರಾಬ್ (ಅ) ಪೋಟ್ ಖರಾಬ್ (ಬ) ಉಳಿದದ್ದು	6.00.00.00 6.00.00.00	(ಅ) ಭೂ ಕಂದಾಯ (ಬ) ಜೋಡಿ (ಕ) ಸೆಸ್ಸುಗಳು (ಡ) ನೀರಿನ ದರ	6.36	•ಶಂಕರಲಿಂಗಪ್ಪ ಬಿನ್ ಲಿಂಗಪ್ಪ	6.00.00.00	378	MR T27/2014-2015 ವಿಭಜನೆ 29/10/2014		
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ಮಣ್ಣಿನ ನಮೂನೆ	7. ಮರಗಳ ಸಂಖ್ಯೆ		8. ಜೇಸಾಯದ ಪ್ರಕಾರ ನೀರಾವರಿಯ ವಿಸ್ತೀರ್ಣ					
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ಕಪ್ಪು								
ಪಟ್ಟಾ ಸರ್ಕಾರಿ								

12. ಸಾಗುವಳಿ ಮತ್ತು ಗೇಣಿಯ ವಿವರಗಳು

13. ಭೂಮಿಯ ಉಪಯೋಗ ಮತ್ತು ಬೆಳೆಗಳ ವಿವರ

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2014-2015 ಮುಂಗಾರು	ಶಂಕರಲಿಂಗಪ್ಪ ಬಿನ್ ಲಿಂಗಪ್ಪ	ಸ್ವಂತ			9	6.0.0.0	ಖುಷ್ಕಿ	ಮಾಗಿ	6.0.0.0		6.0.0.0	ಮಳೆ			

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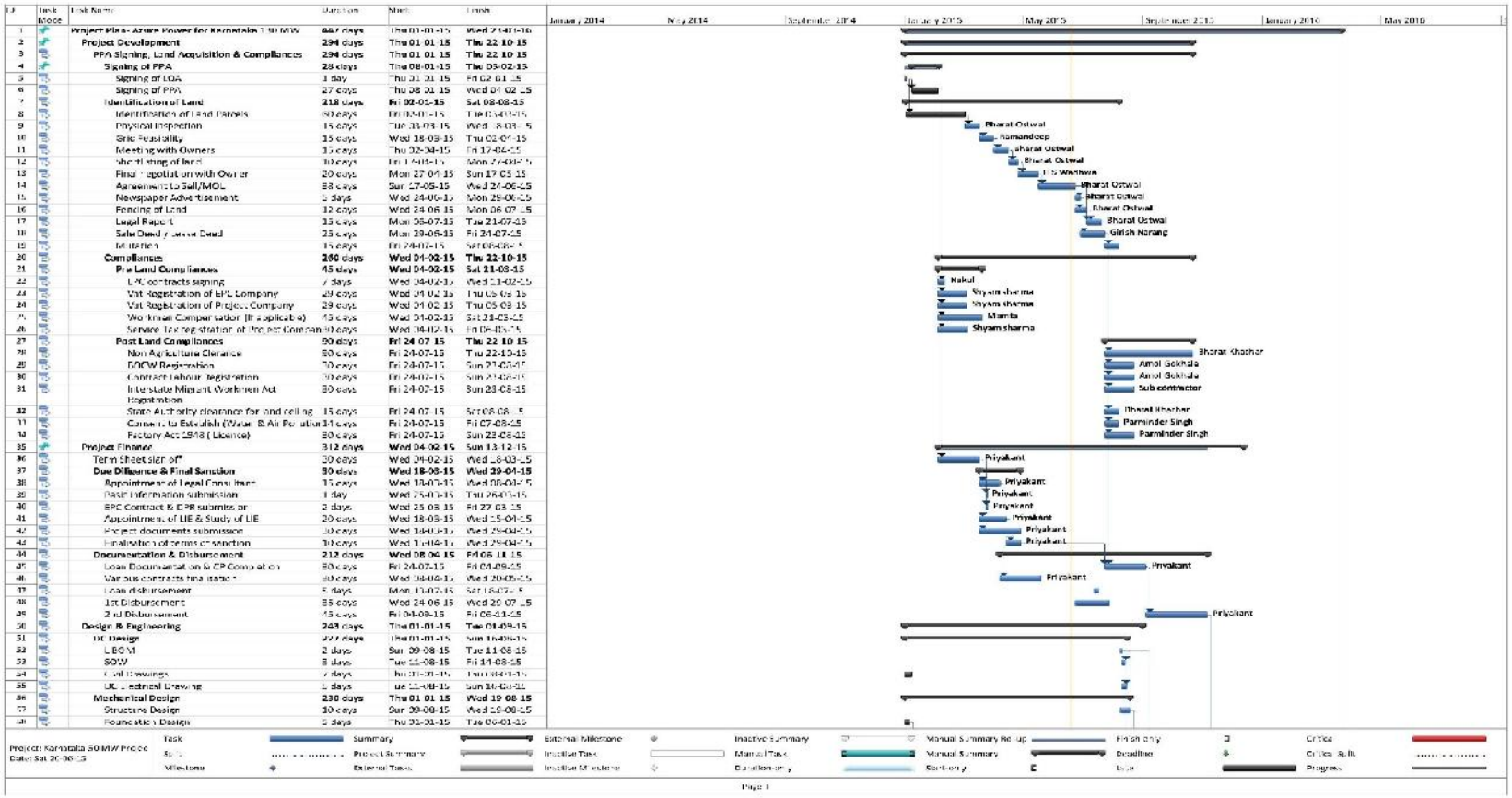
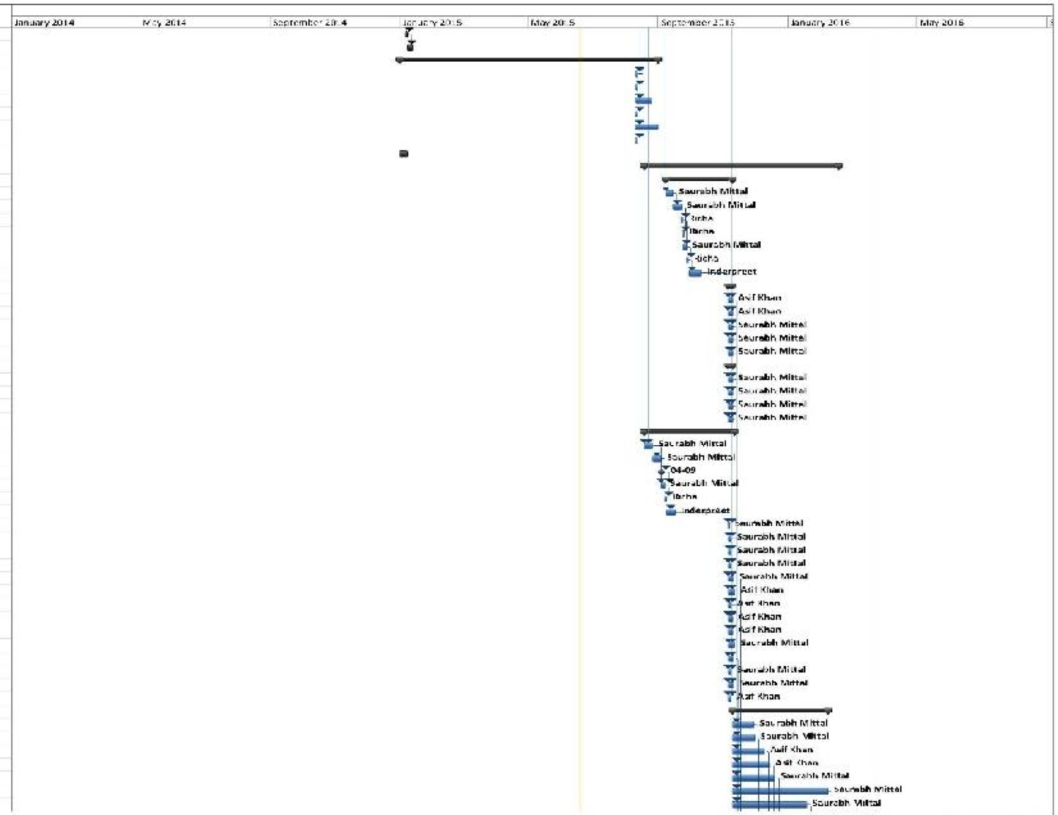
ಕರ್ನಾಟಕ ಭೂಕಂದಾಯ ನಿಯಮಾವಳಿ 1966 ರ ನಿಯಮ 40, 42, 58 ಮತ್ತು 70

Annexure II

Detailed project implementation schedule


ID
Task Mode
Task Name
Duration
Start
Finish
January 2014
May 2014
September 2014
January 2015
May 2015
September 2015
January 2016
May 2016
Project Karnataka 50 MW Projec
Date: Sat 30-05-15
Task
Split
Milestone
Summary
Project Summary
External Tasks
External Milestone
Inactive Task
Inactive Milestone
Inactive Summary
Manual Task
Duration-only
Manual Summary Rollup
Manual Summary
Start-only
Finish-only
Deadline
Progress
Page 1

