# **Environmental and Social Due Diligence Report**

# 100 MW(AC) Solar PV Project (200MWp DC capacity) along with 50MW/150 MWh Battery Energy Storage System

# at Rajnandgaon, Chhattisgarh

*by* Solar Energy Corporation of India Limited *(A Government of India Enterprise)* 





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#### LIST OF ABBREVIATIONS

| AC      | Alternating current                                       |
|---------|---|
| CSPDCL  | Chhattisgarh State Power Distribution Corporation Limited |
| BESS    | Battery energy storage solution                           |
| BMS     | Battery Management System                                 |
| BPL     | Below Poverty Line  |
| CEA     | Central Electricity Authority                             |
| CPCB    | Central Pollution Control Board                           |
| CTE     | Consent to Establish                                      |
| СТО     | Consent to Operate  |
| DC      | Direct current  |
| EHS     | Environment, Health and Safety                            |
| EMP     | Environmental Management Plan                             |
| EPC     | Engineering Procurement and Construction                  |
| ESIA    | Environmental and Social Impact Assessment                |
| ESMF    | Environment and Social Management Framework               |
| ESMP    | Environmental and Social Management Plan                  |
| ESS     | Energy Storage System                                     |
| GAP     | Gender Action Plan  |
| GRM     | Grievance Redressal Mechanism                             |
| GW      | Giga Watt   |
| IUCN    | International Union for Conservation of Nature            |
| LC      | Least Concern   |
| MNRE    | The Ministry of New and Renewable Energy                  |
| MoEF&CC | Ministry of Environment, Forests & Climate Change         |
| NT      | Near Threaten   |
| PAP     | Project Affected Persons                                  |
| PV      | Photovoltaic  |
| RES     | Renewable energy sources                                  |
| MSL     | Mean Sea Level  |
| O&M     | Operation and Maintenance                                 |
| SC      | Scheduled Caste   |
| SEIAA   | State Environment Impact Assessment Authority             |
| SECI    | Solar Energy Corporation of India Limited                 |
| SEMS    | Social and Environmental Management System                |
| SPCB    | Sate Pollution Control Board                              |
| WB      | World Bank  |
|         |   |



## EXECUTIVE SUMMARY

#### Introduction & Project Description

Solar Energy Corporation of India Ltd. (SECI) is a CPSU under the administrative control of the Ministry of New and Renewable Energy (MNRE), set up on 20<sup>th</sup> Sept 2011 to facilitate the implementation of scaling up solar program within India. Its focus has been expanded to include wind energy as well. SECI plans to set-up a 100 MW solar PV project along with Battery Energy Storage System at the project site located in Rajnandgaon district, Chhattisgarh. In the said Project it is proposed to setup 100MW(AC) Solar PV Project (200MWp DC Capacity) with 50MW/150 MWh Battery Energy Storage system.

#### Existing Scenario & Necessity of this project

Analysis of the consumption data of the state suggests a typical demand curve with a steady base load during the day and a marked evening peak between the 72<sup>nd</sup> (6 in the evening) and 88<sup>th</sup> (11 in the night) time-blocks. Based on the complete dataset available for the years 2018 and 2019, Year-on Year growth is approx. to be around 7% (from 3269 MW in 2018 to 3501 MW in 2019) with the load curve character remaining same. The average purchase price of Peak power is approx. Rs. 4.50 over the last two calendar years (2018 and 2019). In the year 2019, the state purchased approx. 470 MUs of energy to meet the peak demand from the IEX at a weighted average energy price of Rs. 4.46/unit. During the evening (between 6 pm to 9 pm) the demand peaks, on an average, to approx. 250 MW above the off-peak load.

For the financial year of 2019-20, Chhattisgarh State Power Distribution Company Limited accrues a power purchase cost of INR 3.27 for power from Central Generating Stations, INR 3.19 from State Generating Stations and INR 7.76 from various Renewable Energy Generators. Assuming an escalation of 3% year on year of the cost of electricity from the former two, financial analysis would show that a tariff of INR 4.00 for the proposed plant of 100 MW with BESS in Rajnandgaon would be cheaper than the renewable energy generators and would approach the cost of electricity from conventional energy sources. This builds a worthy case for the proposed plant.



#### **Approach and Methodology**

The Environmental and Social Management Framework (ESMF, June 2020 of SECI) is intended to identify and assess the several environment and social impacts (both positive and negative) that may result from the proposed setting up of 100MW(AC) Solar PV Project (200MWp DC Capacity) with 50MW/150 MWh Battery Energy Storage system, as well as to provide a corresponding management plan to handle any adverse/negative impacts.

All the available information and data (quantitative, qualitative) regarding the proposed project has been collected from the Detailed Project Report (DPR), consultation with stake-holders and other secondary sources including data from Chhattisgarh Environment Conservation Board, Asian Development Bank Report, Forest Survey Report, District Survey Report for minor mining etc.

The scope of the ESDDR that has been finalized on the basis of project screening and categorization are; describe the sub-project and its components; describe the baseline environmental and social conditions of the sub-project areas and the proposed project facilities; identification and analysis of key environmental issues viz. presence of any ecologically sensitive areas in the vicinity of the project site, as well as social issues (if any) associated with the project; interactions / discussions with the key stakeholders; Environmental and Social Screening and categorization of the sub-project as per the requirements of ESMF of SECI; develop Environmental and Social Management Action Plan (ESMAP) outlining suitable mitigation measures to be adopted by the relevant implementing actor; outline the requirements of specific permissions / clearances / approvals that may be applicable to the proposed project and the requirements of any detailed study [e.g. preparation of Environmental and Social Impact Assessment (ESIA), Resettlement Action Plan (RAP), Tribal Development Plan (TDP), etc.].

#### **Project Screening**

The project screening was carried out to understand the nature, scale and magnitude of environmental and social issues associated with the project. The screening activity was conducted as per the guidelines provided in Environmental and Social Management Framework (ESMF of SECI, June 2020) and on the secondary data analysis, field assessments and stakeholder interactions/consultations. Thereafter, based on the aforementioned the environmental and social impacts were identified and analyzed to develop an Environmental and Social Management Action



Plan (ESMAP) outlining suitable mitigation measures to be adopted by the relevant implementing actors associated with the present project.

Based on the Environmental and Social Screening carried out as part of this due diligence exercise using the screening matrix of the Environmental and Social Management Framework of SECI, the present project of setting up of 100MW(AC) Solar PV Project (200MWp DC Capacity) with 50MW/150 MWh Battery Energy Storage system, is categorized as 'Low Impact' category. The project components have limited environment and social impacts, which can be mitigated with the adoption of suitable mitigation measures.

#### **Baseline Environmental and Social Features**

The baseline information forms the basis to analyze the probable impacts of the proposed project vis-à-vis the present background environmental and social quality of the study area. The baseline information of existing environmental quality and social features related to the physio-chemical aspects, ecological aspects, socio-economic and cultural aspects of the project area has been collected and collated from various secondary sources and from available literature.

#### **Environmental and Social Impacts and their Mitigation**

Though the project envisages few environmental and social impacts, however they are temporary in nature and can be mitigated with the proper implementation safeguard measures suggested in the ESDDR designed for the project along with effective monitoring of the implementation. The project is expected to benefit Chhattisgarh, by providing Renewable Energy at peak hour at very competitive rate.

#### Institutional Arrangement for implementing ESDDR

SECI has proposed to develop the Solar Park with battery storage project in Build Own Operate model. Project would be set up in a turnkey EPC mode, with EPC contractor being determined through a transparent international competitive bidding process.

#### **Cost Estimate**

As per the revised DPR the total cost of the proposed project has been estimated to be Rs. 963 Crore, (including battery replacement cost in  $15^{\text{th}}$  Year – Rs. 100 Crores).



#### **Implementation Schedule**

SECI will award the EPC Contract for implementing the setting up of 100MW(AC) Solar PV Project (200MWp DC Capacity) with 50MW/150 MWh Battery Energy Storage system at Rajnandgaon, Chhattisgarh. It will also include a transmission line connecting to the Grid at Thelkadi, Chhattisgarh sub-station with an approximate length of 33 km.

It is anticipated that entire work will be completed within 18 months from the date of start.



# 1. INTRODUCTION

## 1.1 INTRODUCTION & PROJECT DISCRIPTION

Solar Energy Corporation of India Ltd. (SECI) is a CPSU under the administrative control of the Ministry of New and Renewable Energy (MNRE), set up on 20<sup>th</sup> Sept 2011 to facilitate the implementation of scaling up solar program within India. Its focus has been expanded to include wind energy as well.

SECI plans to set-up a 100 MW solar PV project along with Battery Energy Storage System at the project site located in Rajnandgaon district, Chhattisgarh. In the said Project it is proposed to setup 100MW(AC) Solar PV Project (200MWp DC Capacity) with 50MW/150 MWh Battery Energy Storage system.

### 1.2 CONTEXT OF THE PROJECT

The power sector of a country is the powerhouse of its economic development. India's power scenario has borne witness to many interesting developments in the past decade. Capacity addition has been consistent over the past decade with the present installed capacity standing at 364.96 GW as of 31.10.2019. Coal continues to be the dominant fraction in the energy mix of the country, topping at 62.85% of the total installed capacity. Nevertheless, renewable energy has seen an unprecedented push with right policies formulation and timely execution. At present the proportion of renewable installed capacity is around 23%. The complete break up of India's installed capacity is given in Table 1-1. The table gives an exhaustive view of the generation controlled by State, Private and Central entities.

|           |              | ,           | Thermal  |            |              | Nuclea |              |              | Grand Total |  |
|-----------|--------------|-------------|--|------------|--------------|--------|--------------|--------------|-------------|--|
| Ownership | Coal         | Lignite     | ite $Gas$ $Diese$ $Total$ $r$ Hydro<br>1. $1236.0$ 74506. $0.00$ 26958 |            | Hydro        | RES    |              |              |             |  |
| State     | 65861.5<br>0 | 1290.0<br>0 | 7118.7<br>1  | 236.0<br>1 | 74506.<br>21 | 0.00   | 26958.<br>50 | 2349<br>.98  | 103814.69   |  |
| Private   | 74173.0<br>0 | 1830.0<br>0 | 10580.<br>60   | 273.7<br>0 | 86857.<br>30 | 0.00   | 3394.0<br>0  | 7939<br>7.22 | 169648.52   |  |

#### TABLE 1-1: ALL INDIA INSTALLED CAPACITY (AS ON 31.10.2019) IN MW



| Central | 57660.0<br>0  | 3140.0<br>0 | 7237.9<br>1  | 0.00       | 68037.<br>91  | 6780.0<br>0 | 15046.<br>72 | 1632<br>.30  | 91496.93  |
|---------|---------------|-------------|--------------|------------|---------------|-------------|--------------|--------------|-----------|
| Total   | 197694.<br>50 | 6260.0<br>0 | 24937.<br>22 | 509.7<br>1 | 229401<br>.42 | 6780.0<br>0 | 45399.<br>22 | 8337<br>9.50 | 364960.14 |

Source: http://www.cea.nic.in/reports/monthly/installedcapacity/2019/installed\_capacity-0.pdf

#### 1.2.1 INSTALLED CAPACITY OF RENEWABLE ENERGY

The renewable energy installed capacity comprises of Small hydro, wind, solar and biomass. The installed capacity may be divided into these sub sectors as per the Table 1-2.

 TABLE 1-2 INSTALLED CAPACITY OF RENEWABLE ENERGY IN MW (AS ON 31.10.2019)

| Small   | Wind     | Bio-]                     | Power           | Solar    | Total<br>Capacity |  |
|---------|----------|---------------------------|-----------------|----------|-------------------|--|
| Hydro   | Power    | BM Power/<br>Cogeneration | Waste to Energy | Power    |                   |  |
| 4647.11 | 37090.02 | 9806.31                   | 139.8           | 31696.26 | 83379.5           |  |

Source: http://www.cea.nic.in/reports/monthly/installedcapacity/2019/installed\_capacity-pdf

Among all renewable energy resources, India is blessed with abundant solar energy. Having a potential of generating over 5,000 trillion kilowatts of clean energy, India experiences around 300 sunny days in a year and solar insolation of 4-7 kWh/m<sup>2</sup>/day.

#### 1.2.2 CHHATISGARH: POWER SCENARIO AND SCOPE FOR SOLAR PROJECT

The state of Chhattisgarh was formed on 1 November 2000 post the bifurcation of Madhya Pradesh. It is the ninth largest state in India and the 16<sup>th</sup> most populous. Over the years, Chhattisgarh has emerged as a preferred investment destination. The area is well connected by rail, road and air.

The greatest strength of the state of Chhattisgarh is the abundance of resources. It is a leading producer of coal, iron ore and dolomite. Considerable resources of bauxite, limestone and quartz are also found in the state. The state accounts for approximately 15% of the total steel produced in the country. State government has released an Industrial policy for the year 2014-2019 to incentivize the growth of the sector and bring it on par with the developed industrial states of the country. The Chhattisgarh State Industrial Development Corporation (CSIDC) has set up industrial



growth centers, five industrial parks and three integrated infrastructure development centres (IIDC). The state has a notified special economic zone (SEZ) in Rajnandgaon District.

The state of Chhattisgarh is power surplus state with an installed capacity of 13910 MW as of September 2019, more than 94% of which is thermal power. The detailed breakup of the installed capacity vis-à-vis the sources has been given in Table 1-3.

| Ownershi |              | T       | herma   | 1          |              | Hvdr | Nuclea | DEC        | Grand       |
|----------|--------------|---------|---------|------------|--------------|------|--------|------------|-------------|
| р        | Coal         | Lignite | Ga<br>s | Diese<br>1 | Total        | 0    | r      | RES        | Total       |
| State    | 2080         | 0       | 0       | 0          | 2080         | 120  | 0      | 11.05      | 2211.0<br>5 |
| Private  | 8850         | 0       | 0       | 0          | 8850         | 0    | 0      | 526.8      | 9376.8      |
| Central  | 2173.65      | 0       | 0       | 0          | 2173.65      | 100  | 48     | 0          | 2321.6<br>5 |
| Total    | 13103.6<br>5 | 0       | 0       | 0          | 13103.6<br>5 | 220  | 48     | 537.8<br>5 | 13909.<br>5 |

TABLE 1-3 INSTALLED CAPACITY OF CHHATTISGARH IN MW (SOURCE: CEA)

Renewable power accounts for only 6% of the installed capacity. A favorable environment created by good policy structures will help bring about change in the energy mix of the state, which already has a robust transmission and distribution system in place. The Government of Chhattisgarh released a solar policy on September 2017 that aims to encourage, develop and promote solar power generation in the state that would assist it in developing in an environmentally and economically sustainable manner. The breakup of Renewable Energy Installed Capacity is given in Table 1-4.

 Table 1-4 Chhattisgarh Breakup of RES in MW (as on 31.10.2019) (Source: CEA)

| Small          | Wind  | Bio            | So                | Total       |        |          |
|----------------|-------|----------------|-------------------|-------------|--------|----------|
| Hydro<br>Power | Power | Power<br>Total | Ground<br>Mounted | Roof<br>Top | Total  | Capacity |
| 76.00          | 0.00  | 230.50         | 215.83            | 15.52       | 231.35 | 537.85   |



#### 1.2.3RATIONALE FOR PROJECT

Analysis of the consumption data of the state suggests a typical demand curve with a steady base load during the day and a marked evening peak between the 72<sup>nd</sup> (6 in the evening) and 88<sup>th</sup> (11 in the night) time-blocks. Based on the complete dataset available for the years 2018 and 2019, Year-on Year growth is approx. to be around 7% (from 3269 MW in 2018 to 3501 MW in 2019) with the load curve character remaining same. Shown in the figure below is the average demand curve, time block-wise for the years 2018 and 2019.