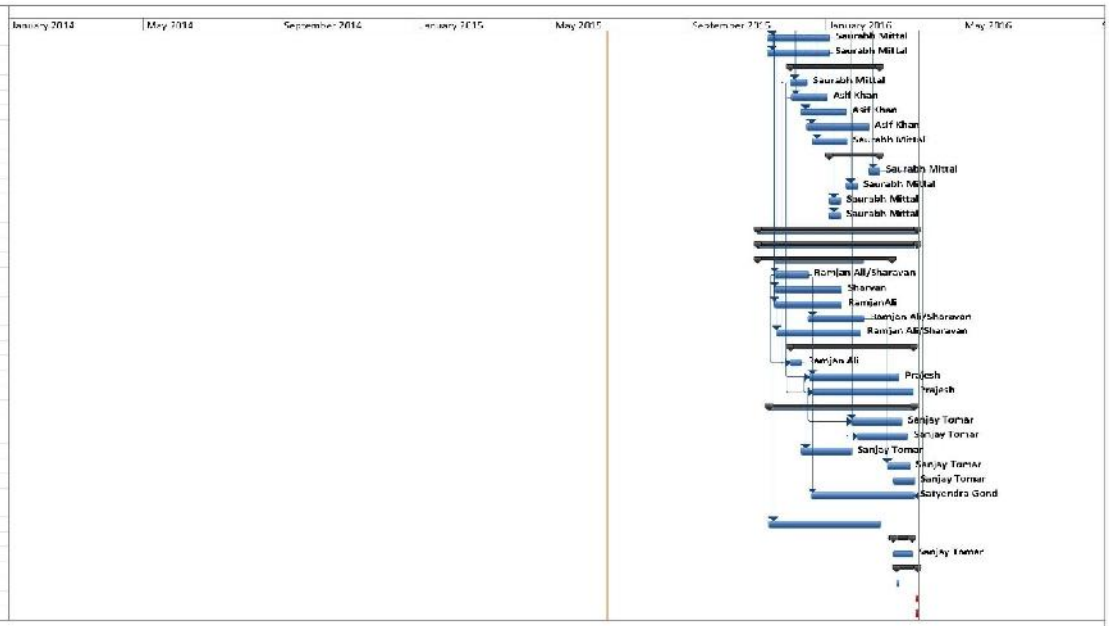
ID	Task Mode	Task Name	Duration	Start	Finish
59		BOM	2 days	Tue 06-01-15	Thu 08-01-15
60		SOW	5 days	Thu 08-01-15	Tue 13-01-15
61		**AC Design**	**243 days**	**Thu 01-01-15**	**Tue 01-09-15**
62		LBOM	2 days	Tue 11-08-15	Thu 13-08-15
63		SLD	2 days	Tue 11-08-15	Thu 13-08-15
64		AC Civil Drawings	15 days	Tue 11-08-15	Wed 26-08-15
65		SOW Civil Works	2 days	Tue 11-08-15	Thu 13-08-15
66		AC Electrical Equipment Drawings	21 days	Tue 11-08-15	Tue 01-09-15
67		SOW AC Works	1 day	Tue 11-08-15	Wed 12-08-15
68		BOM for Transmission Line	7 days	Thu 01-01-15	Thu 08-01-15
69		**Procurement Schedule**	**183 days**	**Wed 19-08-15**	**Thu 18-02-16**
70		**Procurement Schedule (Non Land Dependent)**	54 days	Tue 08-09-15	Tue 10-11-15
71		Issuance of RFQ	6 days	Tue 08-09-15	Tue 15-09-15
72		Receipt of Sealed bids	7 days	Tue 15-09-15	Wed 23-09-15
73		Opening of Seal Bids except Inverters & module	1 day	Wed 23-09-15	Thu 24-09-15
74		Opening of Seal Bids Inverters & Modules	1 day	Thu 24-09-15	Fri 25-09-15
75		Comparative Analysis	3 days	Thu 24-09-15	Mon 28-09-15
76		Comparative Discussion with CEO	1 day	Mon 28-09-15	Tue 29-09-15
77		Negotiations with the vendors	10 days	Wed 30-09-15	Mon 12-10-15
78		**Issue of PO**	**3 days**	**Fri 06-11-15**	**Tue 10-11-15**
79		PO for Inverters	3 days	Fri 06-11-15	Tue 10-11-15
80		PO for Modules	3 days	Fri 06-11-15	Tue 10-11-15
81		PO for ISMB	3 days	Fri 06-11-15	Tue 10-11-15
82		PO for Structure	3 days	Fri 06-11-15	Tue 10-11-15
83		PO for DC Cables	3 days	Fri 06-11-15	Tue 10-11-15
84		**PO for AC Major Items Supply**	**3 days**	**Fri 06-11-15**	**Tue 10-11-15**
85		PO for Transformer	3 days	Fri 06-11-15	Tue 10-11-15
86		PO for CT, PT	3 days	Fri 06-11-15	Tue 10-11-15
87		PO for Breaker	3 days	Fri 06-11-15	Tue 10-11-15
88		PO for Conductors	3 days	Fri 06-11-15	Tue 10-11-15
89		**Procurement Schedule (Land Dependent)**	**73 days**	**Wed 19-08-15**	**Thu 12-11-15**
90		Issuance of RFQ (Land Dependent)	7 days	Wed 19-08-15	Thu 27-08-15
91		Receipt of Seal Bids	7 days	Thu 27-08-15	Fri 04-09-15
92		Opening of Seal Bid	0 days	Fri 04-09-15	Fri 04-09-15
93		Comparative Analysis	2 days	Fri 04-09-15	Mon 07-09-15
94		Comparative Discussion with CEO	2 days	Mon 07-09-15	Wed 09-09-15
95		Negotiations with Vendors	7 days	Wed 09-09-15	Thu 17-09-15
96		PO for Land Survey	1 day	Fri 06-11-15	Sat 07-11-15
97		PO for Land Levelling	2 days	Fri 06-11-15	Mon 09-11-15
98		PO for Fencing & Main Gate	2 days	Fri 06-11-15	Mon 09-11-15
99		PO for Pilling	2 days	Fri 06-11-15	Mon 09-11-15
100		Po for HT C/w	4 days	Fri 06-11-15	Wed 11-11-15
101		PO for AC Services	5 days	Fri 06-11-15	Thu 12-11-15
102		PO for Site Office & Stores	2 days	Fri 06-11-15	Mon 09-11-15
103		PO for Structure Installation	3 days	Fri 06-11-15	Tue 10-11-15
104		PO for InverterPad/Canopy	3 days	Fri 06-11-15	Tue 10-11-15
105		PO for DC Services	5 days	Fri 06-11-15	Thu 12-11-15
106		PO for Transmission Line Works	5 days	Fri 06-11-15	Wed 11-11-15
107		PO for Road & Drainage	2 days	Fri 06-11-15	Mon 09-11-15
108		PO for Optical Fibre	4 days	Fri 06-11-15	Wed 11-11-15
109		PO for RFID	2 days	Fri 06-11-15	Mon 09-11-15
110		**Manufacturing**	**90 days**	**Tue 10-11-15**	**Mon 08-02-16**
111		Manufacturing Process of Post	20 days	Tue 10-11-15	Mon 30-11-15
112		Manufacturing Process of Structure	21 days	Tue 10-11-15	Tue 01-12-15
113		Manufacturing Process of Modules	30 days	Tue 10-11-15	Thu 10-12-15
114		Manufacturing Process of Inverters& CB	35 days	Tue 10-11-15	Tue 15-12-15
115		Manufacturing Process of DC Cables	40 days	Tue 10-11-15	Sun 20-12-15
116		Manufacturing Process of Transformer	90 days	Tue 10-11-15	Mon 08-02-16
117		Manufacturing Process of CT, PT	70 days	Tue 10-11-15	Tue 19-01-16



Project: Karnataka 50 MW Project
Date: Sat 20-06-15

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

ID	Task Mode	Task Name	Duration	Start	Finish
118		Manufacturing Process of Breakers	55 days	Tue 10-11-15	Mon 04-01-16
119		Manufacturing Process of Conductor	55 days	Tue 10-11-15	Mon 04-01-16
120		**Delivery Schedule**	**80 days**	**Mon 30-11-15**	**Thu 18-02-16**
121		Delivery of Post	15 days	Mon 30-11-15	Tue 15-12-15
122		Delivery of Structure	32 days	Tue 01-12-15	Sat 02-01-16
123		Delivery of Modules	40 days	Thu 10-12-15	Tue 19-01-16
124		Delivery of Inverters & CB	55 days	Tue 15-12-15	Mon 08-02-16
125		Delivery of DC Cables	31 days	Sun 20-12-15	Wed 20-01-16
126		**Delivery of AC Major Items**	**45 days**	**Mon 04-01-16**	**Thu 18-02-16**
127		Delivery of Transformers	10 days	Mon 08-02-16	Thu 18-02-16
128		Delivery of C&PT	10 days	Tue 19-01-16	Fri 29-01-16
129		Delivery of Breakers	10 days	Mon 04-01-16	Thu 14-01-16
130		Delivery of Conductors	10 days	Mon 04-01-16	Thu 14-01-16
131		**Construction Schedule**	**143 days**	**Sun 01-11-15**	**Wed 23-03-16**
132		**Construction**	**143 days**	**Sun 01-11-15**	**Wed 23-03-16**
133		Civil	120 days	Sun 01-11-15	Mon 29-02-16
134		Site Leveling	30 days	Mon 16-11-15	Wed 16-12-15
135		Permanent Fencing & Main Gate	60 days	Mon 16-11-15	Fri 15-01-16
136		Store Room Cum Site Office	60 days	Mon 16-11-15	Fri 15-01-16
137		Canopy/Inverter Pad Indoor Type	30 days	Wed 16-12-15	Thu 04-02-16
138		IT Civil Works	75 days	Wed 18-11-15	Mon 01-02-16
139		**Mechanical**	**110 days**	**Mon 30-11-15**	**Sat 19-03-16**
140		Layout Marking of Piles	10 days	Mon 30-11-15	Thu 10-12-15
141		Installation of Post	80 days	Thu 10-12-15	Sun 06-03-16
142		Installation of Mounting Structure	90 days	Sun 20-12-15	Sat 19-03-16
143		**Electrical**	**130 days**	**Wed 11-11-15**	**Sun 20-03-16**
144		Installation of Modules	45 days	Sun 24-01-16	Wed 09-03-16
145		Module Wiring	45 days	Fri 29-01-16	Mon 14-03-16
146		DC Cable Trench & Cable Laying	45 days	Thu 10-12-15	Sun 24-01-16
147		Installation of Inverters & Combiner Boxes	20 days	Thu 25-02-16	Wed 16-03-16
148		DC Pre-Commissioning	19 days	Tue 01-03-16	Sun 20-03-16
149		AC/HT Side Supply, Erection, Inspection, Testing & Comissioning	92 days	Sat 19-12-15	Sun 20-03-16
150		Transmission Line	100 days	Wed 11-11-15	Fri 19-02-16
151		**Others**	**17 days**	**Tue 01-03-16**	**Fri 18-03-16**
152		SCADA, Communication Cable+ ISDN	17 days	Tue 01-03-16	Fri 18-03-16
153		**Inspection & Commissioning**	**19 days**	**Fri 04-03-16**	**Wed 23-03-16**
154		Inspection & Commissioning (50 MW)	2 days	Fri 04-03-16	Sun 06-03-16
155		Inspection & Commissioning (40 MW)	2 days	Mon 21-03-16	Wed 23-03-16
156		Inspection & Commissioning (10 MW)	2 days	Mon 21-03-16	Wed 23-03-16



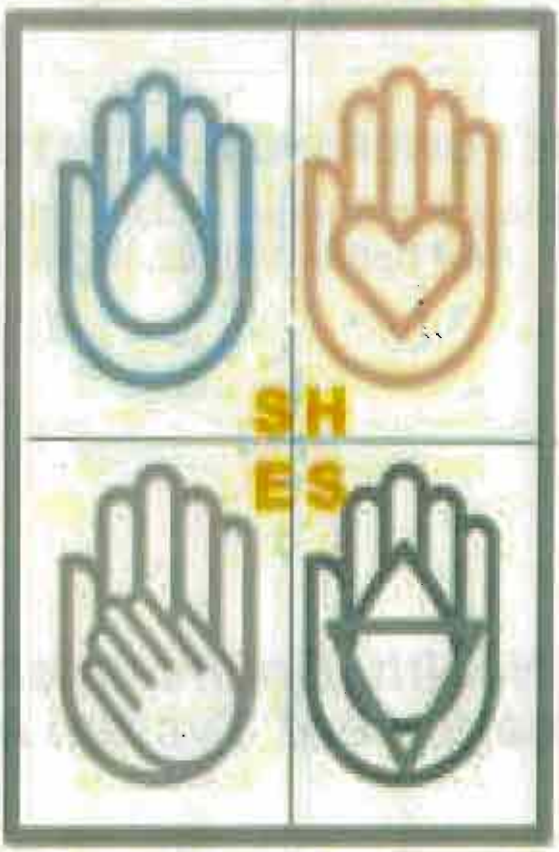
Project: Karnataka 50 MW Project
Date: Sat 20-06-15

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

Annexure III

AZURE-Social, Health, Environment and Safety Management System Manual

Azure Power



SHES

Social, Health, Environment and Safety
Management System Manual

August 2014

Annexure IV

Surface & Ground Water Quality Monitoring Results

Surface water Quality

S.No	Parameters	Unit	Test Methods	**Surface water (Pond) Sankere Village (SW-01) DOS-04/04/15, Time 11:40**	**Surface water (Belagere Lake) Near Belagere Vill. (SW-02) DOS-04/04/15, Time 12:30**	**Surface water (River) Near Gorlathu Vill. (SW-03) DOS-04/04/15, Time 13:30**	**Surface water (Pond) Near Yaraballi / Kandikere Vill. (SW-04) DOS-04/04/15, Time 14:20**	Detection limits
1	Taste	-	APHA 2160	Ageeable	Ageeable	Ageeable	Ageeable	
2	Odour	-	APHA 2150	Ageeable	Ageeable	Ageeable	Ageeable	
3	Colour	Hazen	APHA 2120 B	< 1	< 1	< 1	< 1	
4	pH	-	APHA 4500-H$_B$	6.65	7.4	7.88	7.8	
5	Conductivity (25^{o}C)	µS/cm	APHA 2510-B	597	881	972	457	
6	Dissolved Oxygen (DO) (Min)	mg/L	APHA 4500 C	3.8	4.2	4.0	3.9	
7	BOD (3day, at 27^{o}C)	mg/L	APHA 5210-B, IS : 3025 (P-44)	BDL	BDL	BDL	BDL	0.1
8	Total Coliforms	MPN/100 mL	IS:1622,1981 (2003)	30	80	27	17	2
9	Total Dissolved Solids (TDS)	mg/L	APHA 2540 C	388	590	651	306	
10	Oil and Grease	mg/L	APHA 5520-B	BDL	BDL	BDL	BDL	1
11	Mineral Oil	mg/L	IS 3025 (P-39) 1999	BDL	BDL	BDL	BDL	0.1
12	Total Hardness (as CaCO3)	mg/L	APHA 2340-C	157	214	196	111	
13	Calcium Hardness (as $CaCO_3$)	mg/L	APHA 2340-C	99.1	164.0	150.0	70.2	
14	Magnesium Hardness (as $CaCO_3$)	mg/L	APHA 2340-C	56.7	49.6	45.4	40.5	
15	Chlorides (as Cl)	mg/L	APHA 4500-Cl-B	90.0	134.95	189.94	54.98	
16	Sulfates (as SO_4)	mg/L	IS :3025(P-24) : 2003	69.9	120.39	121.2	33.8	
17	Nitrates (as NO_3)	mg/L	IS 3025 (Part-34)	1.9	2.8	2.6	1.1	

Surface water Quality

S.No	Parameters	Unit	Test Methods	Surface water (Pond) Sankere Village (SW-01) DOS- 04/04/15, Time 11:40	Surface water (Belagere Lake) Near Belagere Vill. (SW-02) DOS- 04/04/15, Time 12:30	Surface water (River) Near Gorlathu Vill. (SW-03) DOS- 04/04/15, Time 13:30	Surface water (Pond) Near Yaraballi / Kandikere Vill. (SW-04) DOS- 04/04/15, Time 14:20	Detection limits
18	Free CO_2	mg/L	APHA 4500 CO2-C	BDL	BDL	BDL	BDL	
19	Free NH_3 (as N)	mg/L	APHA 4500-NH3-C	BDL	BDL	BDL	BDL	
20	Fluorides (as F)	mg/L	APHA 4500-F^-.D	0.5	0.7	0.5	0.3	0.1
21	Calcium (Ca)	mg/L	APHA 3111	39.64	65.59	60	28.06	
22	Magnesium (Mg)	mg/L	APHA 3111	14.18	12.41	11.34	10.13	
23	Copper (Cu)	mg/L	APHA 3111	BDL	BDL	BDL	BDL	0.01
24	Iron (Fe)	mg/L	IS :3025(P-53): 1988 R.A 2003	BDL	BDL	BDL	BDL	0.3
25	Manganese (Mn)	mg/L	APHA 3111	BDL	BDL	BDL	BDL	0.002
26	Zinc (Zn)	mg/L	APHA 3111	BDL	BDL	BDL	BDL	0.2
27	Boron (B)	mg/L	APHA 4500 B-D	BDL	BDL	BDL	BDL	0.1
28	Barium (Ba)	mg/L	IS : 13428 : 2005	BDL	BDL	BDL	BDL	0.01
29	Silver (Ag)	mg/L	APHA 3111	BDL	BDL	BDL	BDL	0.01
30	Arsenic Total (As)	mg/L	IS : 3025 (P-37)	BDL	BDL	BDL	BDL	0.01
31	Mercury (Hg)	mg/L	EPA SW- 846 - 7470/7471	BDL	BDL	BDL	BDL	0.001
32	Lead (Pb)	mg/L	APHA 3111	BDL	BDL	0.67	BDL	0.01
33	Cadmium (Cd)	mg/L	APHA 3111	BDL	BDL	BDL	BDL	0.002
34	Chromium (VI)	mg/L	APHA 3500 Cr^{+6} - B	BDL	BDL	BDL	BDL	0.01

Surface water Quality

S.No	Parameters	Unit	Test Methods	Surface water (Pond) Sankere Village (SW-01) DOS- 04/04/15, Time 11:40	Surface water (Belagere Lake) Near Belagere Vill. (SW-02) DOS- 04/04/15, Time 12:30	Surface water (River) Near Gorlathu Vill. (SW-03) DOS- 04/04/15, Time 13:30	Surface water (Pond) Near Yaraballi / Kandikere Vill. (SW-04) DOS- 04/04/15, Time 14:20	Detection limits
35	Selenium (Se)	mg/L	APHA 3111	BDL	BDL	BDL	BDL	0.01
36	Cyanide (CN)	mg/L	APHA 4500 -CN-	BDL	BDL	BDL	BDL	0.02
37	Phenolic compounds(as C_6H_5OH),	mg/L	APHA 5530-C	BDL	BDL	BDL	BDL	0.001
38	Anionic Detergents (as MBAS)	mg/L	Annex. K of IS 13428	BDL	BDL	BDL	BDL	0.1
39	Poly-Nuclear Aromatic Hydrocarbons(PAH)	µg/L	APHA 6440	0.002	0.002	0.004	0.003	0.1
40	Sodium (Na)	mg/L	APHA 3111	48.19	90.39	70.66	82.19	
41	Sodium Absorption Ratio (SAR)	-	APHA 3111	1.6659	2.676	2.1874	3.3712	
42	Faecal Coliform	/100 ml	IS:1622,1981 (2003)	6	21	4	absent	

Ground Water Quality

S.No.	Parameters	Units	Test Methods	Ground water (Borewell) Hulikunte Village (GW-01) DOS-04/04/15, Time 09:00	Ground water (Hand Pump) Gollahalli Village (GW-02) DOS-04/04/15, Time 10:00	Ground water (Hand Pump) Kandikere Village (GW-03) DOS-04/04/15, Time 11:00	Detection Limits
1	Colour	Hazen	APHA 2120 -B	< 1	< 1	< 1	
2	Odour	-	APHA 2150 -B	Ageeable	Ageeable	Ageeable	
3	Taste	-	APHA 2160- B	Ageeable	Ageeable	Ageeable	
4	Turbidity	NTU	APHA - 2130 - B	< 1	< 1	< 1	
5	pH Value	-	APHA 4500- H+B	7.14	7.72	7.77	
6	Total Hardness (as $CaCO_3$)	mg/L	APHA 2340 - C	300.0	130	200	
7	Iron (as Fe)	mg/L	APHA -3111-B	BDL	BDL	BDL	0.3
8	Chlorides (as Cl)	mg/L	APHA 4500-CL-B	205	45	140	
9	Residual Free Chlorine	mg/L	APHA 4500 Cl-B	BDL	BDL	BDL	0.1
10	Fluorides (F)	mg/L	APHA - 4500 - F- D	1.3	0.4	0.3	
11	Total Dissolved solids	mg/L	APHA -2540-C	726	311	525	
12	Calcium (Ca)	mg/L	APHA -3111-B	82.4	40.08	63.42	
13	Magnesium (Mg)	mg/L	APHA -3111-B	23.61	7.44	10.55	
14	Copper (Cu)	mg/L	APHA -3111-B	BDL	BDL	BDL	0.01
15	Manganese (Mn)	mg/L	APHA -3111-B	BDL	BDL	BDL	0.002
16	Sulphate (as SO_4)	mg/L	APHA-4500-PS04-E	133.8	31.9	108.7	
17	Nitrate (as NO_3)	mg/L	IS 3025 P-34	3.1	1.6	2.1	
18	Phenolic compounds (as C_6H_5OH)	mg/L	APHA -3111-B	BDL	BDL	BDL	0.001
19	Mercury (as Hg)	mg/L	IS : 3025 (P-48)	BDL	BDL	BDL	0.001
20	Cadmium (as Cd)	mg/L	APHA -3111-B	BDL	BDL	BDL	0.002

Ground Water Quality							
S.No.	Parameters	Units	Test Methods	Ground water (Borewell) Hulikunte Village (GW-01) DOS-04/04/15, Time 09:00	Ground water (Hand Pump) Gollahalli Village (GW-02) DOS-04/04/15, Time 10:00	Ground water (Hand Pump) Kandikere Village (GW-03) DOS-04/04/15, Time 11:00	Detection Limits
21	Selenium (as Se)	mg/L	APHA -3111-B	BDL	BDL	BDL	0.01
22	Arsenic (as As)	mg/L	IS : 3025 (P-37)	BDL	BDL	BDL	0.01
23	Cyanide (as CN)	mg/L	APHA 4500-CN-C&E	BDL	BDL	BDL	0.02
24	Lead (as Pb)	mg/L	APHA -3111-B	BDL	BDL	BDL	0.01
25	Zinc (as Zn)	mg/L	APHA -3111-B	BDL	BDL	BDL	0.2
26	Anionic Detergents (as MBAS)	mg/L	APHA 5540 -C, Annex. K of IS 13428	BDL	BDL	BDL	0.1
27	Chromium (as Cr 6+)	mg/L	APHA 3500 - B	BDL	BDL	BDL	0.01
28	Polynuclear Aromatic Hydrocarbons (as PAH)	mg/L	APHA 6440	BDL	0.002	BDL	0.1
29	Mineral Oil	mg/L	IS 3025 (P-39) 1999	BDL	BDL	BDL	0.1
30	Pesticides	mg/L	AFLPL/CH/SOP-167	BDL	BDL	BDL	0.00005
31	Alkalinity	mg/L	APHA -2320-B	140	130	150	-
32	Aluminium (as Al)	mg/L	APHA -3111-B	BDL	BDL	BDL	0.01
33	Boron (as B)	mg/L	APHA - 45- B-B	BDL	BDL	BDL	0.1
34	Total Coliform	MPN/100 ml	IS:1622,1981 (2003)	50	33	23	
34	Faecal Coliform	/100 ml	IS:1622,1981 (2003)	11	7	6	

Annexure V

Purchase/sale/lease of the property

CERTIFIED TRUE EXTRACT OF THE MINUTES OF THE MEETING OF BOARD OF DIRECTORS OF THE COMPANY HELD ON 1st MARCH, 2015 AT 8, LSC, MADANGIR, PUSHPVIHAR, NEW DELHI – 110 062

"RESOLVED THAT pursuant to the applicable provisions of Companies Act, 2013, consent of the board of directors of the company be and is hereby accorded to purchase or sale or take on lease or otherwise, the Land, agriculture field or other property situated in any State of India including Karnataka, for business purpose on such terms and conditions as may be consider appropriate.

RESOLVED FURTHER THAT Mr. Inderpreet Singh Wadhwa, Director or Mr. Harkanwal Singh Wadhwa, Director or Mr. Surendra Kumar Gupta or Mr. Mahesh Shetty , Mr. George Valamchery or Mr. Bharat Khachar, Authorized Person(s) of the Company, be and are hereby severally authorized to negotiate and finalize the terms of such acquisition and to sign and execute purchase/sale/lease deed and all other documents and papers which deemed to be necessary related to purchase/sale/lease of the property and to give effect to the above resolution.

RESOLVED FURTHER THAT the common seal of the company, wherever required, be affixed herein for completion of aforesaid documentation."

Certified True Copy
For Azure Sunrise Private Limited

AZURE SUNRISE PRIVATE LIMITED NEW DELHI

Harkanwal Singh Wadhwa
Director

Din: 00973651
C-2324 Ranjit Avenue, Amritsar, 143001, Punjab

Azure Power
Power to be free!

CERTIFIED TRUE EXTRACT OF THE MINUTES OF THE MEETING OF BOARD OF DIRECTORS OF THE COMPANY HELD ON 1st, MARCH 2015 AT 8, LSC, MADANGIR, PUSHPVIHAR, NEW DELHI – 110 062

"**RESOLVED THAT** pursuant to the applicable provisions of Companies Act, 2013, consent of the board of directors of the company be and is hereby accorded to purchase or sale or take on lease or otherwise, the Land, agriculture field or other property situated in any State of India including Karnataka, for business purpose on such terms and conditions as may be consider appropriate.