### FIGURE 1-1: AVERAGE DEMAND CURVE (YEAR-WISE)

The nature of the distribution of the average demand can be assessed from the following boxplots and frequency distribution curves:





#### FIGURE 1-2: BOX PLOT: YOY DEMAND



FIGURE 1-3: FREQUENCY DISTRIBUTION OF DEMAND

Further to above, the difference between Peak and Off-Peak demands can be assessed from the following frequency distribution curves:





As evident from the box plots below, the Peak and Off Peak demands differ by approx. 250 MW:



#### FIGURE 1-4: PEAK VS. OFF-PEAK DEMAND

The average purchase price of Peak power is approx. Rs. 4.50 over the last two calendar years (2018 and 2019). In the year 2019, the state purchased approx. 470 MUs of energy to meet the peak demand from the IEX at a weighted average energy price of Rs. 4.46/unit. During the evening (between 6 pm to 9 pm) the demand peaks, on an average, to approx. 250 MW above the off-peak load.

For the financial year of 2019-20, Chhattisgarh State Power Distribution Company Limited accrues a power purchase cost of INR 3.27 for power from Central Generating Stations, INR 3.19



from State Generating Stations and INR 7.76 from various Renewable Energy Generators (Reference: Determination of Revised ARR for FY 2019-20). Assuming an escalation of 3% year on year of the cost of electricity from the former two, financial analysis would show that a tariff of INR 4.00 for the proposed plant of 100 MW with BESS in Rajnandgaon would be cheaper than the renewable energy generators and would approach the cost of electricity from conventional energy sources. This builds a worthy case for the proposed plant.

## 1.3 STRUCTURE OF THE REPORT

| Chapter 1 | Introduction & Project Description   |
|-----------|--|
| Chapter 1 | This chapter describes briefly describes the project and its background      |
|           | Approach and Methodology   |
| Chapter 2 | This chapter presents the different steps followed during the process of     |
|           | environmental & social Due Diligence and scope of the present study.         |
|           | Environmental and Social Profile of the Project Area                         |
| Chanton 2 | Description of the baseline environmental and social condition including the |
| Chapter 5 | baseline physical environment, biological environment and socio-cultural     |
|           | conditions of the project area are briefly described in this chapter.        |
|           | Environmental and Social Safeguard Due Diligence                             |
|           | This chapter captures the policy and legal framework of government of India  |
|           | as well the policies of World Bank applicable to the project followed by its |
|           | compliance, consultation processes carried out with the various sections of  |
| Chapter 4 | community and stakeholder groups, potential environmental and social         |
|           | impacts associated with the proposed project, institutional arrangement for  |
|           | implementation of ESMP, Grievance Redress Mechanism, Gender                  |
|           | Assessment, Development and Gender Based Violence (GBV).                     |
|           | Findings of Gap Analysis   |
| Chapter 5 | This chapter provides the major observations of Gap Analysis with respect to |
| -         | major environment and social attributes of the project.                      |
|           | Implementation Schedule and Responsibilities                                 |
| Chapter 6 | This chapter envisages the implementation schedule, responsibilities and     |
| -         | respective time frame for implementation of ESMP                             |
|           | . Recommendations  |
|           | This chapter provides the necessary recommendations to ensure compliance     |
| Chapter 7 | with the ESMF towards improving the environmental and social performance     |
|           | of the project.  |



# 2. APPROACH AND METHODOLOGY

## 2.1 METHODOLOGY

The Environmental and Social Management Framework (ESMF, June 2020 of SECI) is intended to identify and assess the several environment and social impacts (both positive and negative) that may result from the proposed setting up of 100MW(AC) Solar PV Project (200MWp DC Capacity) with 50MW/150 MWh Battery Energy Storage system, as well as to provide a corresponding management plan to handle any adverse/negative impacts. The methodology adopted for conducting Environmental and Social Due Diligence for the proposed interventions is given in **Figure 2-1** below.



FIGURE 0-1 METHODOLOGY ADOPTED FOR CONDUCTING ENVIRONMENTAL AND SOCIAL DUE DILIGENCE

## 2.2 REVIEW OF AVAILABLE DOCUMENTS AND DATA COLLATION

Review of available documents and collating information from various documents to assess the possible environmental and social impacts of the proposed project. All the available



information and data (quantitative, qualitative) regarding the proposed project has been collected from the Detailed Project Report (DPR), consultation with stake-holders and other secondary sources including data from Chhattisgarh Environment Conservation Board, Asian Development Bank Report, Forest Survey Report, District Survey Report for minor mining etc.

## 2.3 DESCRIBING THE SUB-PROJECT ACTIVITIES

With the help of information and data available, collected and consultations with stake-holders, a brief description and analysis of the project activities has been established.

## 2.4 DISCUSSION WITH THE KEY STAKEHOLDERS

The key stakeholders including the Chhattisgarh Energy Department, Chhattisgarh State Power Distribution Company Limited, District Administration, State Forest Department, local people were interacted (both formally and informally) during the field visits while preparing the ESDDR. Most of the associated government departments were visited to collect the relevant data and their feedback on the proposed project activities. Also, they were asked about the mitigation plans proposed to be adopted, suggestions for improvement and any public grievances.

# 2.5 BASELINE ENVIRONMENTAL AND SOCIAL PROFILE OF PROJECT AREA

With the help of secondary information/data received from the available documents and from the discussions/interactions with key stakeholders and host population, a brief description of the baseline environmental and social profile of the project area has been established.

## 2.6 SCREENING ACTIVITIES

The project screening has also been carried out to understand the nature, scale and magnitude of potential environmental and social impacts associated with the proposed project. The screening activities have been conducted as per the guidelines provided in Environmental and Social Management Framework of SECI (ESMF, June 2020) and on the basis of secondary data analysis, field assessments and stakeholder interactions/consultations.

The screening checklist included criteria that detailed out the impact level of various activities during the construction and operation phases. The criteria included environmental factors such as the presence of eco-sensitive region in and around the project area, clearance of tree cover, improper storage of excavation spoils, flooding of adjacent areas, elevated noise and dust



levels, damage to existing utilities, etc. Social criteria included factors such as requirement of land acquisition, displacement of tribes, loss of livelihood and gender issues.

#### 2.7 IDENTIFICATION AND ASSESSMENT OF IMPACTS

Based on the analysis of the data collected from field surveys, stakeholder interactions/ consultations and secondary sources, issues related to the environmental and social sectors were identified. The impacts so identified were compared with the existing baseline environmental and social condition of the study region. Though the project envisages few environmental and social impacts, however they are temporary in nature can be mitigated with the proper implementation safeguard measures suggested in the ESDDR designed for the project along with effective monitoring of the implementation.

#### 2.8 DEVELOPING MANAGEMENT ACTION PLAN

Based on the identified and assessed potential environmental and social impacts, an appropriate mitigation / management action plan has been developed recommending suitable measures needed to prevent, minimize, mitigate, or compensate for adverse impacts (if any) and to improve the environmental and social performance. The mitigation plans are suggested for different stages of the project, as applicable: designing phase, construction phase and, operation and maintenance phase.

#### 2.9 SCOPE OF WORK

Based on the Environmental and Social Screening carried out as part of this due diligence exercise using the screening matrix provided in the Environmental and Social Management Framework of SECI concludes that the present project of setting up of 100MW(AC) Solar PV Project (200MWp DC Capacity) with 50MW/150 MWh Battery Energy Storage system, is categorized as 'Low Impact' category. The project components have limited environment and social impacts, which can be mitigated with the adoption of suitable mitigation measures. The scope of the ESDDR that has been finalized on the basis of project screening and categorization are given below:

- Describe the sub-project and its components;
- Describe the baseline environmental and social conditions of the sub-project areas and the proposed project facilities;



- Identification and analysis of key environmental issues viz. presence of any ecologically sensitive areas in the vicinity of the project site, as well as social issues (if any) associated with the project;
- Interactions / discussions with the key stakeholders;
- Environmental and Social Screening and categorization of the sub-project as per the requirements of ESMF of SECI;
- Develop Environmental and Social Management Action Plan (ESMAP) outlining suitable mitigation measures to be adopted by the relevant implementing actor;
- Outline the requirements of specific permissions / clearances / approvals that may be applicable to the proposed project and the requirements of any detailed study [e.g. preparation of Environmental and Social Impact Assessment (ESIA), Resettlement Action Plan (RAP), Tribal Development Plan (TDP), etc].



# 3. ENVIRONMENTAL AND SOCIAL PROFILE OF PROJECT AREA

Baseline environmental and study was conducted to understand the present status of the environmental resources in the project area. The environment status of project area was based on field survey and secondary data review. Environmental impact assessment involved prediction of potential impacts by the development of the project on the surrounding area. Based on baseline environmental status and proposed project activities potential impacts have been assessed and predicted and appropriate mitigation measures are suggested to avoid / reduce/ compensate the potential adverse impacts and enhance the positive impacts.

## 3.1 TOPOGRAPHY, PHYSIOGRAPHY AND GEOLOGY

Based on regional topography Chhattisgarh region is divided into three regions, the Northern Hills, the Central Plains and the Bastar Plateau. The central Chhattisgarh basin is characterised by two major landform types, the gently sloping Chhattisgarh Plain and the undulating land. The elevation of the plain ranges from about 250 m on the eastern margin to about 330 m in the west. The gentle gradient of the Chhattisgarh Plain is largely due to its geological structure with flat to gently dipping Cuddapah sedimentary formations. The geological structure of Chhattisgarh state mainly consists of Achaean and Cudappah rocks but Dharwad, Gondwana, Deccan Trap and old Alluvial Laterite rock systems are also found in some pockets of the State. Geological and elevation maps of Chhattisgarh State are given in Map 1 and Map 2, respectively.

The Rajanadgaon District can be divided into three district parts, plateau, Hilly terrain and undulating plain. Most of the north western and southern hilly track of the district measuring 3,892 Sq.km is occupied by protected and reserved forests. Nearly 73% of area falls under Mahanadi river basin, 21% under Godavari basin and 6% area in the northern part of the district falls under Narmada basin.







Source: Mines Department, Government of Chhattisgarh



Map 2: Elevation Map of Chhattisgarh

Source: Water Policy for Drought Proofing Chhattisgarh, S. Gupta, Institute for Human Development, 2002

Soil of various types found in the area can be broadly be placed under three groups (i) deep black soil (ii) yellow soil and (iii) red lateritic soil.



#### **3.2 SEISMICITY**

Chhattisgarh has very low rates of seismic activity. In recent years, tremors from earthquakes in neighbouring states have been felt, most notably in 1969. The Bureau of Indian Standards (BIS) updated he seismic hazard map of India in 20003. The main change was merging of Zones I & II. As per this updating, the entire Chhattisgarh state falls in Zone II as shown in Map 3. It reveals that the project region falls in Zones II low to moderate risk zone.



Map 3: Seismic Zone Map Source: IS 1893 (Part 1) 2002

## 3.3 RAINFALL

Rainfall data was collected for Raipur IMD station, which is the nearest IMD station in the project area. On an average, 1289 mm of rainfall is received annually mainly from south-east monsoon in the project area (**Table 3-1**). The graphical presentation and rainy days in the project road area is presented in **Figure 3-1** & **Figure 3-2** respectively. The region is classified as heavy rainfall area. Normally rains start in June and continue up to October. Nearly 94.5 % of annual rainfall is received during June to October months. About 2.3% of the normal rainfall is received during the winter season. On an average, there are about 62.3 rainy days in a year.



| Jan   | Feb   | Mar   | Apr   | May   | June  | July   | Aug    | Sept  | Oct   | Nov   | Dec   | Total  |
|-------|-------|-------|-------|-------|-------|--------|--------|-------|-------|-------|-------|--------|
| 6.7   | 12.3  | 24.6  | 15.7  | 18.8  | 189.8 | 381.0  | 344.7  | 230.2 | 53.9  | 7.4   | 3.7   | 1288.8 |
| (0.8) | (1.0) | (1.7) | (1.6) | (1.9) | (9.3) | (16.0) | (15.7) | (9.7) | (3.6) | (0.6) | (0.4) | (62.3) |

#### Table 3-1: Rainfall in the Project Area

Note: Values given in parentheses are no. of rainy days

Source: IMD Station Raipur, (1951 to 1980)



Figure 3-1 Graphical Presentation of Rainfall in the Project Area



Figure 3-2 Graphical Presentation of Rainy Days in the Project Area



## 3.4 GROUND WATER HYDROLOGY

Ground water is the dominant water source in the area. The sources of recharging of ground water are mostly from precipitation (rainfall) and partly from flowing water bodies and ponds. Hand pumps are commonly used to draw the water from ground in the villages. Static water levels vary along the stretch of project area. First or upper ground water aquifer lies in the range of 5 to 15 m below ground level (bgl). The ground water level in the area show a decline of 1.2 m to 1.5 m from post monsoon to pre monsoon period.

#### **3.5 CLIMATOLOGY**

The climate of the project area is characterized by intensely hot dry summer and well distributed rainfall, in south-west monsoon season and winter. Generally, the project area experiences the following four seasons in a year:

- The summer season (also known as pre-monsoon season) starts around Holi festival in March but the mercury rises to the peak in May and first week of June with the mean daily maximum temperature at about 40°C, and the mean daily minimum at about 26°C.
- The rainy season starts around mid-June and continues up to September.
- The winter season starts around the last week of November and continues up to February.
- The intervening period October and November, is the Post-monsoon season or retreating monsoon period.

#### a) Temperature and Relative Humidity

The mean daily maximum temperature varies from 27.3°C to 42.0°C, while the mean daily minimum temperature varies from 13.2°C to 28.3°C. Data collected from IMD indicates that May is hottest month.

Relative humidity is highest during July to September months (85 to 87% at 8:30 hr and 76 to 78% at 17:30 hr) and lowest during April and May months (39% at 8:30 hr and 23% at 17:30 hr).

#### b) Wind Pattern

Wind pattern in the area is given in **Table 3-2**. the prevailing winds are blown from SW - W sector towards NE – E sector during morning and evening hours from March to September.



During February to October months, wind blow from NE and E direction to SW and W direction. Calm period is low and observed for 6 to 57% of the time.

| Sl.<br>No. | Months    | 5  | Ν  | NE | Е  | SE | S  | SW | W  | NW | Calm |
|------------|-----------|----|----|----|----|----|----|----|----|----|------|
| 1          | January   | Ι  | 21 | 22 | 8  | 4  | 6  | 3  | 2  | 3  | 31   |
|            |           | II | 22 | 11 | 5  | 2  | 4  | 7  | 6  | 5  | 38   |
| 2          | February  | Ι  | 20 | 18 | 7  | 5  | 9  | 7  | 3  | 6  | 25   |
|            |           | II | 20 | 8  | 3  | 2  | 5  | 11 | 14 | 12 | 25   |
| 3          | March     | Ι  | 16 | 15 | 6  | 5  | 10 | 13 | 10 | 7  | 18   |
|            |           | II | 16 | 7  | 4  | 2  | 5  | 15 | 19 | 14 | 28   |
| 4          | April     | Ι  | 7  | 6  | 4  | 4  | 11 | 25 | 21 | 9  | 13   |
|            |           | II | 9  | 5  | 3  | 3  | 7  | 16 | 26 | 16 | 15   |
| 5          | May       | Ι  | 9  | 4  | 4  | 3  | 11 | 25 | 24 | 14 | 6    |
|            |           | II | 13 | 6  | 3  | 4  | 7  | 13 | 22 | 23 | 9    |
| 6          | June      | Ι  | 3  | 2  | 1  | 2  | 7  | 36 | 34 | 9  | 6    |
|            |           | II | 9  | 3  | 3  | 4  | 10 | 25 | 27 | 14 | 5    |
| 7          | July      | Ι  | 1  | 1  | 2  | 1  | 8  | 43 | 33 | 4  | 7    |
|            |           | II | 3  | 2  | 3  | 2  | 10 | 33 | 34 | 7  | 6    |
| 8          | August    | Ι  | 2  | 2  | 2  | 2  | 9  | 37 | 35 | 6  | 5    |
|            |           | II | 2  | 3  | 3  | 2  | 6  | 31 | 36 | 8  | 9    |
| 9          | September | Ι  | 8  | 7  | 5  | 3  | 8  | 20 | 23 | 10 | 16   |
|            |           | II | 11 | 10 | 6  | 4  | 6  | 19 | 19 | 10 | 15   |
| 10         | October   | Ι  | 17 | 22 | 10 | 5  | 7  | 6  | 4  | 5  | 14   |
|            |           | II | 13 | 26 | 14 | 6  | 4  | 4  | 3  | 3  | 27   |
| 11         | November  | Ι  | 26 | 27 | 9  | 3  | 3  | 2  | 2  | 1  | 27   |
|            |           | II | 17 | 24 | 7  | 3  | 2  | 1  | 1  | 2  | 43   |
| 12         | December  | Ι  | 20 | 22 | 7  | 5  | 5  | 1  | 0  | 2  | 38   |
|            |           | II | 17 | 15 | 4  | 2  | 1  | 1  | 1  | 2  | 57   |

### **Table 3-2 Wind Pattern**

All values are percentage of the total time.