RESOLVED FURTHER THAT Mr. Inderpreet Singh Wadhwa, Director or Mr. Harkanwal Singh Wadhwa, Director or Mr. Surendra Kumar Gupta or Mr. Mahesh Shetty , Mr. George Valamchery or Mr. Bharat Khachar, Authorized Person(s) of the Company, be and are hereby severally authorized to negotiate and finalize the terms of such acquisition and to sign and execute purchase/sale/lease deed and all other documents and papers which deemed to be necessary related to purchase/sale/lease of the property and to give effect to the above resolution.

RESOLVED FURTHER THAT the common seal of the company, wherever required, be affixed herein for completion of aforesaid documentation."

Certified True Copy

For Azure Power (Raj) Private Limited

Harkanwal Singh Wadhwa
Director

DIN: 00973651
C-2324 Ranjit Avenue, Amritsar, 143001, Punjab

CERTIFIED TRUE EXTRACT OF THE MINUTES OF THE MEETING OF BOARD OF DIRECTORS OF THE COMPANY HELD ON 1st, MARCH 2015 AT 8, LSC, MADANGIR, PUSHPVIHAR, NEW DELHI – 110 062

"RESOLVED THAT pursuant to the applicable provisions of Companies Act, 2013, consent of the board of directors of the company be and is hereby accorded to purchase or sale or take on lease or otherwise, the Land, agriculture field or other property situated in any State of India including Karnataka, for business purpose on such terms and conditions as may be consider appropriate.

RESOLVED FURTHER THAT Mr. Inderpreet Singh Wadhwa, Director or Mr. Harkanwal Singh Wadhwa, Director or Mr. Surendra Kumar Gupta or Mr. Mahesh Shetty , Mr. George Valamchery or Mr. Bharat Khachar, Authorized Person(s) of the Company, be and are hereby severally authorized to negotiate and finalize the terms of such acquisition and to sign and execute purchase/sale/lease deed and all other documents and papers which deemed to be necessary related to purchase/sale/lease of the property and to give effect to the above resolution.

RESOLVED FURTHER THAT the common seal of the company, wherever required, be affixed herein for completion of aforesaid documentation."

Certified True Copy
For Azure Power Photovoltaic Private Limited

AZURE PHOTOVOLTAIC PRIVATE LIMITED New Delhi

Harkanwal Singh Wadhwa
Director

DIN: 00973651
C-2324 Ranjit Avenue, Amritsar, 143001, Punjab

Annexure VI

Market rates in the four villages

Annexure : Government Guidance Value, Department of Stamps and Registration, Government of Karnataka website Dated 19/10/15

MARKET VALUE

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

Chitradurga > Hiriyur > kandhikere > Kandhikere

ect Property Type	Agriculture	Non Agriculture	Flat/Apartment Residential	Flat/Apartment Commercial

Estimated Market Value in Rs.

LandType	EMV	Unit
Dry, No Source of Irrigation,Other	60000.00000	/Acre
Bagayat, Dry	385000.00000	/Acre
Wet (Assured Water Supply from Government Tanks/Canals), One Crop	85000.00000	/Acre
Coconut Tree in Dry Land	385000.00000	/Acre
Coconut Tree in Wet Land	385000.00000	/Acre
Arecanut Tree in Dry Land	385000.00000	/Acre
Arecanut Tree in Wet Land	385000.00000	/Acre

MARKET VALUE

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

Chitradurga > Hiriyur > Gollahalli > Gollahalli

ect Property Type	Agriculture	Non Agriculture	Flat/Apartment Residential	Flat/Apartment Commercial

Estimated Market Value in Rs.

LandType	EMV	Unit
Dry, No Source of Irrigation,Other	65000.00000	/Acre
Bagayat, Dry	385000.00000	/Acre
Wet (Assured Water Supply from Government Tanks/Canals), One Crop	85000.00000	/Acre
Coconut Tree in Dry Land	385000.00000	/Acre
Coconut Tree in Wet Land	385000.00000	/Acre
Arecanut Tree in Dry Land	385000.00000	/Acre
Arecanut Tree in Wet Land	385000.00000	/Acre

MARKET VALUE

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

Chitradurga > Challakere > Kaparahalli > Kaparahalli

ect Property Type	Agriculture	Non Agriculture	Flat/Apartment Residential	Flat/Apartment Commercial

Estimated Market Value in Rs.

LandType	EMV	Unit
Dry, No Source of Irrigation,Other	65000.00000	/Acre
Bagayat, Dry	150000.00000	/Acre
Arecanut Tree in Dry Land	280000.00000	/Acre
Bagayat, Wet	150000.00000	/Acre
Coconut Tree in Dry Land	190000.00000	/Acre

MARKET VALUE

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

Chitradurga > Challakere > Jadekunte > Jadekunte

ect Property Type	Agriculture	Non Agriculture	Flat/Apartment Residential	Flat/Apartment Commercial

Estimated Market Value in Rs.

LandType	EMV	Unit
Dry, No Source of Irrigation,Other	60000.00000	/Acre
Bagayat, Dry	140000.00000	/Acre
Coconut Tree in Dry Land	170000.00000	/Acre
Arecanut Tree in Dry Land	260000.00000	/Acre
Bagayat, Wet	140000.00000	/Acre

Annexure VI A
Agreement to Sale (ATS)

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AGREEMENT TO SELL

THIS AGREEMENT TO SELL IS MADE AND EXECUTED ON THIS THE THIRTEETH DAY OF SEPTEMBER TWO THOUSAND FIFTEEN (30/09/2015) AT HIRIYUR:

BY:

1. **SRI. MANJUNATHA @ J. MANJUNATHA**
   S/o. Late Jagannatha,
   Aged about 32 years,

2. **SMT. GOWRAMMA**
   W/o. Sri. Manjunatha,
   Aged about 30 years,

3. **MISS. BINDUSHREE**
   D/o. Manjunatha,
   Aged about 9 years,

4. **MASTER MARUTHI,**
   S/o. Manjunatha,
   Aged about 7 years,

   Sellers No. 3 and 4 are minors
   represented by their Natural guardian
   and mother Gowramma

5. **SMT. PUTTAMMA,**
   W/o. Late Jagannatha,
   Aged about 50 years,

All are residing at Gollahalli Village,
Imangala Hobli, Hiriyur Taluk.

Represented by their GPA holder
SMT. LAKSHMI H. V. vide GPA dated 23.07.2015

Registered as Document No.
HYR-4-00057/2015-16 and

Registered as Document No.
HYR-4-00058/2015-16.

Lakshmi H.V.

RE POWER (RAJ.) LTD. RAJ.

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ಸಬ್ ರಜಿಸ್ಟ್ರಾರ ಹಿರಿಯೂರು ರವರ ಕಛೇರಿಯಲ್ಲಿ ದಿನಾಂಕ 30-09-2015 ರಂದು 01:07:50 PM ಗಂಟೆಗೆ ಈ ಕೆಳಗೆ ವಿವರಿಸಿದ ಶುಲ್ಕವೊಂದಿಗೆ

ಕ್ರಮ ಸಂಖ್ಯೆ	ವಿವರ	ರೂ. ಪೈ
1	ನೋಂದಣಿ ಶುಲ್ಕ	200.00
2	ಸ್ಟ್ಯಾಂಪಿಂಗ್ ಫೀ	560.00
3	ಪರಿಶೋಧನಾ ಶುಲ್ಕ	35.00
	ಒಟ್ಟು :	795.00

ಶ್ರೀ M/S Azure power (Raj) PVT. LTD... ಇವರಿಂದ ಹಾಜರ ಮಾಡಲ್ಪಟ್ಟಿದೆ

ಹೆಸರು	ಫೋಟೊ	ಹೆಬ್ಬೆಟ್ಟಿನ ಗುರುತು	ಸಹಿ
ಶ್ರೀ M/S Azure power (Raj) PVT. LTD...			

ಸಬ್ ರಜಿಸ್ಟ್ರಾರ

30-9-15

ಬರೆದುಕೊಟ್ಟದ್ದಾಗಿ(ಮತ್ತು ಪೂರ್ಣ /ಭಾಗಶಃ ಪ್ರತಿಫಲ ರೂ ..... (ರೂಪಾಯಿ) ..... ಮಾತ್ರ
ದ್ದಾಗಿ) ಒಪ್ಪಿರುತ್ತಾರೆ

ಕ್ರಮ ಸಂಖ್ಯೆ	ಹೆಸರು	ಫೋಟೊ	ಹೆಬ್ಬೆಟ್ಟಿನ ಗುರುತು	ಸಹಿ
1	G.P.A. Holder Represented by Lakshmi. H.V. (ಬರೆದುಕೊಡುವವರು)			Lakshmi H.V

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

IN FAVOUR OF:

M/s. AZURE POWER (RAJ.) PVT. LTD.,
No. 8, L.S.C.,
Madangir,
Pushp vihar,
New Delhi – 110 062

Represented by its Authorized Signatory
Sri. BHARATBHAI KHACHAR
S/o. SHANTUBHAI KHACHAR

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

WITNESSETH:

WHEREAS, the Sellers herein are the absolute owners and in peaceful possession and enjoyment of all piece and parcel of land bearing Sy.No.44/3, measuring 1 acre 30 guntas, situated at Gollahalli Village, Imangala Hobli, Hiriyur Taluk, Chitradurga District, Karnataka State which is more fully described in Item No. I of Schedule hereunder and hereinafter referred to as Item No. I of "SCHEDULE PROPERTY".

WHEREAS, herein are the absolute owners and in peaceful possession and enjoyment of all piece and parcel of land bearing Sy. No. 69/4, measuring 2 acres 9 guntas situated at Kandikere Village, Imangala Hobli, Hiriyur Taluk, Chitradurga District, Karnataka State, which is more fully described in Item No. II of Schedule hereunder and hereinafter referred to as Item No. II of "SCHEDULE PROPERTY".

Lakshmi H.V.

AZURE POWER (RAJ.) PVT. LTD. RAJ.

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ಕ್ರಮ ಸಂಖ್ಯೆ	ಹೆಸರು ಮತ್ತು ವಿಳಾಸ	ಸಹಿ
1	ಅಪ್ಪಾಸಾಹೇಬ್ ಬಿನ್ ಹನುಮಂತ ಬಿರಾದರ್ ಚಿತ್ರದುರ್ಗ	A Biradar
2	ನಾಗರಾಜ್ ಬಿನ್ ಕೃಷ್ಣಪ್ಪ ಶಿರಾ	[signature]

ಉಪ ನೋಂದಣಾಧಿಕಾರಿ,
ಹಿರಿಯೂರು
30-9-15

1 ನೇ ಪುಸ್ತಕದ ದಸ್ತಾವೇಜು
ನಂಬರ HYR-1-02992-2015-16 ಆಗಿ
ಸಿ.ಡಿ. ನಂಬರ HYRD229 ನೇ ದ್ದರಲ್ಲಿ
ದಿನಾಂಕ 30-09-2015 ರಂದು ನೋಂದಾಯಿಸಲಾಗಿದೆ

ಸಬ್ ರಿಜಿಸ್ಟ್ರಾರ್ (ಹಿರಿಯೂರು)
ಉಪ ನೋಂದಣಾಧಿಕಾರಿ,
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WHEREAS, the Sellers No. 1 got the title to the Item No. I and II of Schedule Property through a family partition and his name has been entered in Col. No. 9 of R.T.C. through M.R. No. 10/93-94 and M.R. No. 30/93-94. The Item No. I and II of the Schedule Property hereinafter collectively referred as Schedule Property.

By virtue of the Mutation Register the said Sri. Manjunatha Sellers No. 1 become absolute owners and in peaceful possession and enjoyment of the Schedule Property as on date by exercising lawful ownership and they have paid upto date tax to concerned authority. The Sellers No. 2 to 5 are the family members of Sellers No. 1. The Sellers are thus fully seized and possessed of the Schedule Property above said with power and authority to sell or otherwise dispose of the same in favor of any person/s of their choice as absolute owners.