Source: IMD Station Raipur (1951 to 1980)

Note: I and II indicate observations at morning (8.30 hrs) and evening hours (17.30 hrs), respectively.

## 3.6 BIOLOGICAL ENVIRONMENT

Biodiversity encompasses the variety of all life on earth. India is one of the 12-mega diverse countries of the world. The diversity of physical features and climatic conditions in India has



resulted in diverse ecological habitats like forests, grasslands, wetlands, coastal and marine ecosystems and desert ecosystems which harbors and sustain massive components of biodiversity.

Chhattisgarh is gifted with the most pristine and abundant set of natural resources in the country. Mountain, Plateau, and Plains eco-systems constitute roughly a third each of its physiography. Dense, green, and untouched, its forests are also the source of major rivers like Mahanadi, Narmada, Indrāvati, and an exotic flora-fauna.

#### FLORA

The floral species found in around the Project area are reported below:

| Sl. | Botanical Name           | Vernacular Name | Occurrence    |
|-----|--------------------------|-----------------|---------------|
| I.  | Trees                    |                 |               |
| 1.  | Acacia nilotica          | Babool          | Very Frequent |
| 2.  | Acacia leucophloea       | Reunjha         | Frequent      |
| 3.  | Acacia catechu           | Khair           | Frequent      |
| 4.  | Aegle marsupium          | Bel             | Occasionally  |
| 5.  | Azadirachta indica       | Neem            | Very Frequent |
| 6.  | Albizzia procera         | Safed sirish    | Very Frequent |
| 7.  | Albizzia lebbeck         | Kala sirish     | Very Frequent |
| 8.  | Ailanthus excelsa        | Maharukh        | Very Frequent |
| 9.  | Butea monosperma         | Palash          | Occasionally  |
| 10. | Cassia fistula           | Amaltas         | Frequent      |
| 11. | Careya arborea           | Kumbhi          | Occasionally  |
| 12. | Diospyros melanoxylon    | Tendu           | Abundant      |
| 13. | Emblica officinalis      | Amla            | Occasionally  |
| 14. | Eucalyptus sp            | Nilgiri         | Frequent      |
| 15. | Ficus glomerata          | Gular           | Frequent      |
| 16. | Lagerstroemia parviflora | Senha           | Frequent      |
| 17. | Leucaena leucocephala    | Subabul         | Abundant      |
| 14. | Mangifera indica         | Aam             | Frequent      |
| 15. | Madhuca indica           | Mahua           | Occasionally  |
| 16. | Shorea robusta           | Sal             | Occasionally  |
| 17. | Syzygium cumini          | Jamun           | Frequent      |
| 18. | Terminalia arjuna        | Arjun           | Abundant      |
| 19. | Terminalia tomentosa     | Saja            | Frequent      |
| 20. | Tamarindus indica        | Imli            | Occasionally  |
| 21. | Tactona grandis          | Sagun           | Occasionally  |
| 22. | Zyziphus jujuba          | Ber             | Abundant      |

#### **Table 3-3 Flora Species**



| II. | Herbs and Shrubs    |               |               |
|-----|---------------------|---------------|---------------|
| 23. | Achyranthes aspera  | Apmarga       | Very Frequent |
| 24. | Asparagus racemosus | Satavari      | Occasionally  |
| 25. | Argemone mexicana   | Satyanashi    | Abundant      |
| 26. | Abrus precatorius   | Gunja         | Abundant      |
| 27. | Careya herbacea     | Chhoti kumbhi | Occasionally  |
| 28. | Calotropis procera  | Ark           | Frequent      |
| 29. | Datura metel        | Dhatura       | Occasionally  |
| 30. | Ipomoea batata,     | Besharam      | Occasionally  |
| 31. | Lantana camara,     | Raimunia      | Frequent      |
| 32. | Sida acuta          | Baraira/Bala  | Occasionally  |
| 33. | Solanum surattense  | Mokoi         | Occasionally  |
| 34. | Urena lobata        | Lotloti       | Occasionally  |

#### FAUNA

The faunal species found in around the Project area are reported below:

#### Table 3-4 Fauna Species

| MAMMALS                  |                        |              |
|--------------------------|------------------------|--------------|
| Latin name               | Common name            | WPA Schedule |
| Bandicota indica         | Large bandicoot Rat    | V            |
| Funambulus palmarum      | Three striped squirrel | IV           |
| Herpestes edwardsi       | Indian grey mongoose   | IV           |
| Lepus nigricollis        | Indian hare            | IV           |
| Mus booduga              | Common Indian field    | V            |
| Mus musculus             | Home Mouse             | V            |
| Nosokia indica           | Bandicoot rat          | V            |
| Rattus rattus            | Common Indian rat      | V            |
| Suncus murinus           | House shrew            | V            |
| AMPHIBIANS               |                        |              |
| Bufo melanostictus       | Common toad            | IV           |
| Fejervarya limnocharis   | Rice field frog        | IV           |
| Hoplobatrachus tigerinus | Indian Bull frog       | IV           |
| Rana cyanophlyctis       | Skipper frog           | IV           |
| Hyla arborea             | Tree frog              | IV           |
| Polypedates maculatus    | Common tree frog       | IV           |
| REPTILES                 |                        |              |
| Bungarus caeruleus       | Common Indian Krait    | IV           |
| Chameleo zeylanicus      | Chameleon              | IV           |
| Chrysopelea taprobanica  | Tree Snake             | IV           |
| Calotes versicolor       | Garden lizard          | IV           |
| Dryphis nasutus          | Whip Snake             | IV           |
| Eutropis carinata        | Indain grass Skink     | IV           |



| Eutropis multifasciata    | Common skink               | IV           |
|---------------------------|----------------------------|--------------|
| Hemidactylus flaviviridis | Indian wall lizard         | IV           |
| Ptyas mucosa              | Dhaman / Indian Rat snake  | IV           |
| Typhlops diardii          | Giant Blind Snake          | IV           |
| BIRDS                     | ·                          |              |
| Acridotheris tristis      | Common myna                | IV           |
| Actitis hypoleucos        | Common Sandpiper           | IV           |
| Aegithinia tiphia         | Common Iora                | IV           |
| Artamus fuscus            | Ashy Woodswallow           | IV           |
| Bubulcus ibis             | Cattle Egret               | IV           |
| Caprimulgus affinis       | Savanna Nightjar           | IV           |
| Chalcophaps indica        | Emerald Dove               | IV           |
| Charadrius dubius         | Little Ringed Plover       | IV           |
| Charadrius hiaticula      | Common Ringed Plover       | IV           |
| Columba livia             | Blue rock pigeon           | IV           |
| Coracias benghalensis     | Indian roller              | IV           |
| Latin name                | Common name                | WPA Schedule |
| Corvus splendens          | House crow                 | V            |
| Coturnix coturnix         | Common Quail               | IV           |
| Cuculus canorus           | Common Cuckoo              | IV           |
| Cuculus micropterus       | Indian Cuckoo              | IV           |
| Cypsiurus balasiensis     | Asian Palm Swift           | IV           |
| Dendrocitta vagabunda     | Indian tree pie            | IV           |
| Dendrocopus marhatensis   | Maratha Woodpecker         | IV           |
| Egretta garzetta          | Little egret               | IV           |
| Elanus caeruleus          | Black-winged Kite          | IV           |
| Eudynamys scolopaceus     | Common Koel                | IV           |
| Falco tinnunculus         | Common Kestrel             | IV           |
| Halcyon pileata           | Black-capped Kingfisher    | IV           |
| Halcyon smyrnensis        | White-Breasted King fisher | IV           |
| Haliastur indus           | Brahminy Kite              | IV           |
| Hierococcyx varius        | Common Hawk Cuckoo         | IV           |
| Himantopus himantopus     | Black-winged Stilt         | IV           |
| Hydrophasianus chirurgus  | Pheasant-tailed Jacana     | IV           |
| Ictinaetus malaiensis     | Black Eagle                | IV           |
| Lalage melanoptera        | Black-headed Cuckoo        | IV           |
| Lanius cristatus          | Brown Shrike               | IV           |
| Merops orientalis         | Little Green Bee Eater     | IV           |
| Microcarbo niger          | Little Cormorant           | IV           |
| Milvus migrans            | Common Black kite          | IV           |
| Motacilla alba            | White wagtail              | IV           |
| Passer domesticus         | House sparrow              | IV           |
| Perdicula asiatica        | Bush quail                 | IV           |
| Pericrocotus cinnamomeus  | Small Minivet              | IV           |



| Pericrocotus roseus        | Rosy Minivet            | IV           |
|----------------------------|-------------------------|--------------|
| Psilopogon haemacephalus   | Coppersmith Barbet      | IV           |
| Psittacula cyanocephala    | Blossom headed Parakeet | IV           |
| Pycnonotus cafer           | Red-vented bulbul       | IV           |
| Rhipidura albicollis       | White-throated Fantail  | IV           |
| Saxicolodies fulicata      | Indian robin            | IV           |
| Streptopelia capicola      | Ring-necked dove        | IV           |
| Streptopelia chinensis     | Spotted dove            | IV           |
| Streptopelia tranquebarica | Red Collared Dove       | IV           |
| Streptopelia tranquebarica | Spotted-necked Dove     | IV           |
| Sturnus contra             | Pied myna               | IV           |
| Butterflies                |                         |              |
| Precis lemonias lemonias   | Lemon pansy             | IV           |
| Precis hierta hierta       | Yellow Pansy            | IV           |
| Latin name                 | Common name             | WPA Schedule |
| Tros aristolochiae         | Common rose             | IV           |
| Euploea corecor            | Common Crow             | IV           |
| Dananus aglea              | Glassy Blue Tiger       | IV           |
| Precis orithya             | Blue pansy              | IV           |
| Neptis hylas               | Common sailor           | IV           |
| Papilio demoleus           | Lime butterfly          | IV           |
| Catopsilia crocale         | Common emigrant         | IV           |
| Other insects              |                         |              |
| Anax imperator             | Emperor Dragonfly       | Not listed   |
| Tettigonia viridissima     | Common Grasshopper      | Not listed   |
| Hieroglyphus banian        | Rice grasshopper        | Not listed   |
| Pecilocerus pictus.        | Common painted          | Not listed   |
| Nephotettix apicalis       | Paddy Jassids           | Not listed   |
| Hyblea purea               | Skeletonizer or Teak    | Not listed   |
|                            |                         |              |
| Spodoptera mauritia        | Swarming caterpillar    | Not listed   |

It is also evident from the lists that there were no endemic or endangered species of flora and fauna around the Project site.

## 3.7 FOREST AREA AND LAND USE

Chhattisgarh was carved out of Madhya Pradesh in the year 2000. It covers an area of 1,35,192 sq km, which is 4.11% of the geographical area of the country. The State is bordered by the Madhya Pradesh in the northwest, Uttar Pradesh in the north, Jharkhand in the northeast, Maharashtra in the southwest, Telangana in the south and Odisha in the southeast. The State falls under East Deccan physiographic zone and can be divided into three agro-climatic zones,



viz. the Chhattisgarh Plains, the Northern Hills of Chhattisgarh and the Bastar Plateau. The land use pattern of State of Chhattisgarh is presented below:

| Land Use Type                              | Area (in 000' ha) | Percentage |
|--|-------------------|------------|
| Geographical Area                          | 13519             |            |
| Reporting area for land utilization        | 13790             | 100        |
| Forests                                    | 6316              | 45.80      |
| Not available for land cultivation         | 1029              | 7.47       |
| Permanent pastures and other grazing lands | 887               | 6.43       |
| Land under misc. tree crops and groves     | 1                 | 0.01       |
| Culturable wasteland                       | 351               | 2.54       |
| Fallow land other than current fallows     | 258               | 1.87       |
| Current fallows                            | 267               | 1.94       |
| Net area sown                              | 4681              | 33.94      |

| Table 3-5 | Land Use | Pattern – | State of | Chhattisgarh |
|-----------|----------|-----------|----------|--------------|
|-----------|----------|-----------|----------|--------------|

Source: Land Use Statistics, Ministry of Agriculture, GoI, (2014-15)

As per the Champion & Seth Classification of Forest Types (1968), the forests in Chhattisgarh belong to two Type Groups i.e Tropical Moist Deciduous Forests and Tropical Dry Deciduous Forests which are further divided into 12 Forest Types. The State's two main tree species are Sal (Shorea robusta) and Teak (Tectona grandis). Other major species are Bija (Pterocarpus marsupium), Saja (Terminalia tomentosa), Dhavdha (Anogeissus latifolia), Mahua (Madhuca indica), Tendu (Diospyros melanoxylon) and bamboo (Dendrocalamus strictus) etc.

District wise forest cover of Chhattisgarh is presented below.

| District                       | Geographical<br>Area (GA) | Very<br>Dense<br>Forest | Mod.<br>Dense<br>Forest | Open<br>Forest | Total    | % of<br>of<br>GA | Scrub |
|--------------------------------|---------------------------|-------------------------|-------------------------|----------------|----------|------------------|-------|
| Bastar                         | 10,470                    | 954.84                  | 2,117.50                | 1,160.52       | 4,232.86 | 40.43            | 34.87 |
| Bijapur                        | 8,530                     | 2,048.29                | 2,926.49                | 1,537.37       | 6,512.15 | 76.34            | 1.98  |
| Bilaspur                       | 8,272                     | 395                     | 1,539.19                | 522.7          | 2,456.89 | 29.7             | 48.3  |
| Dakshin<br>Bastar<br>Dantewada | 8,298                     | 250.63                  | 2,305.07                | 1,907.45       | 4,463.15 | 53.79            | 26.34 |

Table 3-6 District wise Forest Cover in Chhattisgarh



| Dhamtari               | 4,084    | 49       | 1,385.52  | 424.6     | 1,859.12  | 45.52 | 8.91   |
|------------------------|----------|----------|-----------|-----------|-----------|-------|--------|
| Durg                   | 8,535    | 44       | 512.04    | 220.35    | 776.39    | 9.1   | 20.48  |
| Janjgir-<br>Champa     | 3,853    | 2        | 22.13     | 125.76    | 149.89    | 3.89  | 13.98  |
| Jashpur                | 5,838    | 225.36   | 1,316.71  | 573.7     | 2,115.77  | 36.24 | 21     |
| Kabeerdham             | 4,235    | 79.09    | 1,083.84  | 385.79    | 1,548.72  | 36.57 | 12.75  |
| Korba                  | 6,598    | 203      | 2,313.62  | 877.08    | 3,393.70  | 51.44 | 92.03  |
| Koriya                 | 6,604    | 78.53    | 2,579.90  | 1,438.18  | 4,096.61  | 62.03 | 66.69  |
| Mahasamumd             | 4,790    | 4        | 515.22    | 425.75    | 944.97    | 19.73 | 27.38  |
| Naraynpur              | 4,653    | 1,127.55 | 1,690.63  | 978.12    | 3,796.30  | 81.59 | 19.22  |
| RaigarhT               | 7,086    | 237.96   | 1,591.03  | 791.34    | 2,620.33  | 36.98 | 25.18  |
| Raipur                 | 12,383   | 141.83   | 2,413.04  | 1,075.05  | 3,629.92  | 29.31 | 54.43  |
| Rajnandgaon            | 8,070    | 31       | 1,749.51  | 754.67    | 2,535.18  | 31.41 | 50.13  |
| Surguja                | 15,732   | 706.72   | 3,930.64  | 2,445.25  | 7,082.61  | 45.02 | 77.86  |
| Uttar Bastar<br>Kanker | 7,161    | 488.92   | 2,205.48  | 701.61    | 3,396.01  | 47.42 | 7.99   |
| Grand Total            | 1,35,192 | 7,067.72 | 32,197.56 | 16,345.29 | 55,610.57 | 41.14 | 609.52 |

Source: India State of Forest Report, 2019

Forest cover map of Chhattisgarh is placed below.