Thereafter the said sellers have executed two General Power of Attorney dated 23.07.2015 in favour of Smt. Lakshmi H. V. registered as document No.HYR-4-0057/2015-16, Stored in CD No. HYRD227 and HYR-4-0058/2015-16, Stored in CD No.HYRD227, before the Sub-Registrar Hiriyur, in respect of Schedule Property.

WHEREAS, the Sellers are in need of funds to meet their legal, other family necessities as well as minors education and up-liftments desirous of disposing of the Schedule Property through their GPA Holder approached the Purchaser for the sale of the Schedule Property and the Purchaser agreed to purchase the same. WHEREAS the Sellers have offered to sell the Schedule Property for a total sale consideration of **Rs. 23,85,000/- (Rupees Twenty Three Lakh and Eighty Five Thousand Only)** the Purchaser herein has agreed to purchase the same for the said sum of **Rs. 23,85,000/- (Rupees Twenty Three Lakh and Eighty Five Thousand Only)** which is free from all encumbrances.

Lakshmi H.V.

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ನೋಂದಣಿ ಹಾಗೂ ಮುದ್ರಾಂಕ ಇಲಾಖೆ

Department of Stamps and Registration

ಪ್ರಮಾಣ ಪತ್ರ

1957 ರ ಕರ್ನಾಟಕ ಮುದ್ರಾಂಕ ಕಾಯ್ದೆಯ ಕಲಂ 10 ಎ ಅಡಿಯಲ್ಲಿಯ ಪ್ರಮಾಣ ಪತ್ರ

ಶ್ರೀ M/S Azure power (Raj) PVT. LTD.. . . ಇವರು 2385.00 ರೂಪಾಯಿಗಳನ್ನು ನಿಗದಿತ ಮುದ್ರಾಂಕ ಶುಲ್ಕವಾಗಿ ಪಾವತಿಸಿರುವುದನ್ನು ದೃಢೀಕರಿಸಲಾಗಿದೆ

ಪ್ರಕಾರ	ಮೊತ್ತ (ರೂ.)	ಹಣದ ಪಾವತಿಯ ವಿವರ
ಇತರ ಬ್ಯಾಂಕ್ ಡಿ.ಡಿ.	2385.00	ದಿ: 11/09/2015 ರಂದು ಮುದ್ರಾಂಕ ಶುಲ್ಕವನ್ನು D.D. ನಂ: 032028 ರಲ್ಲಿ 1050/- ರೂ ಮತ್ತು ಡಿ.ಡಿ. ನಂ: 032029 ರಲ್ಲಿ 1335/- ರೂಗಳನ್ನು S.B.I. ಬ್ಯಾಂಕ್ ಲಿ., ಸಾಕೇತ್, ನ್ಯೂಡೆಲ್ಲಿಯಲ್ಲಿ ಪಾವತಿಸಿದೆ.
ಒಟ್ಟು :	2385.00	

ಸ್ಥಳ : ಹಿರಿಯೂರು

ದಿನಾಂಕ : 30/09/2015

ಉಪ ನೋಂದಣಾಧಿಕಾರಿ
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Designed and Developed by C- DAC ,ACTS Pune.

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NOW IT IS HEREBY AGREED BY AND BETWEEN THE PARTIES AS FOLLOWS:

That in pursuance of the aforesaid and in consideration of the mutual obligations undertaken by the parties hereto, the Sellers shall sell and the Purchaser shall purchase the Schedule Property free from all encumbrances, mortgages, litigations, charges, maintenance charges, claims and demands, court attachments, acquisition proceedings, departmental and governmental proceedings etc., subject to the following terms and conditions:-

1) SALE PRICE:

1.1) The total consideration for the sale of Schedule Property is **Rs. 23,85,000/- (Rupees Twenty Three Lakh and Eighty Five Thousand Only).** The purchaser on this day on due performance of its part of agreement has paid a sum of **Rs.5,96,250/- (Rupees Five Lakh Ninety Six Thousand Two Hundred and Fifty only)** through Demand Draft bearing No. 029391 & 029392 both dated 14.09.2015, drawn on Axis Bank, Saket Branch, New Delhi, drawn in favour of Smt. Lakshmi H. V. who is the GPA holder of Sellers.

1.2) The Purchaser has agreed to make the payment of balance sale consideration of **Rs.17,88,750/- (Rupees Seventeen Lakh Eighty Eight Thousand Seven Hundred and Fifty Only)** at the time of execution of sale deed. Out of that a sum of **Rs. 39,750/- (Rupees Thirty Nine Thousand Seven Hundred and Fifty Only)** shall be paid through post dated cheque (90 days from the date of Sale Deed) and same shall be honoured after getting the Mutation in the name of Purchaser. If the Sellers obtains Mutation Register in the name of

Lakshmi H.V. ACME POWER (RAJ.) LTD. RAJ. Purchaser

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Purchaser within 90 days (any time) the Purchaser shall give the new cheques for same amount to the Sellers on the same date (mutation date). In the event obtaining of mutation is delayed more than 90 days the Purchaser shall give the new cheques for same amount to the Sellers for further 90 days.

The said sale consideration shall include the following terms and conditions:

i. The Sellers shall obtain NOC from Gram Panchayat within 30 days from the date of this Agreement.
ii. The Sellers shall put temporary fencing for the entire land required as per law to purchase the said land in name of Purchaser within 30 days from the date of this Agreement. The Purchaser shall co-operate with Seller.
iii. The Sellers shall obtain mutation entries and R.T.C. in the name of Purchaser within 90 days from the date of Sale Deed.
iv. The Sellers shall obtain the permission under 109 of The Karnataka Land Reforms Act 1961 within 30 days from the date of this Agreement in the name of Purchaser.
v. The Sellers shall obtain all Endorsement viz., PTCL Act, 79 (A) & (B), and 48 (A) and 7(A) of Karnataka Land Reforms Act 1961 within 30 days from the date of this Agreement.
vi. The Sellers shall obtain Nil Acquisition NOC's KHB, KIADB, NHAI, KPTCL, KSPCB, Department of Factories and Boilers, Railway within 30 days from the date of this Agreement.
vii. The Sellers shall furnish registered Mortgage Discharge Deed, Loan Clearance Certificate from the concerned Bank or Society.

Rajkumar H.U. RENEW POWER (RAJ) PVT. LTD. RAJ.

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2) PERIOD FOR COMPLETION:

The sale of Schedule Property shall be completed within sixty (60) days from this day, subject to the Sellers complying the terms and conditions of this Agreement and further subject to the Sellers satisfying their title over the Schedule Property unless otherwise both parties mutually extend or alter the period in writing only.

3) TITLE:

3.1) The Sellers hereby covenant, declare, assure and confirm that apart from them there is no other person interested or having any claim in Schedule Property or portions thereof and they have not entered into any Agreement to Sell in respect of the Schedule Property or its portions in favour of any other person and have not transferred part or whole of interest in the Schedule Property to any person in any manner and there is no restraint for them to sell the Schedule Property in terms of this Agreement. The sale of Schedule Property is subject to encumbrance free, clear and marketable title of Sellers to the same. The Sellers covenant and bind them and assure the Purchaser that:

a) that the Sellers are the sole and absolute owners of the Schedule Property and their title to the Schedule Property is clear, good, marketable and subsisting and that none else have any right, title, interest or share therein Schedule Property are free from encumbrances and claims including all claims by way of sale, exchange, mortgage, gift, inheritance, trust, possession, easement, lien or otherwise.

AZURE POWER (RAJ.) PVT. LTD. RAJ.

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b) that the Sellers have not entered into any agreement or arrangement for sale of the Schedule Property with anyone else and have not executed any Power of Attorney to deal with the Schedule Property except this G.P.A. holder.

c) The Sellers assure the Purchaser that they are not made any kind of sale transaction nor they are not received any sale consideration from any third parties towards the Schedule Property prior to this agreement.

d) that the Schedule Property is not subject matter of any proceedings and the same is not attached or sold or sought to be sold in whole or in portions in any Court or other Civil or Revenue or other proceedings and not subject to any attachment by the process of the courts or in the possession or custody by any Receiver, Judicial or Revenue Court or any officer thereof;

e) The Sellers assure the Purchaser that there is no acquisition, requisition or notification in respect of the schedule Property.

f) That Sellers do not have any pending liabilities with regard to income tax, wealth tax or any other tax which would affect this title to the Schedule Property;

g) That the Sellers have made available to the Purchaser herein all the facts and details in proof of their title and have not withheld any information in relation to the Schedule Property;

h) That the Sellers are not prevented from selling the Schedule Property to the Purchaser by any order of any Court or under any law;

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AZURE POWER (RAJ.) PVT. LTD. RAJ.

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i) That there is no prohibition or restriction on sale of the Schedule Property or delivery of possession;

3.2) The Sellers have agreed to deliver to the Purchaser all the original title deeds or agree to furnish such other documents as may be required by the Purchaser in respect of the Schedule Property and answer all reasonable requests to be made in respect of the title of the Sellers to the Schedule Property and the sale of Schedule Property are subject to marketability of title and free from all encumbrances.

3.3) The Sellers covenant that the sale of the Schedule Property is for the benefit of the Sellers and the members of their family.

4) PROPERTY TAXES:

The Sellers shall pay all outgoings and other charges and taxes etc., in respect of Schedule Property up-to this date and the Purchaser shall be liable to pay all the taxes from this date on wards.

5) STAMP DUTY AND REGISTRATION FEE:

The Purchaser shall bear and pay the cost of non-judicial stamp papers, registration fee and other expenses for this Agreement to Sell and registration of the Sale Deed.

6) SELLERS' COVENANT:

6.1) That during the tenure of this Agreement to Sell, the Sellers shall not deal with the Schedule Property or the possession or their title

Lakshmi H.U.

SHREE POWER (RAJ) PVT. LTD. RAJ.

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

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

6.3) That in the event of full payment of the said consideration amount on or before the period of this agreement agrees to execute necessary Sale deed and giving vacant possession and agrees to come over to the registration office for completing the registration. Moreover, this agreed land is subjected to full connectivity and the Sellers ensure the exact demarcation of the land from the Government Surveyor. The Sellers will extend full support to purchaser for putting the temporary fencing as well as soil testing before the sale deed of the Purchaser. The cost of temporary fencing and soil testing will be borne by Purchaser. Sellers confirm that there will be no trees on the agreed land before the execution of Sale deed.

6.4) Sellers shall take all the necessary approvals from concern authority/ies for sale which is in the name of Sellers as per the revenue records before the execution of Sale deed.

Lakhveer H.U.

ACTIVE POWER (RAJ.) PVT. LTD. RAJ.

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7) THE PURCHASER CONFIRMS:

7.1) That in the event of Purchaser fulfilling all the conditions of payment of Sale consideration, if the Sellers fails to execute necessary Sale deed and complete the registration on or before the completion of period of agreement the Sellers shall be to return the advance amount to the purchaser and the Sellers shall be liable for all damages and expenses of the purchaser and also the Purchaser reserved the rights to suit for specific performance.

7.2) That the Purchaser is buying this Property for the purpose of setup the Solar Power Plant on this land.

7.3) After the completion of formalities and legal diligence the title of sellers is found to be valid, and revenue documents matches to title the Purchaser will pay the balance sale consideration to the Sellers in the time of registration of sale deed with in stated period thereof.

8) SPECIFIC PERFORMANCE:

In the event of any default by the Sellers in compliance of their obligations under this Agreement, the Purchaser entitled to enforce specific performance at the cost and expenses of the Sellers and claim damages and consequential losses and damages arising out of such default. The Sellers assures and covenants to keep the Agreement in force and subsistence at all times. The Sellers undertake and bind not to do any act, deed or thing which will affect the absolute right of the Purchaser in dealing with the Schedule Property or portions thereof. Notwithstanding clause of damages mentioned above the parties are

Lakhveer H.U.