Map 5: Forest Cover Map of Chhattisgarh Source: India State of Forest Report, 2019



## 3.8 ECOLOGICAL SENSITIVE AREAS

As per Protected Area Gazette Notification Database, there are 03 National Parks and 11 Wildlife Sanctuary located in the State of Chhattisgarh.



## Map 6: Wildlife Protected Areas in Chhattisgarh

Out of the above 14, no protected area is situated in the Rajnandgaon district. Further, there are 03 tiger reserves, 02 elephant reserve and 04 important bird areas in Chhattisgarh, however, all are located outside the Rajnandgaon district.

## 3.9 SOCIO-CULTURAL ENVIRONMENT

Rajnandgaon district is situated in the western part of newly created Chhattisgarh state, the district lies between latitude 20°70"- 22°29" North latitude and 80°23" to 81°29" East longitude covering an area of 8172.33 sq.kms. Its greatest length in the north-south is about 185 kms, while its width in the east-west extends about 80 kms. It is surrounded by Kawardha district in north, Durg district in the east; Bastar district is the in south and Garchiroli, Bhandara (Maharashtra) and Balaghat (Madhya Pradesh) districts in the west. The District headquarter Rajnandgaon is on the Mumbai - Howrah line of south-eastern railways. The National Highway



no. 6 (Great Eastern Road) (AH 46) also passes through the town of Rajnandgaon. The nearest airport to the District is at Mana (Raipur), about 80 kms away. All-important places within the district are well connected by a network of the state highways and all-weather roads. The district is divided into 8 tehsils and 9 blocks for its administrative functioning and revenue collections. It is further divided in 1 Nagar Palik Nigam, 2 Nagar Palika , 5 Nagar Panchayat , 9 Janpad Panchayat , 692 Gram Panchayat. Rajnandgaon town (N 21°5' E 81°2') is the district Headquarters. Profile of the District Rajnandgaon as per Census – 2011 is present below:

| District Profile - Rajnandgaon     |              |         |           |  |
|------------------------------------|--------------|---------|-----------|--|
| Number of Villages                 | Total        |         | 1,653     |  |
|                                    | Inhabited    |         | 1,600     |  |
|                                    | Uninhabite   | d       | 53        |  |
| Number of Towns                    | Statutory    |         | 8         |  |
|                                    | Census       |         | -         |  |
|                                    | Total        |         | 8         |  |
| Number of Households               | Normal       |         | 317,515   |  |
|                                    | Institutiona | վ       | 587       |  |
|                                    | Houseless    |         | 386       |  |
| Population                         | Total        | Persons | 1,537,133 |  |
|                                    |              | Males   | 762,855   |  |
|                                    |              | Females | 774,278   |  |
|                                    | Rural        | Persons | 1,264,621 |  |
|                                    |              | Males   | 626,212   |  |
|                                    |              | Females | 638,409   |  |
|                                    | Urban        | Persons | 272,512   |  |
|                                    |              | Males   | 136,643   |  |
|                                    |              | Females | 135,869   |  |
| Sex Ratio                          |              | Total   | 1,015     |  |
| (Number of females per 1000 males) |              | Rural   | 1,019     |  |
|                                    |              | Urban   | 994       |  |
| Literates                          | Persons      |         | 75.96     |  |
| (in percentage)                    | Males        | Males   |           |  |
|                                    | Females      |         | 66.7      |  |
| Scheduled Castes                   | Persons      |         | 156,623   |  |
|                                    | Males        |         | 76,979    |  |
|                                    | Females      |         | 79,644    |  |
| Scheduled Tribes                   | Persons      |         | 405,194   |  |
|                                    | Males        |         | 198,032   |  |
|                                    | Females      |         | 207,162   |  |
| Workers and Non-Workers            |              |         |           |  |
| Total Workers (Main and Marginal)  | Persons      |         | 800,092   |  |



|                                      | Males           |                      | 436,611 |  |  |
|--------------------------------------|-----------------|----------------------|---------|--|--|
|                                      | Females         | Females              |         |  |  |
| (i) Main Workers                     | Persons         |                      | 595,959 |  |  |
|                                      | Males           |                      | 358,946 |  |  |
|                                      | Females         |                      | 237,013 |  |  |
| (ii) Marginal Workers                | Persons         |                      | 204,133 |  |  |
|                                      | Males           |                      | 77,665  |  |  |
|                                      | Females         |                      | 126,468 |  |  |
| Non-Workers                          | Persons         |                      | 737,041 |  |  |
|                                      | Males           | Males                |         |  |  |
|                                      | Females         | Females              |         |  |  |
| Category of Workers (Main & margin   | al)             |                      |         |  |  |
| (i) Cultivators                      | Persons         |                      | 342,116 |  |  |
|                                      | Males           |                      | 182,739 |  |  |
|                                      | Females         |                      | 159,405 |  |  |
| (ii)Agricultural Labourers           | Persons         |                      | 290,108 |  |  |
|                                      | Males           |                      | 125,229 |  |  |
|                                      | Females         |                      | 164,879 |  |  |
| (iii)Workers in household industry   | Persons         |                      | 10,847  |  |  |
|                                      | Males           | 6,403                |         |  |  |
|                                      | Females         | Females              |         |  |  |
| (iv) Other Workers                   | Persons         | Persons              |         |  |  |
|                                      | Males           | 122,240              |         |  |  |
|                                      | Females         |                      | 34,781  |  |  |
| Source of household lighting         | Electricity     | Electricity          |         |  |  |
| (% of household)                     | Kerosene        | 11.89                |         |  |  |
|                                      | Solar           | 0.35                 |         |  |  |
|                                      | Other Oil       | 0.16                 |         |  |  |
|                                      | Any Other       |                      | 0.07    |  |  |
|                                      | No Lighthing    | No Lighthing         |         |  |  |
| Main Source of Drinking Water        | Tapwater fro    | m treated source     | 14.3    |  |  |
| (in %)                               | Tapwater fro    | om un-treated source | 8.76    |  |  |
|                                      | Covered wel     | 1                    | 0.78    |  |  |
|                                      | Un-covered      | well                 | 8.35    |  |  |
|                                      | Handpump        |                      | 62.99   |  |  |
|                                      | Tubewell/Bo     | orehole              | 4.35    |  |  |
|                                      | Spring          |                      | 0.08    |  |  |
|                                      | River/<br>Canal |                      | 0.13    |  |  |
|                                      | Tank/ Pond/Lake |                      | 0.03    |  |  |
|                                      | Other source    | es                   | 0.23    |  |  |
| Percentage Distribution of Household | Total           | Permanent            | 26.23   |  |  |
| living in Pemanent, Semi-Permanent   |                 | Semi-Permanent       | 67.65   |  |  |
| and Temporary Houses                 |                 | Temporary            | 5.93    |  |  |
|                                      | 1               |                      |         |  |  |


|  | Rural | Permanent                       |   | 17.54 |
|--|-------|---------------------------------|---|-------|
|  |       | Semi-Permanent                  |   | 76.24 |
|  |       | Temporary                       |   | 6.1   |
|  | Urban | Permanent                       | 64.28                                   |       |
|  |       | Semi-Permanent                  |   | 30    |
|  |       | Temporary                       |   | 5.18  |
| Type of Latrine Facility<br>(% of Household) | Total | Flush / Pour latrine            | Piped Sewer<br>System                   | 0.96  |
|  |       |                                 | Septic Tank                             | 14.43 |
|  |       |                                 | Other System                            | 3.25  |
|  |       | Pit Latrin                      | With<br>slab/Ventilated<br>improved pit | 3.21  |
|  |       |                                 | Without slab/open                       | 3.01  |
|  |       | Night soil disposed into        | open drain                              | 0.06  |
|  |       | Service Latrine                 | Night soil removed by human             | 0     |
|  |       |                                 | Night soil removed<br>by animal         | 0.06  |
|  |       | No Latrin within                | Public Latrine                          | 1.63  |
|  |       | premises                        | Open                                    | 73.39 |
|  | Rural | Flush / Pour latrine Pit Latrin | Piped Sewer<br>System                   | 0.57  |
|  |       |                                 | Septic Tank                             | 6.87  |
|  |       |                                 | Other System                            | 3.73  |
|  |       |                                 | With<br>slab/Ventilated<br>improved pit | 3.68  |
|  |       |                                 | Without slab/open<br>pit                | 3.6   |
|  |       | Night soil disposed into        | 0.02                                    |       |
|  |       | Service Latrine                 | Night soil removed<br>by human          | 0     |
|  |       |                                 | Night soil removed by animal            | 0.06  |
|  |       | No Latrin within                | Public Latrine                          | 0.18  |
|  |       | prennises                       | Open                                    | 81.28 |
|  | Urban | Flush / Pour latrine            | Piped Sewer<br>System                   | 2.69  |
|  |       |                                 | Septic Tank                             | 47.56 |
|  |       |                                 | Other System                            | 1.18  |
|  |       | Pit Latrin                      | With<br>slab/Ventilated<br>improved pit | 1.13  |
|  |       |                                 | Without slab/open<br>pit                | 0.4   |
|  |       | Night soil disposed into        | open drain                              | 0.19  |
|  |       | Service Latrine                 | Night soil removed by human             | 0     |
|  |       |                                 | Night soil removed by animal            | 0.04  |



|   |       | No Latrin within                              | Public Latrine           | 7.99  |
|---|-------|---|--------------------------|-------|
|   |       | premises                                      | Open                     | 38.82 |
| Type of drainage connectivity for waste | Total | Closed Drainage                               |                          | 3.56  |
| water outlet                            |       | Open Drainage                                 | 19.21                    |       |
| (% of nousenoid)                        |       | No Drainage                                   | 77.23                    |       |
|   | Rural | Closed Drainage                               | 2.36                     |       |
|   |       | Open Drainage                                 |                          | 9.48  |
|   |       | No Drainage                                   |                          | 88.17 |
|   | Urban | Closed Drainage                               |                          | 8.81  |
|   |       | Open Drainage                                 |                          | 61.88 |
|   |       | No Drainage                                   |                          | 29.31 |
| Avilabilty of Kitchen Facility          | Total | Cooking inside house                          | Has Kitchen              | 64.26 |
| (% of household)                        |       |   | Does not have<br>kitchen | 31.68 |
|   |       | Cooking outside house                         | Has Kitchen              | 1.53  |
|   |       |   | Does not have kitchen    | 2.35  |
|   |       | No cooking                                    |                          | 0.19  |
|   | Rural | Cooking inside house                          | Has Kitchen              | 61.85 |
|   |       |   | Does not have kitchen    | 33.94 |
|   |       | Cooking outside house                         | Has Kitchen              | 1.61  |
|   |       |   | Does not have kitchen    | 2.47  |
|   |       | No cooking                                    |                          | 0.14  |
|   | Urban | Cooking inside house<br>Cooking outside house | Has Kitchen              | 74.82 |
|   |       |   | Does not have<br>kitchen | 21.77 |
|   |       |   | Has Kitchen              | 1.19  |
|   |       |   | Does not have kitchen    | 1.85  |
|   |       | No cooking                                    |                          | 0.39  |
| Avilability of Fuel Used for Cooking    | Total | Firewood                                      |                          | 88.4  |
| (% of nousehold)                        |       | Crop Residue                                  |                          | 0.51  |
|   |       | Cowdung Cake                                  |                          | 0.86  |
|   |       | Coal/lignite/charcoal                         |                          | 0.92  |
|   |       | Kerosene                                      |                          | 0.6   |
|   |       | LPG/PNG                                       |                          | 8.39  |
|   |       | Electricity                                   |                          | 0.05  |
|   |       | Bio-gas                                       |                          | 0.05  |
|   |       | Any other                                     |                          | 0.04  |
|   |       | No Cooking                                    |                          | 0.19  |
|   | Rural | Firewood                                      |                          | 96.68 |
|   |       | Crop Residue                                  |                          | 0.49  |
|   |       | Cowdung Cake                                  |                          | 0.95  |
|   |       | Coal/lignite/charcoal                         | 0.19                     |       |



|       | Kerosene              | 0.18  |
|-------|-----------------------|-------|
|       | LPG/PNG               | 1.23  |
|       | Electricity           | 0.05  |
|       | Bio-gas               | 0.05  |
|       | Any other             | 0.03  |
|       | No Cooking            | 0.14  |
| Urban | Firewood              | 52.14 |
|       | Crop Residue          | 0.57  |
|       | Cowdung Cake          | 0.44  |
|       | Coal/lignite/charcoal | 4.13  |
|       | Kerosene              | 2.44  |
|       | LPG/PNG               | 39.78 |
|       | Electricity           | 0.03  |
|       | Bio-gas               | 0.04  |
|       | Any other             | 0.05  |
|       | No Cooking            | 0.39  |

### 3.10 LAND REQUIREMENT FOR THE PROJECT

The project is proposed to be developed on Revenue Waste Land allocated by State Government for the development of Solar Park. The overall land initially identified for the proposed project is around 405 hectares, after preliminary assessment by SECI based on the contour maps developed from Digital Elevation Map of the site suitable areas for the project has been identified marked and has been mentioned in the below table. SECI has also carried out the topography survey for the said land parcels. The location of different plots are identified and same was marked in Google Maps and shown in Figure 3-2(a) and (b).





Figure 0-2(a): Indicative layout of the site superimposed on village map





FIGURE 0-2(B): INDICATIVE LAYOUT OF THE SITE SUPERIMPOSED ON VILLAGE MAP



The entire 378 ha of land that has been transferred to the project is government land as shown in the maps above. The project however will require 200 ha. SECI is in process of conducting the topography survey. After the conclusion of the topographic survey, SECI will finalize the tentative project boundary, wherein, due care shall be taken to avoid tree cutting, acquisition of private land, gothan area, any damage to property of cultural importance, community building, schools etc.

The proposed project falls under the villages listed in Table 13-6. It is also proposed to construct a transmission line of length 33 km approx. the exact route shall be determined at later stage by conducting a detailed route survey analysis.

| S.NO       | VILLAGE NAME | TEHSIL     | AREA AS PER<br>RECORD (P-II) (Ha) |
|------------|--------------|------------|-----------------------------------|
| Ι          | RENGAKATHERA | Dongargarh | 3.22                              |
|            |              | Dongargarh | 6.13                              |
| SUB- TOTAI | L (I)        |            | 9.35                              |
| П          | DUNDHERA     | Dongargarh | 9.22                              |
|            |              | Dongargarh | 10.78                             |
|            |              | Dongargarh | 2.25                              |
|            |              | Dongargarh | 2.55                              |
|            |              | Dongargarh | 5.99                              |
| SUB- TOTAI |              |            | 30.79                             |
| III        | AMLIDEEH     | Dongargarh | 40.56                             |
| SUB- TOTAI |              |            | 40.56                             |
| IV         | DHABA        | Dongargaon | 0.24                              |
|            |              | Dongargaon | 39.7                              |
|            |              | Dongargaon | 10.93                             |
|            |              | Dongargaon | 2.58                              |
|            |              | Dongargaon | 9.59                              |
| SUB- TOTAI | L (IV)       |            | 63.04                             |
| V          | КОНКНА       | Dongargaon | 36.3                              |
|            |              | Dongargaon | 7.8                               |
|            |              | Dongargaon | 0.41                              |
| SUB- TOTAI | L (V)        |            | 44.5                              |
| VI         | ODARBANDH    | Dongargaon | 30.44                             |
|            | Γ            | Dongargaon | 22.89                             |
| SUB- TOTAI | L (VI)       |            | 53.34                             |
| VII        | TOLAGAON     | Dongargaon | 51.09                             |
|            |              | Dongargaon |                                   |

#### **Table 3-7 List of Project Affected Villages**



| SUB- TOTAI | L (VII)                | 51.09      |       |
|------------|------------------------|------------|-------|
| VIII       | MARGAON                | Dongargaon | 19.67 |
|            |                        | Dongargaon | 6.62  |
|            |                        | Dongargaon | 4.05  |
|            |                        | Dongargaon | 2.33  |
|            |                        | Dongargaon | 4.87  |
|            |                        | Dongargaon | 2.7   |
| SUB- TOTAI | L (VIII)               |            | 40.23 |
| IX         | GIRGAON                | Dongargaon | 52.88 |
| SUB- TOTAI | (IX)                   |            | 52.88 |
| Х          | GUGHWA                 | Dongargaon | 19.24 |
|            |                        | Dongargaon |       |
| SUB- TOTAI | 19.24                  |            |       |
| Grand      | Total (I+II+III+IV+V+V | 405.022    |       |

### 3.11 DEMOGRAOHIC PROFILE OF AFFECTED VILLAGES

The details of the 10 Project Affected Villags, as per Census – 2011 data is presented below:



| Tehs                     | sil        | I                | Dongargarh |         | Dongargaon |        |           |          |         |         |        |
|--------------------------|------------|------------------|------------|---------|------------|--------|-----------|----------|---------|---------|--------|
| Villa                    | ge         | Renga<br>kathera | Dundera    | Amlidih | Dhaba      | Kohkha | Odarbandh | Tolagaon | Margaon | Girgaon | Gughwa |
| Number of Hous           | seholds    | 356              | 370        | 212     | 276        | 283    | 83        | 113      | 332     | 167     | 97     |
| Population               | Total      | 1772             | 1917       | 1081    | 1,284      | 1,334  | 409       | 585      | 1,769   | 841     | 480    |
|                          | Males      | 899              | 951        | 546     | 648        | 639    | 202       | 286      | 848     | 433     | 232    |
|                          | Females    | 873              | 966        | 535     | 636        | 695    | 207       | 299      | 921     | 408     | 248    |
| Literates                | Total      | 1098             | 1162       | 690     | 879        | 926    | 277       | 434      | 1,112   | 616     | 309    |
|                          | Males      | 649              | 661        | 396     | 500        | 492    | 155       | 227      | 614     | 342     | 163    |
|                          | Females    | 449              | 501        | 294     | 379        | 434    | 122       | 207      | 498     | 274     | 146    |
| Scheduled                | Total      | 88               | 100        | 90      | 88         | 212    | 5         | 145      | 338     | 11      | 83     |
| Castes                   | Males      | 50               | 54         | 45      | 36         | 102    | 3         | 78       | 165     | 6       | 36     |
|                          | Females    | 38               | 46         | 45      | 52         | 110    | 2         | 67       | 173     | 5       | 47     |
| Scheduled                | Total      | 490              | 578        | 305     | 527        | 363    | 202       | 83       | 506     | 322     | 78     |
| Tribes                   | Males      | 249              | 277        | 157     | 273        | 175    | 92        | 39       | 250     | 165     | 37     |
|                          | Females    | 241              | 301        | 148     | 254        | 188    | 110       | 44       | 256     | 157     | 41     |
| Workers and N            | on-Workers |                  |            |         |            |        |           |          |         |         |        |
| Total Workers            | Total      | 1093             | 1129       | 623     | 681        | 747    | 277       | 392      | 848     | 460     | 277    |
| (Main and<br>Marginal)   | Males      | 569              | 565        | 319     | 364        | 372    | 134       | 192      | 484     | 244     | 137    |
| ivia ginar)              | Females    | 524              | 564        | 304     | 317        | 375    | 143       | 200      | 364     | 216     | 140    |
| (i) Main                 | Total      | 915              | 1042       | 579     | 277        | 318    | 229       | 330      | 802     | 278     | 89     |
| Workers                  | Males      | 476              | 537        | 296     | 184        | 173    | 113       | 166      | 464     | 240     | 70     |
|                          | Females    | 439              | 505        | 283     | 93         | 145    | 116       | 164      | 338     | 38      | 19     |
| Category of Wo<br>(Main) | orkers     |                  |            |         |            |        |           |          |         |         |        |
| (a) Cultivators          | Total      | 219              | 753        | 401     | 60         | 294    | 46        | 160      | 483     | 208     | 54     |
|                          | Males      | 164              | 373        | 201     | 55         | 157    | 18        | 78       | 276     | 192     | 44     |
|                          | Females    | 55               | 380        | 200     | 5          | 137    | 28        | 82       | 207     | 16      | 10     |
|                          | Total      | 508              | 240        | 155     | 7          | 14     | 162       | 152      | 264     | 36      | 24     |



| (b)                          | Males   | 147 | 132 | 79  | 2   | 7   | 82  | 76  | 136 | 18  | 20  |
|------------------------------|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Agricultural<br>Labourers    | Females | 361 | 108 | 76  | 5   | 7   | 80  | 76  | 128 | 18  | 4   |
| (c) Workers in               | Total   | -   | 3   | -   | 7   | -   | 4   | -   | -   | 1   | 2   |
| household                    | Males   | -   | 1   | -   | 4   | -   | 2   | -   | -   | 1   | 2   |
| maasay                       | Females | -   | 2   | -   | 3   | -   | 2   | -   | -   | -   | -   |
| (d) Other                    | Total   | 188 | 46  | 23  | 203 | 10  | 17  | 18  | 55  | 33  | 9   |
| Workers                      | Males   | 165 | 31  | 16  | 123 | 9   | 11  | 12  | 52  | 29  | 4   |
|                              | Females | 23  | 15  | 7   | 80  | 1   | 6   | 6   | 3   | 4   | 5   |
| (ii) Marginal                | Total   | 178 | 87  | 44  | 404 | 429 | 48  | 62  | 46  | 182 | 188 |
| Workers                      | Males   | 93  | 28  | 23  | 180 | 199 | 21  | 26  | 20  | 4   | 67  |
|                              | Females | 85  | 59  | 21  | 224 | 230 | 27  | 36  | 26  | 178 | 121 |
| Category of Wo<br>(Marginal) | orkers  |     |     |     |     |     |     |     |     |     |     |
| (a) Cultivators              | Total   | 2   | 43  | 1   | 2   | 96  | 22  | 37  | 27  | 172 | 13  |
|                              | Males   | 1   | 6   | 1   | 1   | 49  | 10  | 15  | 9   | 4   | 7   |
|                              | Females | 1   | 37  | -   | 1   | 47  | 12  | 22  | 18  | 168 | 6   |
| (b)                          | Total   | 171 | 40  | 42  | 312 | 333 | 25  | 24  | 17  | 7   | 162 |
| Agricultural                 | Males   | 89  | 20  | 21  | 135 | 150 | 10  | 11  | 9   | -   | 49  |
| Labourers                    | Females | 82  | 20  | 21  | 177 | 183 | 15  | 13  | 8   | 7   | 113 |
| (c) Workers in               | Total   | -   | 3   | -   | -   | -   | 1   | -   | -   | -   | 8   |
| household                    | Males   | -   | 1   | -   | -   | -   | 1   | -   | -   | -   | 7   |
| maasay                       | Females | -   | 2   | -   | -   | -   | -   | -   | -   | -   | 1   |
| (d) Other                    | Total   | 5   | 1   | 1   | 90  | -   | -   | 1   | 2   | 3   | 5   |
| Workers                      | Males   | 3   | 1   | 1   | 44  | -   | -   | -   | 2   | -   | 4   |
|                              | Females | 2   | -   | -   | 46  | -   | -   | 1   | -   | 3   | 1   |
| Non-Workers                  | Total   | 679 | 788 | 458 | 603 | 587 | 132 | 193 | 921 | 381 | 203 |
|                              | Males   | 330 | 386 | 227 | 284 | 267 | 68  | 94  | 364 | 189 | 95  |
|                              | Females | 349 | 402 | 231 | 319 | 320 | 64  | 99  | 557 | 192 | 108 |





# 4. ENVIRONMENTAL AND SOCIAL SAFEGUARD DUE DILIGENCE

### 4.1 POLICY, LEGAL AND REGULATORY REQUIREMENTS

The policy, legal and regulatory requirements that are relevant to the environmental and social aspects of the proposed project shall comply with the policy, legal and regulatory requirements of the Government of India (GoI), respective State Governments and World Bank.

The policy, legal and regulatory requirements that are applicable to the environmental and social aspects of the investments implemented under the programme are as follows:

- Policy and Regulatory Framework of Government of India (GoI)
- Environmental Policy and Regulations of the respective State Governments
- Legislations applicable to construction activities
- Environmental and Social Management Framework of SECI (ESMF, June 2020)
- The World Bank Environmental and Social Safeguard Policy
- The World Bank Group General Environment, Health and Safety (EHS) Guidelines; and for Power Transmission and Distribution

4.2 KEY APPLICABLE LAWS AND REGULATIONS - ENVIRONMENTAL

The key environmental laws and regulations as relevant to the Renewable project is tabulated below.

| Act/ Rule/ Policy  | Year | Objective  | Project<br>Applicability  | Authority<br>Responsible   |
|--|------|--|---|--|
| Environmental<br>(Protection) Act  | 1986 | To protect and<br>improve the overall<br>environment   | It is an Umbrella<br>Act for all<br>environmental<br>legislations in the<br>county. | MoEF&CC,<br>SPCB   |
| Environment<br>Impact Assessment<br>Notification (and<br>subsequent<br>amendments) | 2006 | To provide<br>environmental<br>clearance to<br>developmental<br>activities, to mitigate<br>the impact of the<br>project on the | Not Applicable  | MoEF&CC,<br>SEIAA (State<br>Environment<br>Impact<br>Assessment<br>Authority)<br>SPCB. |

| Table 4-1 Key | Applicable | Laws and | <b>Regulations</b> - | - Environmental |
|---------------|------------|----------|----------------------|-----------------|
| v             |            |          | 0                    |                 |



| Act/ Rule/ Policy   | Year         | Objective   | Project<br>Applicability   | Authority<br>Responsible   |
|---|--------------|---|--|--|
|   |              | surrounding<br>environment.   |  |  |
| Indian Forest Act   | 1927         | To protect Forest<br>land from impacts of<br>the project.   | If RE Project and<br>Transmission line<br>pass through Forest<br>Areas then it will<br>attract the provision   | State Forest<br>Department /<br>MoEFCC,<br>Regional<br>Office  |
| The Forest<br>(Conservation) Act<br>The Forest<br>(Conservation)<br>Rules | 1980<br>1981 | To keep a check on<br>the forested land and<br>check on<br>deforestation by<br>restricting<br>conversion of forest<br>areas into non-forest<br>areas.   | Conservation Act<br>requiring Forest<br>Clearance  | State Forest<br>Department<br>and Regional<br>Office of<br>MoEFCC and<br>Central<br>Government<br>depending<br>upon the<br>extent of forest<br>acquisition |
| National Forest<br>Policy (Revised)                                       | 1988         | To maintain<br>ecological stability<br>through preservation<br>and restoration of<br>biological diversity   | RE Projects where<br>clearing of forest/<br>felling of trees is<br>required.   | Forest<br>Department,<br>GoI   |
| Wildlife<br>(Protection) Act  | 1972         | Parliament of India<br>enacted for<br>protection of plants<br>and animal species<br>by protecting<br>National Parks and<br>Sanctuaries.   | If RE project located<br>inside the boundary<br>of Wildlife<br>Sanctuary or<br>National Park,<br>Wildlife reserves.<br>If Project area under<br>bio-reserves or<br>National<br>biodiversity reserves | National<br>Board of<br>Wildlife or<br>Chief Wildlife<br>Warden of<br>State.   |
| Biological<br>Diversity Act   | 2002         | An Act to provide<br>for conservation of<br>biological diversity,<br>sustainable use of its<br>components, and fair<br>and equitable<br>sharing of the<br>benefits arising out<br>of the use of<br>biological resources,<br>knowledge and for |  | MoEFCC,<br>National<br>Biodiversity<br>Authority and<br>State<br>Biodiversity<br>Boards  |



| Act/ Rule/ Policy                                     | Year | Objective  | Project<br>Applicability   | Authority<br>Responsible |
|---|------|--|--|--------------------------|
|   |      | matters connected<br>therewith or<br>incidental thereto.   |  |                          |
| Air (Prevention<br>and Control of<br>Pollution) Act   | 1981 | To control air<br>pollution by<br>controlling discharge<br>of pollutants as per<br>the prescribed.<br>Approval for<br>Consent to Operate<br>(CTO) and Consent<br>to Establish (CTE).         | CTE & CTO is not<br>applicable to RE<br>projects as per<br>Chhattishgarh solar<br>power policy.<br>CTE & CTO will be<br>applicable if the<br>contractor<br>establishes high<br>capacity Batching<br>Plant.<br>Installation of DG<br>sets also requires<br>NOC                        | SPCB                     |
|   |      |  | Activities during<br>construction phase<br>should conform to<br>the Air Act with<br>respect emission<br>standard.  |                          |
| Water (Prevention<br>and Control of<br>Pollution) Act | 1974 | To control water<br>pollution by<br>controlling discharge<br>of pollutants as per<br>the prescribed<br>norms. Approval for<br>Consent to Operate<br>(CTO) and Consent<br>to Establish (CTE). | CTE & CTO is not<br>applicable to RE<br>projects.<br>CTE & CTO will be<br>applicable if the<br>contractor<br>establishes high<br>capacity Batching<br>Plant.<br>Discharges of<br>domestic wastewater<br>from toilets<br>Activities during<br>construction phase<br>should conform to | SPCB                     |
|   |      |  | should conform to<br>the Water Act with<br>respect to discharge<br>standard.   |                          |



| Act/ Rule/ Policy  | Year | Objective   | Project<br>Applicability  | Authority<br>Responsible  |
|--|------|---|---|---|
| Permission for<br>abstraction of<br>Ground water<br>under<br>Environmental<br>(Protection) Act | 1986 | To protect<br>unauthorized<br>abstraction of<br>Ground water.   | If the RE project<br>requires to abstract<br>ground water at the<br>time on construction<br>and operation phase.<br>No Objection<br>Certificate (NOC)<br>for ground water<br>withdrawal will be<br>required | Normally<br>Central<br>Ground Water<br>Authority is<br>the concerned<br>authority. In<br>case of<br>Chhattisgarh<br>the concerned<br>authority for<br>such<br>permission is<br>Chhattisgarh<br>Ground Water<br>Authority/<br>Commissioner<br>of Rural<br>Development<br>Authority |
| Construction and<br>Demolition Waste<br>Rules  | 2016 | For addressing the<br>indiscriminate<br>disposal of C & D<br>Waste and enable<br>channelization of the<br>waste for reuse and<br>recycling in gainful<br>manner | Approval required<br>from local<br>authorities, if waste<br>generation is >20<br>tons in a day or 300<br>tons per project in<br>month   | Local<br>Authority and<br>State Pollution<br>Control Board  |
| E-waste<br>(Management and<br>Handling) Rules  | 2016 | To control/mitigate<br>potential impacts<br>due to e-waste<br>handling & storage<br>on the site.  | Applicable for RE<br>projects while using<br>and repairing,<br>storing of<br>equipment. To<br>obtain authorization<br>From SPCB.<br>Filing of return and<br>maintenance of<br>records in the forms          | SPCB  |
| Hazardous and<br>Other Waste<br>(Management and<br>Trans-boundary<br>Movement) Rules           | 2016 | To control/mitigate<br>potential impacts<br>due to Hazardous-<br>waste Import,<br>Export, Handling,<br>Storage and disposal.                                    | given in the Rules<br>Applicable to RE<br>projects at the time<br>of Construction<br>(Prior to initiation of<br>any work)   | SPCB  |