ALTURE POWER (RAJ.) PVT. LTD. RAJ.

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entitled to sue or to be sued in accordance with Specific Relief Act-1963.

9) **ARBITRATION:**

This Sale Agreement shall be governed under the laws of India and every dispute, difference or question which may at any time arise between the parties hereto or any person claiming under them, touching or arising out of or in respect of this MOU the subject matter thereof shall be referred to arbitration with the Arbitration and Conciliation Act – 1996 and the jurisdiction over any of the matter arising out of or pursuant to this MOU shall be at Bangalore.

10) **INDEMNITY:**

The Sellers assure that apart from them, there are no other persons interested in the Schedule Property or portions thereof and the Sellers hereby agree to keep the Purchaser at all times fully indemnified and harmless against any loss or liability, action or proceedings, cost or claims which may arise against the Purchaser or the Schedule Property and/or portions thereof by reason of any defect in or want of title on the part of the Sellers. The Sellers agreed and bind to defend the Purchaser herein against all claims and demands and the expenses in this regard shall fully borne by the Sellers.

11) **POSSESSION:**

The Sellers shall deliver and put the Purchaser in actual physical vacant possession of the Schedule Property at the time of execution of Sale Deed. The Sellers agreed not to deal with the Schedule Property in any manner prejudicial to the interest of the Purchaser and further

Lakshmi H.U.

AZURE POWER (RAJ.) PVT. LTD. RAJ.

Purchaser

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shall not alter the nature of the Schedule Property without the Purchaser consent.

12) CUSTODY:

The original of this Agreement shall be with the Purchaser and the Photocopy thereof with the Sellers.

Contents of the Sale Agreements has been read and explained to the Sellers in Kannada language and known to them.

SCHEDULE PROPERTY

Item No.I

All that piece and parcel of the immovable land bearing Sy. No. 44/3, measuring 1 Acres 30 guntas Situated at Gollahalli Village, Imangala Hobli, Hiriyur Taluk, Chitradurga District, Karnataka and bounded on:

East by : Land belongs to Ramalingaiah;
West by : Land belongs to Eranna;
North by : Land belongs to Thippeswamy;
South by : Land belongs to Mahalingappa;

Item No. II.

All that piece and parcel of Land bearing Sy. No. 69/4, measuring 2 acre 09 guntas situated at Kandikere Village, Imangala Hobli, Hiriyur Taluk and bounded on the:

East by : Land belongs to Veerendra;
West by : Land belongs to Savitramma;
North by : Land belongs to Veerendra;
South by : Land belongs to Pandappa;

Lakkireddi H.V.

AZURE POWER (RAJ.) PVT. LTD. RAJ.

8 15 16
2992

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

WITNESSESS:

1. Aboladar (Appasaheb Biradar) Chitradurga

2.

Lakshmi H.V.

SELLERS
Represented by their
GPA holder Smt. LAKSHMI H.V

For AZURE POWER (RAJ.) PVT. LTD.
Authorised Signatory

PURCHASER
M/s. AZURE POWER (RAJ.) PVT. LTD.
Rep. by its Authorised Signatory
Sri. BHARATBHAI KHACHAR

Drafted by:

SUBRAHMANYA HEGDE, Advocate.
ANANDA & HEGDE LAW ASSOCIATES
Bangalore
KAR 84/2009

[illegible] : 9,947

[illegible]

[illegible] 15

[illegible] 15 (148[illegible])

Print Date/Time: Wednesday, 30 September, 2015 - 1:23:15PM

[illegible] : 7,800

[illegible]

Details of Property: Properties situated in: Gollahalli having , Survey No - 0 ; Properties situated in: kondhikere having , Survey No - 0 ;

[illegible] 30/09/2015 [illegible] 30/09/2015 [illegible]

[illegible]	[illegible]	[illegible]	[illegible] (in Rs.)	[illegible]		[illegible]	[illegible]	[illegible]
				[illegible]	[illegible]	[illegible]		[illegible]
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Village Name: [illegible] Property Schedule Description: (LAND MARK)[illegible] 44/3, [illegible] 01 [illegible] 30 [illegible] (Schedule A:) [illegible] 44/3, [illegible] 01 [illegible] 30 [illegible] (EAST)[illegible] (WEST)[illegible] (SOUTH)[illegible] (NORTH)[illegible] (Note:)	30/09/2015	[illegible] Market Value 0.00 Consideration 2,385,000.00	(1)G.P.A. Holder Represented by Lakshmi. H.V.	(1)M/S Azure power (Ilop) PVT LTD. . .	HYRD229	9	HYR-1-02992-2015-16

	Village Name: [illegible] Property Schedule Description: (LAND MARK)[illegible] 69/4, [illegible] 02 [illegible] 09 [illegible] (Schedule A:) [illegible] 69/4, [illegible] 02 [illegible] 09 [illegible] (EAST)[illegible] (WEST)[illegible] (SOUTH)[illegible] (NORTH)[illegible] (Note:)	30/09/2015	[illegible] Market Value 0.00 Consideration 2,385,000.00	(1)G.P.A. Holder Represented by Lakshmi. H.V.	(1)M/S Azure power (Ilop) PVT LTD. . .	HYRD229	16	HYR-1-02992-2015-16

[illegible] ....
[illegible] ....

[illegible] ....

[illegible] : [illegible] :

[illegible]

[illegible] (1) [illegible]

(2) [illegible] 57 [illegible] 138 (1) [illegible]

(a) [illegible]

(b) [illegible]

Annexure VII

Preliminary Record

Form No. 1

PRELIMINARY

Serial Number	Survey number	Reference to Old Khata: Khata number	Reference to Old Khata: Name of Khatedar	Sub-Division number	Area	Assessment	Land …	Person in possession of Government land or alienated land (otherwise as tenant for a period …)
1	2	3	4	5	6	7	8	9
125	43	2		3	7 14 18 31	48		[illegible]
126	44	2	[illegible] 19.12.78	4	0 29	2 20		[illegible]
127				1 [2]	0 38	44		[illegible]
128				2	2 14	1 10		[illegible]
129?				3	2 34	1 00		[illegible]

Brief description of nature of Right and date of acquisition thereof, where available [illegible]	Reference to Mutation Register [illegible]	Reference to Disputed Case Register [illegible]	Reference to Record of Rights [illegible]	Other rights and encumbrances, such as easements, hypothecations, etc., which do not transfer possession, with names of right holders or encumbrancers [illegible]		[illegible]	[illegible]	[illegible]	Remarks
				Name of holder [illegible]	Nature of Rights [illegible]				
10	11	12	13	14	15	16	17	18	19

Annexure VIII

RTC (translated sample unfilled RTC)

RECORDS OF RIGHTS, TENANCY AND CROP INSPECTION (R.T.C)

Village Type: 2
Taluk Office Seal **Taluk: Hiriyur** **Hobli : Aimangala** **Village: Kandikere** **Page Serial No.**

1. Survey Number	3. Khetvaru	Acre Guntas	4.Assessment	Rs. P.	9. Name of the owner of Khaljedar with Father's Name:	Measurement Acre Guntas	Khata No.	10. Nature of Possession	11. Other Rights and Liabilities	
									Rights:	Liabilities:
70 *	Total Measurement (A) Pot Kharab (B) Pot Kharab Balance	6.00.00.00 6.00.00.00	(A) Assessment (B) A Pair of (C) Cessess	6.36	Sangeetha	6.00.00.00	267	MR H42/2014-15 Sale 28.02.2015		
2. Hissa 2			Total	6.36						

5. Type of Soil	7. Number of Trees		8. Irrigation as Khetwar				
	Name	No.	Sl. No.	Source	Mungari	Hingari	Gardens	Total
Black								
6. Patta								
Govt.								

12. Tenancy Details — 13. Land Utilisation and Crop details

Year and Season 1	Actual Cultivators Name and Place of residence 2	Mode of Cultivation 3	Tenancy: Area on Lease 4 Acre Guntas	Tenancy: Rent fixed 5	Land Utilisation: Class 6	Land Utilisation: Area 7 Acre Guntas	Dry Irrigated garden	Crop 9	Area Sown: Pure 10	Area Sown: Mixed 11	Area Sown: Total 12	Source of Irrigation 13	Estimated Production per Acre 14	Gross Area under mixed crops: Mixture Area under each constituent crop 15	Gross Area under mixed crops: Area 16
2014-15	Sangeetha	Own						Dry			6-00				

Annexure IX

Old and New RTC

Sy.No 44/2

ರೆಕಾರ್ಡ್ ಆಫ್ ರೈಟ್ಸ್ ಗೇಣಿ ಮತ್ತು ಪಹಣಿ ಪತ್ರಿಕೆ

ಪುಟ ಕ್ರಮ ಸಂಖ್ಯೆ

ತಾಲ್ಲೂಕು [illegible] ಹೋಬಳಿ [illegible] ಗ್ರಾಮ [illegible]

1 ಸರ್ವೆ ನಂಬರು: [illegible]	3 ಕ್ಷೇತ್ರಫಲ ... ಒಟ್ಟು ವಿಸ್ತೀರ್ಣ (ಎ. ಗು.): 3-14 ... ಉಳಿದದ್ದು: 3-14	4 ಕಂದಾಯ ... (ಅ) ಮೂಲ ಕಂದಾಯ (ರೂ. ಪೈಸೆ): [illegible] (ಬ) ಜೋಡಿ (ಕ) ಸೆಸ್ಸುಗಳು (ಡ) ನೀರಿನ ದರ ... ಒಟ್ಟು
2 ಹಿಸ್ಸಾ: 2		
5 ಮಣ್ಣಿನ ನಮೂನೆ	7 ಮರಗಳ ಸಂಖ್ಯೆ	8 ಕ್ಷೇತ್ರವಾರು ಪ್ರಕಾರ ನೀರಾವರಿಯ ವಿಸ್ತೀರ್ಣ
6 ಪಟ್ಟಾ		

9 ಅಧಿಭೋಗದಾರ ಅಥವಾ ಸ್ವಾಧೀನದಾರನ ಹೆಸರು ತಂದೆ ಹೆಸರು ಮತ್ತು ವಿಳಾಸ: [illegible]

ಖಾತೆ ನಂ.