| Act/ Rule/ Policy  | Year | Objective  | Project<br>Applicability   | Authority<br>Responsible |
|--|------|--|--|--------------------------|
|  |      | Proper management<br>of Hazardous Waste<br>Storage facility.   | At the time of<br>operation phase<br>hazardous waste<br>will be generated in<br>from of refuse of<br>turbine oil,<br>transformer oil and<br>their tank bottom<br>sludge. |                          |
|  |      |  | In addition disposal<br>of PV cells also<br>attract the<br>provisions of rules   |                          |
|  |      |  | Permission for<br>storage of hazardous<br>and other wastes<br>will be required for<br>handling hazardous<br>wastes   |                          |
| The Bio Medical<br>Waste<br>Management Rules                       | 2016 | To control storage,<br>transportation and<br>disposal of Bio<br>Medical Waste.   | Comply with the<br>handling and<br>disposal<br>Requirements of the<br>rules.   | SPCB                     |
| Noise-Pollution<br>(Regulation and<br>control) Rules               | 2000 | To control noise<br>levels and maintain<br>it to the standards<br>prescribed for<br>various areas like<br>residential,<br>commercial or silent<br>zones by the Central<br>Pollution Control<br>Board (CPCB). | Noise abatement<br>during construction<br>time and compliance<br>under the rules to<br>maintain stipulated<br>standards.   | CPCB, SPCB               |
| Ozone Depleting<br>Substances<br>(regulation and<br>Control) Rules | 2000 | To control and<br>reduce the use of<br>Ozone depleting<br>substances to protect<br>the Ozone layer   | Applicable to RE<br>Projects where air<br>conditioning units<br>installed  | Secretary,<br>MoEFCC     |
| Batteries<br>(Management and<br>Handling) Rules                    | 2001 | The Act defines the<br>requirements for<br>disposal of used<br>batteries for bulk<br>users. The  | Applicable when<br>batteries are used for<br>storage of power.   | SPCB                     |



| Act/ Rule/ Policy   | Year | Objective   | Project<br>Applicability   | Authority<br>Responsible   |
|---|------|---|--|--|
|   |      | developers in sub-<br>project would be<br>likely bulk users.  |  |  |
| Electricity Act   | 2003 | Laws relating to<br>generation,<br>transmission,<br>distribution, trading<br>and use of<br>electricity,<br>promotion of<br>efficient and<br>environmentally<br>benign policies. | Applicable for RE<br>and Transmission<br>line projects. Where<br>the national grid<br>connectivity is being<br>involved.                                       | State<br>Electricity<br>Board, Power<br>Grid<br>State<br>transmission<br>and<br>distribution<br>companies  |
| The Central<br>Electricity<br>Authority<br>(Technical<br>Standards for<br>Connectivity to the<br>Grid) Amendment<br>Regulations | 2013 | Guidelines for Gird<br>– Connectivity<br>(Technical<br>Standards) for RE<br>projects<br>Compensation<br>payments for<br>transmission<br>(ROW) <sup>1</sup>                      | Applicable for RE<br>and Transmission<br>line projects. Where<br>the national grid<br>connectivity is being<br>involved.                                       | Ministry of<br>Power, Central<br>Electricity<br>Authority<br>(CEA),  |
| Energy<br>Conservation Act<br>2001  | 2001 | Established under<br>the National Mission<br>for enhanced Energy<br>Efficiency.   | Not directly<br>applicable for RE<br>projects  | BEE (Bureau<br>of Energy<br>Efficiency).   |
| Ancient<br>Monuments and<br>Archaeological<br>Sites and Remains<br>Act  | 1958 | Conservation of<br>cultural and<br>historical remains<br>found in India.  | For the project<br>located within 300<br>m from such<br>features.(first 100<br>meters as prohibited<br>area followed by<br>200 meters to be<br>regulated area) | Archaeological<br>Dept. GOI,<br>Indian<br>Heritage<br>Society and<br>Indian<br>National Trust<br>for Art and<br>Culture<br>Heritage<br>(INTACH). |

<sup>1</sup> 

<sup>&</sup>lt;u>http://powermin.nic.in/sites/default/files/uploads/Guidelines\_for\_payment\_of\_compensation\_towards\_damages\_i</u> <u>n\_regard.pdf</u> -Guidelines for compensation



4.3 KEY APPLICABLE LAWS AND REGULATIONS – LAND AND SOCIAL

The key laws and regulations governing land and social issues and relevant to the Renewable project is tabulated below.

| Act/ Rule/ Policy   | Year        | Objective  | Project<br>Applicability   | Authority<br>Responsible   |
|---|-------------|--|--|--|
| 73 <sup>rd</sup> Constitution<br>Amendment Act,   | 1992        | The Act enables<br>participation of<br>Panchayat level<br>institutions in<br>decision-making.<br>Panchayats at the<br>village level will be<br>involved for<br>preparation and<br>implementation of<br>the project.  | Applicable for any<br>project located in<br>panchayat area   | Department<br>of Panchayat<br>Raj, State<br>Government                 |
| Chhattisgarh<br>Panchayats Act  | 1993        | The act gives<br>powers to the<br>Panchayats in case<br>there is any<br>grievance arises by<br>the project. There is<br>Provision for<br>application of<br>consent from the<br>respective<br>panchayat<br>body/village<br>administrative<br>officer etc., during<br>the project life<br>cycle. | SECI will ensure<br>that all grievances<br>raised by locals<br>related to the<br>project are<br>addressed through<br>grievance redressal<br>process. | Department<br>of Panchayat<br>Raj, State<br>Government                 |
| Right of way and<br>compensation as<br>per provision of<br>Electricity Act,<br>2003 and Indian<br>Telegraph Act,<br>1885. | 2003        | To ensure adequate<br>compensation for<br>loss of land under<br>tower footings and<br>restrictive use of land<br>under ROW.  | Transmission Line  | Ministry of<br>Power,<br>Central<br>Electricity<br>Authority<br>(CEA), |
| Guidelines issued<br>by Ministry of<br>Power for payment<br>of compensation   | Oct<br>2015 | To determine compensation  | Any sub project that<br>also includes<br>transmission line or  | Corporation /<br>Municipality<br>/Local Body                           |

#### Table 4-2 Key Applicable Laws and Regulations – Land and Social



| Act/ Rule/ Policy  | Year | Objective  | Project<br>Applicability                  | Authority<br>Responsible    |
|--|------|--|---|-----------------------------|
| towards damages<br>caused by tower<br>and Right of Way<br>for transmission<br>lines. |      | tower base area<br>impacted due to<br>installation of<br>tower / pylon<br>structure; and<br>compensation<br>towards diminution<br>of land value in the<br>width of Right of<br>Way (RoW) corridor<br>due to laying of<br>transmission line and<br>imposing certain<br>restrictions | as an associate<br>project of solar park. | or the State<br>Government. |

# 4.4 OTHER LEGISLATIONS APPLICABLE TO CONSTRUCTION ACTIVITIES UNDER THE PROJECT

- Workmen's Compensation Act 1923 (the Act provides for compensation in case of injury by accident arising out of and during the course of employment);
- Payment of Gratuity Act, 1972 (gratuity is payable to an employee under the Act on satisfaction of certain conditions on separation if an employee has completed 5 years);
- Employees PF and Miscellaneous Provision Act 1952 (the Act provides for monthly contributions by the employer plus workers);
- Maternity Benefit Act, 1951 (the Act provides for leave and some other benefits to women employees in case of confinement or miscarriage, etc.);



- The Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act, 2013 is introduced to prevent and provide redressal of complaints of sexual harassment.
- The Protection of Women from Domestic Violence Act, 2005 defines domestic violence, describes the powers and duties of protection officers, service providers and lists the procedures for obtain reliefs.
- Contract Labor (Regulation and Abolition) Act, 1970 (the Act provides for certain welfare measures to be provided by the contractor to contract labour);
- Minimum Wages Act, 1948 (the employer is supposed to pay not less than the Minimum Wages fixed by the Government as per provisions of the Act);
- Payment of Wages Act, 1936 (it lays down as to by what date the wages are to be paid, when it will be paid and what deductions can be made from the wages of the workers);
- Equal Remuneration Act, 1979 (the Act provides for payment of equal wages for work of equal nature to Male and Female workers and not for making discrimination against Female employees);
- Payment of Bonus Act, 1965 (the Act provides for payments of annual bonus subject to a minimum of 83.3% of wages and maximum of 20% of wages);
- Industrial Disputes Act, 1947 (the Act lays down the machinery and procedure for resolution of industrial disputes, in what situations a strike or lock-out becomes illegal and what are the requirements for laying off or retrenching the employees or closing down the establishment);
- Industrial Employment (Standing Orders) Act; 1946 (the Act provides for laying down rules governing the conditions of employment);
- Trade Unions Act, 1926 (the Act lays down the procedure for registration of trade unions of workers and employers. The trade unions registered under the Act have been given certain immunities from civil and criminal liabilities);
- Child Labour (Prohibition and Regulation) Act, 1986 (the Act prohibits employment of children below 14 years of age in certain occupations and processes and provides for



regulation of employment of children in all other occupations and processes. Employment of child labour is prohibited in Building and Construction Industry);

- Inter-State Migrant Workmen's (Regulation of Employment and Conditions of Service) Act, 1979 (the inter-state migrant workers, in an establishment to which this Act becomes applicable, are required to be provided certain facilities such as housing, medical aid, travelling expenses from home to the establishment and back, etc.);
- The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 and the Cess Act of 1996 (all the establishments who carry on any building or other construction work and employs 10 or more workers are covered under this Act; the employer of the establishment is required to provide safety measures at the building or construction work and other welfare measures, such as canteens, first-aid facilities, ambulance, housing accommodation for Workers near the workplace, etc.);
- The Factories Act, 1948 (the Act lays down the procedure for approval of plans before setting up a factory, health and safety provisions, welfare provisions, working hours and rendering information-regarding accidents or dangerous occurrences to designated authorities);
- Hazardous Wastes (Management, Handling and Trans-boundary Movement) Rules, 2008 (the Rules govern handling, movement and disposal of hazardous waste);
- Manufacture, Storage and Import of Hazardous Chemicals Rules 1989, amended 1994 and 2000 (the Rules provide indicative criteria for hazardous chemicals and require occupiers to identify major accident hazards and prepare on-site and off-site emergency plans).
- All the laws and regulations set by different authorities (MoEF, NGRBA, CPCB, etc.) have been reviewed to understand the applicable laws in the context of this proposed sub-project in Kanpur District I. All the applicable laws enlist the responsible authority and reasons for its applicability. It is therefore proposed that during the implementation of this project responsible authorities should be contacted acted by the implementing agency for monitoring the law and regulation.

### 4.5 APPLICABLE WORLD BANK POLICIES

As the Project is seeking financing from the World Bank and therefore the Bank's Operational Policies pertains to environmental and social safeguards are also applicable to this Project. The



No forest land diversion and tree felling is envisaged under the

activities is also located near to any National Park / Sanctuary / Eco sensitive zones and nor fall within 10 Km. radius of such protected areas. Applicable in case of Private Land Acquisition to minimize / avoid

resettlement wherever feasible.

Project does not lie in the notified Schedule areas of Chhattisgarh.

Though tribal population is located in the project area, none of them will be adversely impacted due to loss of land or any other immovable

property. The project however will carry out FPIC and prepare TDP.

No land acquisition and/or resettlement is envisaged for the establishment of proposed Project. Applicable to protect the dignity, right and cultural uniqueness of tribes & indigenous people impacted

for the project.

proposed project activities. None of project location and

Operational Policies of World Bank that are applicable to the project under Namami Gange programme are as follows:

| S.<br>No. | World Bank<br>Safeguard<br>Policies | Subject Category            | Applicable<br>(Yes / No) | Reason for Applicability  |
|-----------|-------------------------------------|-----------------------------|--------------------------|---|
| 1         | OP 4.01                             | Environmental<br>Assessment | Yes                      | Umbrella Policy applicable for all infrastructure projects.   |
| 2         | OP 4.36:                            | Forests                     | No                       | Applicable to protect forest health<br>and commercial forestry activities .<br>In the execution of Project, no Forest<br>diversion has been envisaged. No<br>commercial forestry activity will be<br>supported. |
|           |                                     |                             |                          | Applicable to protect natural habitats<br>including forest and wild life<br>impacted due to project.  |

No

No

Yes

 TABLE 4-3: APPLICABLE SAFEGUARD POLICIES OF WORLD BANK

Natural Habitats

Involuntary

Resettlement

Indigenous people

OP 4.04

OP 4.12

OP 4.10

3

4

5



Furthermore, in addition to the General EHS guidelines of the World Bank Group, Environmental, Health, and Safety (EHS) Guidelines for Electrical Power Transmission and Distribution should be customized for the site once the design is finalized.

#### 4.6 COMPLIANCE TO REGULATORY REQUIREMENTS

The projects may require some statutory permission/clearances under different Acts and Rules at different stage of the project. These are listed in **Table 4-5**.

| S.<br>No. | Type of<br>Clearance/Permits<br>(If Applicable)  | Applicability  | Project<br>Stage  | Responsibility        | Time<br>Required |
|-----------|--|--|---|-----------------------|------------------|
| 1.        | Forest Clearance<br>for land diversion   | For diversion<br>of forest land<br>in case<br>transmission<br>line passing<br>through forest<br>area         | Pre<br>Construction   | SECI/ State<br>Agency | 10-11<br>months  |
| 2.        | Tree felling<br>permission   | For tree<br>cutting for<br>establishment<br>of solar-wing<br>hybrid park or<br>transmission<br>line          | Pre<br>construction   | SECI/State<br>Agency  | 1-2 months       |
| 3.        | NOC (Consent to<br>Establish and<br>Consent to<br>Operate) under Air<br>and Water Act<br>from SPCB | For siting and<br>erection<br>Batching<br>plants etc. DG<br>sets & toilet<br>water<br>treatment (if<br>Reqd) | Construction<br>Stage (Prior<br>to erection<br>and<br>operation of<br>Plants)             | EPC<br>Contractor     | 2-4 months       |
| 4.        | Explosive License<br>from Chief<br>Controller of<br>Explosives                                     | For storing<br>fuel oil,<br>lubricants,<br>diesel etc.   | Construction<br>stage (Prior<br>to storing<br>fuel,<br>lubricants<br>and Diesel,<br>etc.) | Contractor            | 2-3 months       |

TABLE 4-4 SUMMARY OF STATUTORY CLEARANCE REQUIREMENT OF THE PROJECT



| S.<br>No. | Type of<br>Clearance/Permits<br>(If Applicable)   | Applicability  | Project<br>Stage   | Responsibility | Time<br>Required |
|-----------|---|--|--|----------------|------------------|
| 5.        | Permission for<br>storage of<br>hazardous chemical<br>from CPCB   | Manufacture<br>storage and<br>Import of<br>Hazardous<br>Chemical   | Construction<br>stage (Prior<br>to initiation<br>of any work)  | Contractor     | 2-3 months       |
| 6.        | Authorization<br>Under Hazardous<br>Waste rules   | For proper<br>disposal of<br>Used<br>Oil/Other<br>Hazardous<br>wastes<br>generated<br>during<br>construction &<br>operations | Construction<br>& operation  | Contractor     | 2-3 Months       |
| 7.        | Permission for<br>extraction of<br>ground water for<br>use in project<br>construction<br>activities from<br>State Ground<br>Water board | Extraction of ground water   | Construction<br>stage (Prior<br>to initiation<br>of<br>installation<br>of bore<br>wells and<br>abstraction<br>of water<br>from such<br>source) | Contractor     | 1-2 months       |
| 8.        | Permission for use<br>of water for<br>construction<br>purpose from<br>irrigation<br>department  | Use of surface<br>water for<br>construction  | Construction<br>stage (Prior<br>to initiation<br>of<br>abstraction<br>of water<br>from such<br>source)   | Contractor     | 1-2 months       |
| 9.        | Labour license<br>from Labour<br>Commissioner<br>Office   | Engagement<br>of Labour  | Construction<br>stage (Prior<br>to initiation<br>of any work)  | Contractor     | months           |



#### 4.7 STAKEHOLDER CONSULTANTS

The key stakeholders including the Chhattisgarh Energy Department, Chhattisgarh State Power Distribution Company Limited, District Administration, State Forest Department, local people were interacted (both formally and informally) during the field visits while preparing the ESDDR. Most of the associated government departments were visited to collect the relevant data and their feedback on the proposed project activities. Also, they were asked about the mitigation plans proposed to be adopted, suggestions for improvement and any public grievances.

#### 4.8 ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

The Solar PV project has substantial environmental and social benefits. The project generates power without emitting air pollution & greenhouse gases the project will generate employment in the local community. The society will benefit from accessibility of power supply. Ultimately, the project will uplift the socio-economic environment of the region.

Potential environmental impacts, both bio-physical and socio-economic, are assessed in terms of the direct and indirect nature of the impact, extent, duration and significance. The level of assessment of each potential impact are based on the important environmental issues identified.

The impacts of major infrastructure projects can be divided into two principal categories. First direct impacts which result from physical presence of the facilities and the way they are designed, built and operated. Second, indirect impacts, which stem from the construction and economic activities surrounding construction and the induced development resulting from new project. These impacts occur in two main phases- construction and operation. Direct environmental impacts are those that are directly caused by construction or operation. During construction these impacts primarily occur within project site area or immediately adjacent to it, and at ancillary sites such Labour camp. Direct construction impacts can include the damage to ecological features such as land resources and water bodies, damage to manmade structures and resettlement.

The Solar PV power plant project may influence various environmental components at different stages of the project viz: Pre-construction/ Design phase, Construction phase, Operation phase and Decommissioning phase. The impacts may be direct or indirect and may be beneficial or adverse with respect to the environment. The major works associated with the construction phase mainly are site clearance, earth work in embankment, excavation and cross drainage works, dumping of soils and waste materials and other construction activities and



associated works like mobilization of constructional equipment, setting up of labour camps, transportation and storage of materials, etc. These activities have potential impacts on physical, biological as well as social environment. The likely impacts on various environmental components have been described as follows:

#### 4.8.1 IMPACTS DURING DESIGN/ PRE-CONSTRUCTION PHASE

During the pre-construction phase land procurement activity will be carried out. And this activity will impact on socio economic condition of area. On the other hand, the site selection is directly related with surrounding environmental conditions.

#### Impacts on Land

Project is proposed to be set up on approximately 200 Ha of government land, whereas the Govt. of Chhattisgarh has offered over 405 Ha of land. The screening exercise carried out shows that the land is free from any habitation and there is no structure on the identified land parcels. SECI will finalize the tentative project boundary, wherein, due care shall be taken by to avoid tree cutting, acquisition of private land, gothan area, any damage to property of cultural importance, community building, schools etc. So, there will not be any physical displacement of people due to the project. Whereas, for transmission line compensation will be paid for the restrictive use of land per the policy "Right of way and compensation as per provision of Electricity Act, 2003 and Indian Telegraph Act, 1885, if any. However, some temporary damages/ disturbances can happen, which will be compensated as per the law of the land and applicable/prevailing guidelines.

The transmission line of length 33km is envisaged to be constructed for power evacuation from proposed project. Installation of towers and right of way will result in restrictive use of land. Though PAP will continue to cultivate the land under ROW, trees and houses beyond a certain height cannot be grown or constructed. The footprint of towers though will be a small area and it will be possible to cultivate the land under the tower footings.

Mitigation Measures:

• The entire affected person will be identified in advance prior to commencement of construction works.

• The R&R Plan will be prepared for affected persons once the alignment is finalized and exact location of tower footings is identified.



• All the affected persons (TL) will be compensated as per prevailing rules and policy of the state government for the transmission line.

#### Impacts on Forest Land

Since the baseline study indicates that the project is not located in forest land; any impact on forest land due to location of solar park is not envisaged. The proposed alignment of transmission line if at all passes through the forest land can be avoided by shifting the alignment in this particular area. So, after implementing the shifting of alignment, there will not be any impact on forest land.

#### 4.8.2 IMPACTS DURING CONSTRUCTION PHASE

Most of the adverse environmental impacts are related to construction works which are inevitable but are manageable through certain environmentally friendly practices. The negative environmental effects can be taken care of at an early stage through proper engineering design and through the proper management of contract during construction practices.

The standard construction works involved are site clearance, excavation, filling of earth materials and sub grade materials, handling of hazardous materials like bitumen, diesel, etc., dumping of unusable debris materials, transportation of materials to construction site, and other related activities and associated works like mobilization of construction equipment's, setting up of labour camps, material storage etc. These activities have certain impacts of various magnitudes on different components of environment. The anticipated impacts due to all these activities have been described below:

#### Impact on Land Resources

There will be change in the land use in project site especially after construction of inside road, installation of Solar Park, Pooling Sub-Station, Stockyard & Site Office etc. All of the above components of the proposed development will require the clearing of vegetation to a certain extent apart from grubbing and excavation.

Site is a barren land very less vegetation can be observed in the area. Along with natural drainage, density of vegetation is relatively high due to higher moisture content in the soil. Only taller vegetation would need to be cleared for installation of PV panels in the proposed layout. Vegetation removal could result in windblown dust which could constitute an in direct visual impact. Impact would be minor short-term negative in nature.



The excavation activity will lead to generation of excavated materials which would mainly be soil mixed with pebbles in the project area. The suitable materials will be re-used as fill materials, aggregates. The unsuitable excavated material will need to be disposed off as per EMP. The disposal of debris materials in haphazard manner will not only hamper the aesthetic look of the area but at the same time they are potential contaminant for the surrounding land. The underground wiring and pipeline would require a trench to be excavated along the PV panel modules resulting in disturbance and potential erosion of the substrate. Excavation is required for establishment of solar panel, trench and access road construction other infrastructure etc. in the solar park. Considering this impact would be moderate localized and short-term negative.

To establish tower for transmission line excavation is required and impact for excavation would be minor localized short-term negative impact. Some land would be needed to establish site offices and construction camps, labour camps. These will require temporary land for a short period. Such land parcels however will be taken on lease by the contractor in mutual agreement with the landowner.

There could be loss of crop during installation of towers and stringing.

Mitigation Measures

- The earth material generated due to excavation will be used to optimum quantity to reduce impact on land resources.
- Road layout will ensure that as much as possible avoidance of disturbance of natural drainage.
- The proposed access roads inside project area do cut cross several non-perennial drainage channels and would require construction of adequate number of cross-drainage structures to mitigate the adverse impacts on the surface runoff
- It should be ensured that no additional access roads other than those proposed as per the layout plan are created.
- It will be ensured that no trees are required to be cut while installation of solar PV panels. If any tree is still required to be cut, permission from the state forest department need to be obtain along with compensatory plantation as per the guidelines issued by the state forest department.



- The Construction camps will be located preferably on barren land and sufficiently away from settlements and water bodies.
- The Construction camp will be provided with necessary sanitation arrangements and basic facilities.
- After dismantling of Camp the natural condition of the land will be restored.
- No site will be left unattended after excavation activity.
- All crop damages to be compensated at market value.

#### Impact on Soil

Construction will require clearing, grubbing as well as excavation for foundation to establish solar panel and other developments such as office building, road and infrastructure. The impact on the soil due to the project activities are envisaged as below:

#### i. Loss of Topsoil

The site clearance process includes excavation and vegetation clearance which ultimately induces vegetation loss as well as loss of top soil. Clearing and grubbing would be required for establishing solar Park to the area required to established Solar PV panel. The activities associated with the site preparation and excavation plus movement of vehicles and equipment can disturb the surrounding lands. Top soils of the project site will be stored and re-use. So impact on top soil due to construction activities will be minimized.

The proposed transmission line 33 km starched pass mainly through barren land and agriculture fields the impact on top soil is anticipated due to foundation work to establish the electric towers. Around 105 towers would be required for 33 km length. For foundation works excavation is required which may lead to loss of top soil if proper care is not taken. Additional impact on topsoil is also envisaged due to movement of vehicles and equipment at site and storage of materials into the agricultural fields. Top soil will be impacted by those activities and it will take some time to return to the original condition. In view of such activities impact on top soil in the construction phase would be moderate localized medium term negative. However, the extent of impact on topsoil can be minimized by following mitigation measures:

#### Mitigation Measures

• In case of good quality topsoil comes under the construction area it should be preserved with utmost care and needs to be used for gardening or agricultural area.



- On the proposed alignment of the transmission line, at the time of construction good quality top soil should be kept sufficiently away from the construction zone to avoid contamination and needs to be reused in the agriculture field.
- No construction materials should be stacked in the agriculture field.
- ii. Contamination of Soil

Due to temporary camp site or stockyards, workshops, and other ancillary sites there is chance of loss to soil fertility due to various activities like accidental spillage of lubricants / fuel and other chemicals that may potentially cause soil contamination. The repair works of underground pipeline / cable network may lead to increased soil erosion in that localized pocket. Such contamination of soil will reduce the soil fertility and impact would be minor localized medium-term negative.

#### Mitigation Measures

- The earth material generated due to excavation will be used to optimum quantity to reduce impact on soil environment.
- Proper stripping and stockpiling of soil layers to reduce dust pollution.
- The construction camp will be provided with necessary sanitation arrangements and basic facilities to avoid soil contamination.

#### iii. Soil compaction

Compaction of soil is anticipated due to the movement of construction vehicles and heavy machines as well as at camp site and stockyard. Thus, regulation of movement of heavy equipment and vehicles shall be essential to prevent this.

Vehicular movement in agricultural field to support erection of transmission line will create soil compaction near transmission line area. Stockpile in the agricultural field should be restricted otherwise it would create soil compaction. The impact of soil compaction would be moderate regional medium term negative.

#### Mitigation Measure

- The excavation activities and vegetation clearance will strictly be limited to the pegged area, road and drains formations and other construction area.
- All the usable excavated materials will be re-used as fill materials and aggregates.



- The movement of construction vehicles and equipment will be restricted to only designated route.
- It should be ensured that no additional access roads other than those proposed as per the layout plan are created.

#### iv. Soil erosion

Inadequate soil stabilization measures in cleared areas could lead to erosion that could cause the loss of riparian vegetation and siltation of nearby drainage channels/ surface water bodies. Impact of soil erosion would be moderate/ regional/ long term and negative.

#### Mitigation Measure

- Designated storage site for fill materials and adequate stockpiling to prevent erosion and runoff related problem.
- Garland drains around excavated soil will trap silt. Silt trap will reduce siltation load in the nearby drainage and surface water body.
- Appropriate soil conservation and rainwater harvesting interventions to be done at the project site by use of simple techniques such as recharge pits, say @one per every 20 meters and (if possible) a number of small ponds to cover about 1% of project area if the slope is less than 2%, trench-cum-field bunds for every 400 square meters, if the slope is 2-5% and construction of appropriate number of Gabion check dams if the slope is more than 5% along with appropriate bonding at periodic intervals. Bunding will prevent soil erosion and recharge structures as mentioned above will improve water recharge significantly.

#### Impact on Water Resources

Proposed project will lead to increase in surface run-off. No surface water bodies are available inside project site however certain non-perennial drainage channels feeding these surface water bodies could be altered during to clearing and grubbing operations. Such alteration will reduce availability of water in the water body. Thus assessed impact would be moderate regional short term negative. It will be ensured that natural drainage system should be maintained properly. Any kind of dumping should be strictly prohibited. Drain should be free from any blockage.

As no surface water bodies are available inside project site, required water demand will be meet through ground water extraction.



#### Impact on Water Quality

Construction activity may temporarily deteriorate surface water quality of the water bodies outside project area resulting in increase in turbidity as well as in oil and grease. Considering contaminants and its interaction with water environment. Anticipated impact would be minor regional short to medium term negative. These impacts can be managed through following proposed mitigation measures:

- All water and liquid wastes arising from construction activities will be properly disposed off and will not be discharged into any water body/ stream course without adequate treatment.
- Littering or unauthorized discharge will not be permitted.
- Permission of the engineer and the concerned regulatory authorities will be obtained for disposal of the waste as the designated disposal point.
- The stream course and drain will be kept free from dumping of solid wastes and earth materials.
- The construction materials and debris will be stored away from water bodies or water ways and only at the designated sites along the construction zones.

#### Impact on Ambient Air Quality

The air quality parameter is the most common environmental feature, which is being affected by any project construction. The major indicators of Ambient Air Quality are suspended particulate matters (SPM), Particulate matters of size less than 10 $\mu$  (PM10), particulate matters of size less than 2.5  $\mu$  (PM2.5), Sulphur dioxide (SO2), nitrogen oxides (NOx), carbon monoxide (CO) in the atmosphere. Significant amount of dust is likely to be generated due to site clearance and excavation activities, exhaust of mobile and stationary construction equipment, batching plant, embankment and grading activities, transportation of earth materials and dumping of spoils, which lead to potential deterioration of air quality during the process. The emissions will be limited to the project area and dispersed rapidly. The activities will be confined to project area and which is away from the locality.

The improper sanitation at work camps and waste disposal usually lead to odour problem. Foul odour may also be caused during laying of pavement. The above mentioned problems related to the deterioration of air quality, however, impact will be moderate regional short term negative.



#### Mitigation Measures

#### Generation of Dust:

- Water will be sprayed, in earth handling sites, other excavation areas for suppressing fugitive dust during construction phase.
- Water sprinkling and transporting construction materials with tarpaulin coverage during the construction stage.
- Dust emission from stock piles of excavated material will be controlled either by covering the stockpiled materials or water spraying over it.
- As soon as construction is over all the surplus earth will be utilized properly & all loose earth will be removed from the site.

#### Mitigation measures for Plants & Equipment:

- The emissions will be limited to the project area and dispersed rapidly as the activities will be confined to project area and which is away from the locality.
- All the vehicles used during the construction stage to have valid PUC certificate
- Provision of effective air pollution control systems in batch mix plants such as dust containment cum suppression system for the equipment, construction of wind breaking walls along periphery of plant sites, construction of the metaled roads within the premises, regular cleaning and wetting of the ground within the premises, etc.
- Gaseous Pollution
- All the Construction vehicles and machineries will be regularly maintained to conform to the emission standards stipulated under Environment (Protection) Rules, 1986.
- All the DG sets will conform to the emission standards as stipulated under Environment (Protection) Rules, 1986.
- The workers working at Batch mix plants will be provided masks.

#### Impacts on Ambient Noise Level

Operation of heavy machineries; movement of heavy vehicles, aggregate mixing activities generates high noise increasing the ambient noise level in the surrounding.