10 [illegible]

11 [illegible]

12 ಗೇಣಿಯ ವಿವರಗಳು

13 ಭೂಮಿಯ ಉಪಯೋಗ ಮತ್ತು ಬೆಳೆಗಳ ವಿವರ

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
[illegible]					[illegible]	3-14	[illegible]								
	[illegible]				[illegible]	3-14	[illegible]	[illegible]	3-14		3-14				
						[illegible]			[illegible]		3-14				

ತಾಲ್ಲೂಕು 1 2 7 ಶಿರಾಗಿ 3 6 4 4

ರೆಕಾರ್ಡ್ ಆಫ್ ರೈಟ್ಸ್, ಗೇಣಿ ಮತ್ತು ಪಹಣಿ ಪತ್ರಿಕೆ (R.T.C) ಫಾರಂ ನಂ. ೧೬

Village Account Form No. 2

Valid from 27/10/2001 To Till Date

ಹೋಬಳಿ : ಐಮಂಗಲ ಗ್ರಾಮ : ಗೌಡನಹಳ್ಳಿ ಪುಟದ ಕ್ರಮ ಸಂಖ್ಯೆ : 223

3. ವಿಸ್ತೀರ್ಣ	ಎಕರೆ ಗುಂಟೆ	4. ಕಂದಾಯ	ರೂ. ಪೈ	9. ಕಬ್ಜೆದಾರರ ಹೆಸರು ಮತ್ತು ವಿಳಾಸ	ವಿಸ್ತೀರ್ಣ ಎ. ಗುಂ	ಖಾತೆ ನಂ.	10. ಕಬ್ಜೆ ಅಥವಾ ಸ್ವಾಧೀನತೆಯ ರೀತಿ	11. ಋಣಗಳು	ಹಕ್ಕುಗಳು
ಒಟ್ಟು ವಿಸ್ತೀರ್ಣ ಪೋಟ್ ಖರಾಬ್ (ಅ) ಪೋಟ್ ಖರಾಬ್ (ಬ) ಉಳಿದದ್ದು	3.14.00.00 3.14.00.00	(ಅ) ಜಮೀನು ಕಂದಾಯ (ಆ) ಜೋಡಿ (ಇ) ಸೆಸ್ಸುಗಳು (ಈ) ನೀರಿನ ದರ ಒಟ್ಟು	4.06 4.06	•ತಿಪ್ಪೇಸ್ವಾಮಿ ಬಿನ್ ಸಣ್ಣರಂಗಪ್ಪ	3.14.00.00	44		ಮ್ಯು.ಗಾ.ಷರಾ ವಜಾ	ಎಸ್.ಸಿ.ಎಸ್. ಮರಡಿಹಳ್ಳಿ

7. ಮರಗಳ ಸಂಖ್ಯೆ		8. ಬೇಸಾಯದ ಪ್ರಕಾರ ನೀರಾವರಿಯ ವಿಸ್ತೀರ್ಣ					
ಹೆಸರು	ಸಂಖ್ಯೆ		ನೀರಾವರಿ ಮೂಲ	ಮುಂಗಾರು	ಹಿಂಗಾರು	ಬಾಗಾಯ್ತು	ಒಟ್ಟು

ಸಾಗುವಳಿ ಮತ್ತು ಗೇಣಿಯ ವಿವರಗಳು — 13. ಭೂಮಿಯ ಉಪಯೋಗ ಮತ್ತು ಬೆಳೆಗಳ ವಿವರ

ವರ್ಷ ಋತು 1	ಸ್ವಾಧೀನದಾರರ ಹೆಸರು ಮತ್ತು ಶಾಶ್ವತ 2	ಸಾಗುವಳಿ ಪದ್ಧತಿ 3	ಗೇಣಿಯ ವಿವರ ವಿಸ್ತೀರ್ಣ ಎ. 4 ಗುಂ	ಗುತ್ತಿಗೆ 5	ಭೂಮಿಯ ಉಪಯೋಗ ವರ್ಗ 6	ವಿಸ್ತೀರ್ಣ ಎ. 7 ಗುಂ	ಮಿಶ್ರ ಕರಿ. ಬಾಗಾಯ್ತು 8	ಬೆಳೆಯ ಹೆಸರು 9	ಬೆಳೆಯ ವಿಸ್ತೀರ್ಣ ಅಮಿಶ್ರ 10	ಮಿಶ್ರ 11	ಒಟ್ಟು 12	ನೀರಾವರಿಯ ಮೂಲ 13	ಎಕರೆಗೆ ಉತ್ಪತ್ತಿ 14	ಮಿಶ್ರ ಬೆಳೆಗಳ ಒಟ್ಟು ಮಿಶ್ರಣದ ಹೆಸರು 15	ವಿಸ್ತೀರ್ಣ ಎ. 16 ಗುಂ
2014-2015 ಮುಂಗಾರು	ತಿಪ್ಪೇಸ್ವಾಮಿ	ಸ್ವಂತ					---	No Crop Info.							

(RTC Unique No.: -T13061000342824, Printed on : 16/12/2014 15:01:48, Amount : 10 /-)

Page No.1/1

ಗ್ರಾಮ ಲೆಕ್ಕಿಗರ ಸಹಿ ಮತ್ತು ಗೌಡನಹಳ್ಳಿ

ಕರ್ನಾಟಕ ಭೂಕಂದಾಯ ನಿಯಮಗಳು 1966 ರ ನಿಯಮ 40, 42, 56 ಮತ್ತು 70

Annexure X

Kharab land Judgement

APPELLATE CIVIL*

Before: Narayana Pai, Chief Justice.

SAUDAGAR RASUL KHAN .. APPELLANT.

Vs.

STATE OF MYSORE BY ITS CHIEF SECRETARY, VIDHANA SOUDHA, BANGALORE, AND OTHERS .. RESPONDENTS.

1973

..Mysore Land Revenue Rules—Title to 'Kharab' land—Transfer of Property in—"Kharab" land What is—Does it get transferred along with cultivable land adjacent to it or is it also capable of "Ownership":

Held.—Kharab land is so called because it is not cultivable and is a classification made for purposes of revenue exemption. Kharab land is also capable of Ownership, and cannot be regarded as an adjunt to cultivable land which gets transferred along with the cultivable land. Acquisition of title to the Kharab land is similar to the acquisition of title to the cultivable land. (Page 6).

Sri M. S. Gopal in both the appeals for the Appellants.

Sri Annadanayya Puranik, H.C.G. Pleader in both the appeals for the Respondents.

JUDGMENT

The appellant filed O. S. 290 of 1963 for declaration of his title in respect of S. Nos. 167/1 and 167/2 of Talaguppa village and for injunctions against the respondents viz., the State Government, the Executive Engineer and the Village Panchayat of Talguppa against interferring with his possession and directing the demolition of the buildings put up on the suit land. During the pendency of the suit, certain water-pipes appeared to have been laid on the suit land. Hence, the appellant filed another suit O. S. 118/64 for removal of those water-pipes.

* R.S.A. No. 840/1968. Against RA 34 of 66 dated the 14th ... on the file of Civil Judge, Shimoga and R.S.A. No. 49 ... dated 14th June 1968 on the file of Civil Judge ... Munisiff, Sagar on O.S. 290/63.

2. It is in evidence that the offending buildings and the water pipes etc., are situate in Kharab portion of the land. It is also not disputed that S. No. 167/1 comprises of 5 acres and 15 guntas of cultivable land and 2 acres and 25 guntas of Kharab land and that S. No. 167/2 consists of 6 acres of cultivable land and 2 acres and 29 guntas of kharab land. These two survey sub-divisions, were purchased by the plaintiff under two sale deeds *viz.*, Ex. P. 2 dated 26th May 1945 and Ex. P. 3 dated 7th July 1945.

3. The said sale deeds mention expressly in the body of the text that what was sold under Ex. P. 2 was 5 acres and 15 guntas of cultivable land and what was sold under Ex. P. 3 was 6 acres of cultivable land. The plaintiff, in his oral evidence, admitted that he had purchased only the cultivable land and not the kharab land.

4. It is on these facts that the courts below dismissed the suit upon the finding that the plaintiff had not acquired any title to the kharab portion.

5. The argument that the boundaries should have been taken into account cannot be accepted for the simple reason that the main boundaries of the survey numbers would take in the portion where the traveller's bungalow and attached buildings are situated, and the sale deeds expressly exclude this portion. The evidence discloses that the traveller's bungalow and the meti house and the approach road etc., actually occupy an area of over 5 acres which is exhaustive of the extent of the kharab land comprised in S. Nos. 167/1 and 167/2.

6. It was also suggested for the first time in this court that because the Revenue Rules permit the owner of the adjacent cultivable land to bring the kaharb land belonging to the Government under cultivation, one should presume that when the cultiable land is sold, some sort of title in respect of the adjacent khrab land is alo conveyed. It is difficult to accept this proposition. Kharab land is so called because it is not cultivable and is a classification made for purposes of revenue exemption. Kharab land is also capable of ownership, and cannot be regarded as an adjunct to cultivable land which gets transferred along with the cultivable land. Acquisition of title to the Kharab land is similar to the acquisition of title to the cultivable land.

7. The finding of the courts below is one of fact and no question of law arises.

Both the second appeals are therefore, dismissed. No

Annexure XI

Notification on section 109

RNI No. KARBIL/2001/47147

ಕರ್ನಾಟಕ ರಾಜ್ಯಪತ್ರ

ಅಧಿಕೃತವಾಗಿ ಪ್ರಕಟಿಸಲಾದುದು

ವಿಶೇಷ ರಾಜ್ಯ ಪತ್ರಿಕೆ

ಭಾಗ - IV-A	ಬೆಂಗಳೂರು, ಗುರುವಾರ, ಆಗಸ್ಟ್ ೨೮, ೨೦೧೪ (ಭಾದ್ರಪದ ೬, ಶಕ ವರ್ಷ ೧೯೩೬)	ಸಂ. ೫೩೯
Part - IV-A	Bangalore, Thursday, August 28, 2014 (Bhadrapada 6, Shaka Varsha 1936)	No. 539

ಸಂಸದೀಯ ವ್ಯವಹಾರಗಳು ಮತ್ತು ಶಾಸನ ರಚನೆ ಸಚಿವಾಲಯ

ಅಧಿಸೂಚನೆ

ಸಂಖ್ಯೆ: ಸಂವ್ಯಶಾಇ 24 ಶಾಸನ 2014, ಬೆಂಗಳೂರು, ದಿನಾಂಕ: 28-08-2014

ದಿ ಕರ್ನಾಟಕ ಲ್ಯಾಂಡ್ ರಿಫಾರ್ಮ್ಸ್ ಅಂಡ್ ಸರ್ಟೇನ್ ಅದರ್ ಲಾ (ಅಮೆಂಡ್‌ಮೆಂಟ್) ಬಿಲ್, 2014ಕ್ಕೆ 2014ರ ಆಗಸ್ಟ್ ತಿಂಗಳ 25ನೇ ದಿನಾಂಕದಂದು ರಾಜ್ಯಪಾಲರ ಒಪ್ಪಿಗೆ ದೊರೆತಿದ್ದು, ಸಾಮಾನ್ಯ ತಿಳುವಳಿಕೆಗಾಗಿ ಇದನ್ನು 2014ರ ಕರ್ನಾಟಕ ಅಧಿನಿಯಮ ಸಂಖ್ಯೆ27 ಎಂಬುದಾಗಿ ಕರ್ನಾಟಕ ರಾಜ್ಯ ಪತ್ರದಲ್ಲಿ ಪ್ರಕಟಿಸಬೇಕೆಂದು ಆದೇಶಿಸಲಾಗಿದೆ.

KARNATAKA ACT NO. 27 OF 2014

(First Published in the Karnataka Gazette Extra-ordinary on the Twenty eighth day of August 2014)

THE KARNATAKA LAND REFORMS AND CERTAIN OTHER LAW (AMENDMENT) ACT, 2014

(Received the assent of the Governor on the Twenty fifth day of August 2014)

An Act further to amend the Karnataka Land Reforms Act, 1961 and the Karnataka Land Revenue Act, 1964.

Whereas it is expedient further to amend the Karnataka Land Reforms Act, 1961 (Karnataka Act 10 of 1962) and the Karnataka Land Revenue Act, 1964 (Karnataka Act 12 of 1964) for the purposes hereinafter appearing;

Be it enacted by the Karnataka State Legislature in the sixty fifth year of the Republic of India, as follows:-

1. Short title and commencement.- (1) This Act may be called the Karnataka Land Reforms and Certain Other Law (Amendment) Act, 2014.

(2) It shall come into force at once.

2. Amendment of Karnataka Act 10 of 1962.- In the Karnataka Land Reforms Act, 1961 (Karnataka Act 10 of 1962) in section 109,-

(i) after sub-section(1A), the following shall be inserted, namely:-

"(1B) in cases where the land in any area, cannot be utilized for the purpose of industrial development, educational institutions, Places of worship, a Housing Project approved by the State Government or Horticulture purpose under sub-section (1) within the prescribed time, such land shall be surrendered to the land bank of the Government, failing which the exemption shall be cancelled and same be forfeited to the Government without paying compensation."

(ii) after sub-section (2) the following proviso shall be inserted, namely:-

"Provided that, any of the Company or Organization, after a period of seven years from the date of obtaining permission under section 109, for the purpose of expansion of project or to tide over the financial crisis or for changing of land usages, submit application, which shall be considered by the High Power Committee headed by the Chief Secretary to Government subject to such conditions as deemed fit on case to case basis."

3. Amendment of Karnataka Act 12 of 1964.- In the Karnataka Land Revenue Act, 1964, (Karnataka Act 12 of 1964) in section 95, after sub-section (7), before explanation, the following shall be inserted, namely:-

"(8) The permission for diversion of agricultural land for industrial development, educational institutions, Places of worship a Housing Project approved by the State Government, or for purpose of Horticulture under this section shall be deemed to have been granted when permission for purchase of agricultural land is accorded under section 109 of the Karnataka Land Reforms Act, 1961 (Karnataka Act 10 of 1962) for industrial development, educational institutions, Places of worship, a Housing Project approved by the State Government, or for purpose of Horticulture as the case may be subject to the payment of fees as may be prescribed."

By Order and in the name of the Governor of Karnataka,

S.B. GUNJIGAVI
Secretary to Government
Department of Parliamentary Affairs

Annexure XII

Socio- Economic Survey Sample Questionnaire for Village Profile

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

Land rights					
Livestock	***Cow***	***Buffalo***	***Goat***	***Pig***	***Fowl***
	Duck	***Others***			
Grazing areas					
Cooking medium and source	***Fuel Wood***	***Kerosene***	***Cow Dung cake***	***Crop Residue***	***LPG***
	Others				
Common property Resources(CPR)	***Religious and cultural places***	***Sacred places***	***Community hall***	***community Ponds***	***Cremation ground***
	Streams	***canal***	***river***	***Others***	
Major rituals and festivals	***Name***	***Period***	***Name***	***Period***	
Fishing area		***Name of the***			
Forest	***Wood***	***Timber***	***NTFP***	***Others***	
Any Vulnerable Groups like- landless/homeless- people, Women headed HH, Orphans etc.					
Any program related to child / women health care program					
Any employment generation program					
HH & Cottage industries in the village / area					
Any proposed Scheme / Program related infrastructure / any amenities					
Occurrence any Natural Calamities / industrial / anthropogenic Hazard					

Annexure XIII

Demographic Profile of the Study Area Villages

Sl No	Particular	Household	Total Population	Ave. HH Size	Male Pop.	% M	Female Pop.	% F	Sex Ratio
A	**District level**								
1	Chitradurga	357003	1659456	4.6	840843	50.67	818613	49.33	974
B	**Tehsil/Block level**								
1	Challakere	76361	365784	4.8	185931	50.83	179853	49.17	967
2	Hiriyur	64086	286133	4.5	144160	50.38	141973	49.62	985
C	**Study Area Villages**								
1	Kaparahalli	360	1531	4.3	773	50.49	758	49.51	981
2	Jadekunte	246	1111	4.5	558	50.23	553	49.77	991
3	Khandikere	399	1854	4.6	947	51.08	907	48.92	958
4	Gollahalli	218	882	4.0	430	48.75	452	51.25	1051

Source- census data 2011

Annexure XIV

Schedule cast and Schedule tribes Population in Study Area

S. No	Particular	Total Population	SC Population	% SC	ST Population	% ST
A	**District level**					
1	Chitradurga	1659456	389117	23.45	302554	18.23
B	**Tehsil/Block level**					
1	Challakere	365784	82899	22.66	107640	29.43
2	Hiriyur	286133	71730	25.07	28028	9.80
C	**Study Area Villages**					
1	Kaparahalli	1531	782	51.08	16	1.05
2	Jadekunte	1111	71	6.39	22	1.98
3	Khandikere	1854	337	18.18	209	11.27
4	Gollahalli	882	179	20.29	95	10.77
	Average			**33.42**		**6.14**

Source- census data 2011

Annexure XV

Literacy rates of study area villages

S. No	Particular	Total Literate	% Total	Male Literate	% M	Female Literate	% F
A	**District level**						
1	Chitradurga	1087392	73.71	607188	81.37	480204	65.88
B	**Tehsil/Block level**						
1	Challakere	224637	69.22	128140	77.84	96497	60.34
2	Hiriyur	188743	73.91	104445	81.32	84298	66.41
C	**Study Area Villages**						
1	Kaparahalli	1054	76.05	576	81.24	478	70.61
2	Jadekunte	766	75.84	412	82.57	354	69.28
3	Khandikere	1152	69.65	666	79.67	486	59.41
4	Gollahalli	598	75.13	323	84.55	275	66.43

Source- census data 2011

Annexure XVI

Workforce Participation for Study Area Villages/Tehsil/District

Particular	Total Worker	Work Participation Rate	% Cultivator	% Agriculture Labour	% Household Worker	% Other Worker
District level						
Chitradurga	856587	51.62	30.01	22.50	1.95	23.46
Tehsil/Block level						
Challakere	199247	54.47	27.64	24.78	2.23	19.89
Hiriyur	145256	50.77	28.21	24.24	2.45	23.14
Study Area Villages						
Kaparahalli	797	52.06	34.88	46.93	1.25	6.15
Jadekunte	712	64.09	63.2	17.7	2.25	11.24
Khandikere	928	50.05	30.39	31.90	0.32	11.21
Gollahalli	585	66.33	29.06	67.01	1.03	2.56

Source- census data 2011

Annexure XVII

Village wise Information of Infrastructure in Study Area

Sr. No.	Village	Educational Institution	Health Facilities	Drinking water supply	Communication (PO&PH)	Transportation (Bus & Rail)	Approach Road	Power Supply
District: Chitradurga								
Tehsil: Challakere, Hiriyur								
1	Kaparahalli	P(2), M(1), H(1)	HSC(1)	HP, TPW, TW	PH-A	BS	APR, AMR	ED, EA
2	Jadekunte	P(2)	-	HP, TPW, TW	PH-A	BS	APR, AMR	ED, EA
3	Khandikere	P(1), M(1), H(1)	HSC(1)	HP, TPW	PH-A	BS	APR, AMR	ED, EA
4	Gollahalli	P(1)	-	HP, TPW, TW			APR, AMR	ED, EA

Source – District Census Handbook, 2011

Abbreviation

Education
P: Primary school
M: Middle school
SS: Senior Secondary School
H: High school
C: Collage

Health Facilities
PHC: Primary Health Centre
HSC: Health Sub Centre
UH: Unani Hospital
DIS: Allopathic Dispensary
PMP: Registered Private Medical Practitioners
PNH: Private Nursing Home
CWC: Child Welfare Centre
A: Available

Drinking water
TPW: Tap water
W: Well water
TW: Tube water
HP: Handpump

Transport facility
BS: Bus service

Post and telegraph
PO: Post office
PH: Telephone connection

Road
APR: Approach paved roads
AMR: Approach mud roads
AFP: Approach foot path
ANC: Approach - navigable canal

Power Supply
ED: Electricity for domestic purpose
EA: Electricity for all purpose

Annexure XVIII

Protected Monuments in Chitradurga District, Karnataka

Sl. no	Name of monument(s)	Location	Distance from the project site (km)
1	Rangayyana Bagilu,Fort Gate	Chitradurga	More than 20 km
2	Siddeswara Temple	Chitradurga	More than 20 km
3	Channakeshava Temple	Chitradurga	More than 20 km
4	Trisankeswara Temple	Chitradurga	More than 20 km
5	Lakshminarayana Temple	Chitradurga	More than 20 km
6	Rock cut Temples	Chitradurga	More than 20 km
7	Jain Bastis	Chitradurga	More than 20 km

Source: Archeological Survey of India/Karnataka/Chitradurga

Annexure XIX

Stakeholders Participant List

Sr. No.	Person Name	Gender M/F	Designation	Village/township/local govt. institution	Date	Signature
1	G T SHARANAPPA	M	AGL: ~~L.S. (Land Seller)~~	Byalahal.	5/10/15	
2	H [illegible]	M	L.S.	Kandikere	5/10/15	
3	[illegible]	M	L.S.	Kandikere	5/10/15	
4	[illegible]	M	L.S.	Kandikere	5/10/15	
5	Hanumantha. D	M	L.S.	Byalahal	5/10/15	
6	[illegible]	M	L.S.	[illegible]	5/10/15	
7	[illegible]	M	L.S.	Kapanahalli	5/10/15	
8	[illegible]	M	L.S.	[illegible]	5/10/15	
9	V. Raja	M	L.S.	[illegible]	5/10/15	
10	[illegible]	M	L.S.	[illegible]	5/10/15	
11	[illegible]	M	L.S.	[illegible]	5/10/15	
12	V. Raja	M	L.S.	[illegible]	5/10/15	
13	[illegible]	M	L.S.	[illegible]	5/10/15	
14	[illegible]	M	L.S.	[illegible]	5/10/15	
15	[illegible]	M	L.S.	[illegible]	5/10/15	
16	[illegible]	M	L.S.	[illegible]	5/10/15	
17	[illegible]	M	L.S. (Land Seller)	[illegible]	5/10/15	
18	K. Siddu	M	Land Seller	Galahalli	5/10/15	
19	[illegible]	M	Land Seller	[illegible]		
20	V M [illegible]	M	Land Seller	[illegible]	5/10/15	
21	NATARAJ	M	Land Ag	Ag. Sire		
22	[illegible]	M	Land Sch.	Ag Sire.	5/10/15	
23	Ved Murthy	M	Belagere PDO = Belagere Panchayat President	Belagere Panchayat Kapanahalli, Galahalli Kandikere	6/10/15	
24	Shivanand Appa	M			6/10/15	

Stakeholder holder's participation list

Sr. No.	Person Name	Gender M/F	Designation	Village/township/local govt. institution	Date	Signature
25	Shivanna	M	Panchayat member	Kanalikere	6/10/15	
26	Subramanya Hegde	M	Lawyer & Agiure	Bangalore	7/10/15	
27	Mahesh Shetty	M	Team Agiure Team	Chitradurga	7/10/15	
28	Appa Saheb	M	Agiure Team	Chitradurga	7/10/15	
29	Kachur Barat	M	Agiure Lead Team	Chitradurga	7/10/15	
30	Jitendra Team	M	Agiure Team	Chitradurga	7/10/15	
31	Sanjulata	F	Env. Expert ARCADIS	Chitradurga	7/10/15	
32	Dr Rajani Iyer	F	Sr. Sociologist ARS	Chitradurga	7/10/15	
33	Dhirendra	M	Sociologist	Chitradurga	7/10/15	
34	Ishwar Appa	M	Panchayat member	Sanikere Panchayat	5/10/15	
35	Jagarappa	M	Vice President	Sanikere Panchayat	5/10/15	
36	Tippe Swami	M	Panchayat member	Sanikere Panchayat	5/10/15	

Annexure XX

Photographs –Stakeholder Consultation and amenities

Photographs-site visit

Consultation with land sellers from Gollahalli village, Chhitradurga

Consultation with land sellers from Kaparahalli village, Chhitradurga

Consultation with land aggregator, Chhitradurga

Consultation with land seller one to one, Kaparahalli village

Consultation with Panchayat Development Officer (PDO) Belagere Panchayat, Chhitradurga

Consultation with Panchayat president Kandikere village

Consultation with Panchayat president Sanekere Panchayat, Challakere

Consultation with staff- minor irrigation Dept., Chhitradurga

ARCADIS team visit at KSPCB, Chhitradurga

Primary Health Centre in Yaraballi Panchayat

Higher secondary school in Yaraballi Panchayat

Annexure XXI

Worker Housing Standards-ILO

No.6
ILO HELPDESK
ASSISTANCE@ILO.ORG
International Labour Organization

Workers' housing

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

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

Guiding principles

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

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

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

Siting and construction

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

The location of workers' housing should ensure that workers are not affected by air pollution, surface run-off or sewage or other wastes.1[10]

Housing Standards

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

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

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

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

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

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

Sanitation facilities

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

Health and safety

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

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

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

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

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

Inspection of premises

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

Vacating the premises upon termination of employment

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

Consultation

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

References

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

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

[12] R. 115, Suggestions Concerning Methods of Application, Part IV, paragraph 17.

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

[14] R. 115, Suggestions Concerning Methods of Application, Part IX, paragraph 42.

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