Workers working near the noise generating equipment and plants are likely to be exposed to high noise level. The acceptable limits (for 8 hour duration) of the equivalent noise level exposure during one shift is 90 dB (A). Hence, noise generated due to various activities in the



construction camps may affect health of the workers if they are continuously exposed to high noise level. For reasons of occupational safety, exposure to impulses or impact noise should not exceed 140 dB (A) (peak acoustic pressure). Exposure to 10,000 impulses of 120 dB (A) are permissible in one day. The noise likely to be generated during excavation, loading and transportation of material will be in the range of 90 to 105 dB (A) and this will occur only when all the equipment operates together and simultaneously. This is however, is a remote possibility. The workers in general are likely to be exposed to an equivalent noise level of 80 to 90 dB (A) in an 8-hour shift, for which all statutory precautions should be taken into consideration. However, careful planning of machinery selection, operations and scheduling of operations can reduce these levels. A typical Noise generation due to different activities has been given in the Table 4-6.

| Type of Machinery/Equipment | Typical Noise Level during Major<br>Construction Activity (Noise Level in |  |  |
|-----------------------------|---|--|--|
|                             | dB(A) at 50 Feet)   |  |  |
| CLEA                        | RING  |  |  |
| Bulldozer                   | 80  |  |  |
| Front end loader            | 72 - 84   |  |  |
| Dump truck                  | 83 - 94   |  |  |
| Jack hammer                 | 81 - 98   |  |  |
| Crane with ball             | 75 - 87   |  |  |
| EXCAVATION AN               | D EARTH MOVING  |  |  |
| Bulldozer                   | 80  |  |  |
| Backhoe                     | 72 - 93   |  |  |
| Front end loader            | 72 - 84   |  |  |
| Dump truck                  | 83 - 94   |  |  |
| Jack hammer                 | 81 - 98   |  |  |
| Scraper                     | 80 - 93   |  |  |
| STRUCTURE CONSTRUCTION      |   |  |  |
| Crane                       | 75 - 77   |  |  |
| Welding generator           | 71 - 82   |  |  |
| Concrete mixer              | 74 - 88   |  |  |
| Concrete pump               | 81 - 84   |  |  |
| Concrete vibrator           | 76  |  |  |
| Air compressor              | 74 - 87   |  |  |
| Pneumatic tools             | 81 - 98   |  |  |
| Bulldozer                   | 80  |  |  |
| Cement and dump trucks      | 83 - 94   |  |  |
| Front end loader            | 72 - 84   |  |  |
| Dump truck                  | 83 - 94   |  |  |
| Paver                       | 86 - 88   |  |  |

 TABLE 4-6: TYPICAL NOISE LEVELS OF PRINCIPAL CONSTRUCTION EQUIPMENT



| Type of Machinery/Equipment | Typical Noise Level during Major<br>Construction Activity (Noise Level in<br>dB(A) at 50 Feet) |
|-----------------------------|--|
| GRAND AND (                 | COMPACTING   |
| Grader                      | 80 -93   |
| Roller                      | 73 - 75  |
| PAV                         | ING  |
| Paver                       | 86 - 88  |
| Truck                       | 83 - 94  |
| Tamper                      | 74 - 77  |
| LANDSCAPING                 | AND CLEAN UP   |
| Bulldozer                   | 80   |
| Backhoe                     | 72 - 93  |
| Truck                       | 83 - 94  |
| Front end Loader            | 72 - 84  |
| Dump Truck                  | 83 - 94  |
| Paver                       | 86 - 88  |

#### Source: CPCB, Govt. of India

It is evident from the above table that the operation of construction machinery e.g. bulldozer, loader, backhoes, concrete mixer, etc. will lead to rise in noise level to the range between 80-95 dB (A). Vehicles carrying construction materials will also act as the noise sources. The magnitude of impact from noise will depend upon types of equipment to be used, construction methods and also on work scheduling. However, the noise pollution generated due to different construction activities is a temporary affair. Each type of activity can generate different type and levels of noise that continue for a short period during the operations of those activities. The noise generation will be limited to the project area as the activities will be confined to project area which is away from the locality. The impact of noise on the ambient environment would be moderate local medium term negative. Implementing proper mitigation measures can reduce a lot of problem associated with noise pollution due to construction activities.

Mitigation Measures:

- The main stationary noise producing sources such as generator sets shall be provided with noise shields around them. The noise shields can either be a brick masonry structure or any other physical barrier which is effective in adequate attenuation of noise levels. A three meter high enclosure made up of brick and mud with internal plastering of a non-reflecting surface will be very effective in this regard
- The plants and equipment used for construction will strictly conform to CPCB noise standards.



- Vehicles and equipment used will be fitted with silencer and maintained accordingly.
- Noise to be monitored as per monitoring plan and if the noise level at any time found to be higher than immediate measure to reduce noise in that area will be ensured.
- Noise standards of industrial equipment will be strictly enforced to protect construction workers from severe noise impacts.
- All the workers working very close to the noise generating machinery shall be provided earplugs to avoid any ill impacts on their health.
- An awareness programme will be organized for drivers and equipment operators to make them aware of the consequences of noise and to act properly at site.

#### Impact on Social Environment

#### Employment

The project is likely to bring in positive benefits either from short term job opportunities during construction stage or long term during operational stage. The local community will be hired based on skill sets. The implementation of the projects will also create off-site infrastructure/ rental opportunities (canteens, guest houses, water tankers, vehicles etc.) in the vicinity. Project will ensure that those who are eligible and are vulnerable are given preference in the employment.

The proposed Solar project with additional employment opportunities will result in improvement in the standard of living of the local community in addition to the potential increase in land prices in the vicinity of the project site.

#### Aesthetics

Disturbance of landscape aesthetics due to excavation is expected during the construction phase. However, it will be temporary and will be restored with proper management plans within a specified timeframe. Impact on aesthetics environment would be moderate.

Mitigation Measures:

- The site will be cleaned immediately after the construction activity is over.
- The debris materials will be disposed off only at identified area for disposal and proper leveling will be done after disposing the materials and shall be covered with top soil and some landscaping will be done at the disposal site

#### Loss of Access



Though screening results shows part of the land being used for cultivation which is in the south of the identified land parcels. These parcels are not being considered for the park. The developer will ensure that there is no loss of access by leaving enough space for the cultivators to access their land parcels.

#### **Public Health and Safety**

Health and safety are of major concern during the construction as well as operational phases. The impact on health and safety can be envisaged for workers at site. Emission of gaseous pollutants and dusts are major result of various processes like material treatment. This emission effect is only for short term till the construction work is over but the effect may be significant from the point of view that the workers are directly exposed to these emissions. Apart from this, safety risks to workers, primarily in the areas of storage and handling of dangerous materials, and in operation of heavy machinery, slopes, power line, work at height are also involved during the construction works.

Mitigation Measures

- The project will comply with the requirements of the EHS Guidelines.
- The plants and equipment will be installed sufficiently away from the settlement.
- All the construction equipment and vehicles will conform with the emission standards stipulated by the CPCB.
- Safe working techniques will be followed up and all the workers will be trained
- All the workers will be provided with proper personal safety equipment at construction as well as plant site
- Proper caution signage, barricading, delineators etc. will be installed at Construction zone and temporary diversions
- Proper traffic management will be ensured at the Construction zone as per IRC.
- An Emergency Response system in case of any incidence will be developed and implemented.
- Periodical health check facility will be provided at camp sites.

#### Impact of Labour influx on Host Population

The influx of workers and followers can lead to adverse social and environmental impacts on local communities, especially if the communities are rural, remote or small. Such adverse impacts may include increased demand and competition for local social and health services, as


well as for goods and services, which can lead to price hikes and crowding out of local consumers, increased volume of traffic and higher risk of accidents, increased demands on the ecosystem and natural resources, social conflicts within and between communities, increased risk of spread of communicable diseases, and increased rates of illicit behavior and crime. Such adverse impacts are usually amplified by local-level low capacity to manage and absorb the incoming labor force, and specifically when civil works are carried out in, or near, vulnerable communities and in other high-risk situations. While many of these potential impacts may be identified in a project's Environmental and Social Impact Assessment (ESIA), they may only become fully known once a contractor is appointed and decides on sourcing the required labor force. This means that not all specific risks and impacts can be fully assessed prior to project implementation, and others may emerge as the project progresses.

### Mitigation Measures

Within 30 days from the appointed date, the Concessionaire/Contractor shall prepare and submit 4 hard copies and 1 soft copy of Labour Influx and Worker's Camp Management Plan that addresses specific activities that will be undertaken to minimize the impact on the local community, including elements such as worker codes of conduct, training programs on HIV/AIDS, etc. A Workers' Camp Management Plan addresses specific aspects of the establishment and operation of workers' camps This Labour Influx and Worker's Camp Management Plan will include:

- mandatory and repeated training and awareness raising for the workforce about refraining from unacceptable conduct toward local community members, specifically women;
- informing workers about national laws that make sexual harassment and gender-based violence a punishable offence which is prosecuted;
- introducing a Worker Code of Conduct as part of the employment contract, and including sanctions for non-compliance (e.g., termination), manual scavenging, engagement with local residents, child labour, non-discrimination, harassment of co-workers including women and those belonging to SC and STs and other minority social groups,
- contractors adopting a policy to cooperate with law enforcement agencies in investigating complaints about gender-based violence.
- training programs on HIV/AIDS and other communicable diseases,
- workers' Camp Management Plan addressing specific aspects of the establishment and operation of workers' camps provided the ULB/ Executing Agency is unable to cater to the



demand for affordable housing for this additional workforce in terms of rentals, hostels, apartments etc.; and

• compliant handling Mechanism at the project level

### Other Environmental Concerns of Construction Phase:

Various other environmental impacts during construction stage include:

### Labour Camps

Construction workers are a much neglected group in the country. Unless the workers are provided proper amenities to live at the labour camp site the environmental issues of proposed construction cannot be properly met. The labour camps to be set up will need to have adequate provisions for water supply else uncontrolled interaction of construction workers with the existing surface water bodies could lead to pollution of these water bodies e.g. dumping of construction waste into these water bodies, washing of the construction machinery/ equipment etc. The lack of provision of adequate sanitary facilities may lead to direct or indirect faecal pollution of surface water resources. The contractor shall ensure that the mitigation measures proposed shall be implemented properly.

At labour camps lot of wastes are generated. These wastes are solid as well as liquid waste mainly refuse water and kitchen waste. The disposal of such waste material to the surrounding land can potentially damage the land and would generate health risk to not only surrounding area but within the premises itself. Improper drainages system within the premises also creates insanitary condition thereby enhancing health risk. Impact would be moderate local short to medium term negative.

Mitigation Measures

- Contractor will follow all relevant provisions of the Factories Act, 1948 and the Building and the other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 as well as the guidelines will be followed for construction and maintenance of labour camp throughout the construction period.
- The Construction/labour camps will be established only on area approved by site project team comprising SECI & Contractor.
- The labour camp will be located away from water bodies, schools and residential areas. The camp will be constructed with proper accommodation facilities.



- The workers camp will be provided with drinking water supply system so that local water sources are not disturbed.
- The camp should be provided with fuel for cooking like kerosene and /or LPG to avoid any cutting of trees for fuel wood.
- All camps will be provided with proper sanitation facilities, separate toilets and bathrooms for female and male workers, septic tanks with soak pits of sufficient size, dust bins etc.
- Waste water from domestic uses and solid wastes will be disposed of without violating environmental norms. The measures will be site specific.
- The labour camps will be provided with crèche, first aid facilities, etc. as required under Factory Act.
- If the COVID situation persists, arrangements for quarantine /isolation of vulnerable / infected individuals would need to be ensured. Additional waste management measures for Bio Medical waste may be required in such a situation.
- After completion of construction, the contractor will dismantle the camp and restore it to the original condition of the area before handing over the site to the land owner.

### **Different wastes generated**

Construction waste like concrete waste, debris will be generated from construction activities. The waste will be inert in nature but in absence of proper disposal construction waste will create soil and water pollution and disturb the drainage system. Impact would be moderate local short to medium term negative.

### Mitigation Measures

- Construction waste should be stored separately in a designate area.
- The waste can be used as filler material.

## 4.8.3 IMPACTS DURING OPERATIONAL PHASE

During operation stage, given the long-term nature, impacts would require adequate mitigation measures to minimize predicted impacts. In general, solar power generating facilities need to occupy a very large area in comparison to other types of power generation facilities relative to the level of power output generated. This is an important component of the visual aspect of Solar power plants as they can occupy large parts of a landscape, especially when viewed from



an elevated position. The land use changed in the construction phase due to installation of Solar Park, Pooling Sub-Station, Stockyard & Site Office etc. will remain unchanged.

### Impacts on Water Quality and Resources

During the operation phase, the possibility of degradation of water quality is very remote. The water requirements during the operation phase would be limited to cleaning operations for PV panels and other office building requirements including administrative buildings etc.

In this phase of the Solar Projects, requirement of 100 KL/day water is estimated for module washing. Water demand will be met through Ground water abstraction. Such ground water abstraction may lead to direct negative impact on the water environment. Due to consumption of ground water on regular basis impact would be moderate regional long term negative.

### Mitigation Measures

- Installation of alternative waterless cleaning technology for Solar PV
- Used water should be properly channelled to settling tank for stabilization and treatment so that recycled water could be reused for PV washing which will reduce the load on ground water.
- Adequate capacity of Rain Water storage will be built to harvest rain water which will be connected with drainage network. The stored water can be used for washing of Solar PV to promote optimal use of surface and ground water.
- Building of artificial ground water recharge structures as per guideline of Ground Water Board to promote ground water level.
- Requisite permissions need to be obtained before withdrawing ground water from bore wells/ tube wells from the competent authority.

### Impact on Air Quality

No emissions are expected due to the operation of the Solar PV Park. The solar PV panels do not release any greenhouse gas emissions or any other toxic pollutants.

### Impact on Noise Quality

Operation of Solar PV Park will not generate noise.

### Impact on Ecological Resources



At the time of operation phase Solar PV Park will not pose any risk on the surrounding ecology.

### Impact on Social Environment

### Employment

The project is likely to bring in positive benefits with temporary job opportunities during operation stage. Local people will be targeted for skilled and semi- skilled tasks wherever feasible. The implementation of the projects will also create off-site infrastructure (hotels, restaurants, canteens, guest houses etc.) in the vicinity. Apart from technical manpower and more staffs required for regular cleaning and security purpose which can be recruited from local community.

Establishment of Transmission tower and stringing will result in restrictive use of land under the RoW of the proposed alignment of transmission line. It will create obstruction in the movement of man and machine required for the agricultural activities. In order to minimize the impact, project will pay 85% of the land value of the land under for the tower pads and 15% of the land value for the land under ROW. The ownership of the land however will remain with the landowner.

### **Hazardous Waste**

During operation and maintenance generation of hazardous waste including damaged solar panels, transformer oil, E-Waste, batteries waste require special care because they poses serious threat to the public health safety. Generation of the waste will be continuous till the operational line of the project. Impact of hazardous waste will be minor local long term negative. Hazardous waste will be disposed off separately as per identified different rules.

At the time of handling Solar panels, they might get broken, cracked, deformed or scratched. Random disposal of such panel may lead to soil pollution as well as it will possess threat to public health safety.

Mitigation Plan

• The out-of-use (damaged, substandard, or out-of-use) solar panel should be stored separately and handed over to the manufacturer or authorized vendor for proper recycling/disposal.

### **E-Waste**



Improper disposal of generate E waste may create soil pollution and health hazardous.

### Mitigation Measures

- E waste should be stored separately
- Maintain records of e-waste generated
- End-of-life electrical and electronic equipment are not admixed with e-waste containing radioactive material if any.
- E-waste generated should be channelized through collection centre or dealer of authorized producer or dismantler or recycler or through the designated take back service provider of the producer to authorized dismantler or recycler;
- E waste should be managed in compliance of E-Waste (Management) Rules, 2016.

### **Batteries waste**

From the storage unit of the power plant battery waste will be generate as a result of end-oflife or defect in the storage cell. Batteries waste should be handled with utmost care. Any kind of leakage and spillage from batteries will create soil and water pollution and also create health hazardous for the people working around. The draft Batteries Rules (2020) should be reviewed by the Contractor to develop the final mitigation measures.

#### Mitigation Measures

- Batteries should be maintained properly so that any kind of leakage and spillage from batteries can be avoided.
- Batteries should be disposed off by depositing with the dealer, manufacturer, importer, assembler, registered recycler, re-conditioner or at the designated collection centers,
- Batteries waste should be managed in compliance with the Batteries (Management and Handling) Rules, 2001 in case of lead acid battery.

#### Solid Waste

At the operation phase solid waste will be generated from the office. Waste will be comprised of organic waste, recyclable waste and non- recyclable waste. Improper disposal of solid waste will create soil, water, air pollution and aesthetic problem. Impact of solid waste will be minor local long term/ negative.

### Mitigation Measures



- Waste should be segregate at source.
- Organic waste will be converted in to soil conditioner by composting.
- Recyclable waste will be sold to the authorized recycler.
- Inert waste will be disposed off in low lying area

#### 4.8.4 IMPACTS DURING DECOMMISSIONING PHASE

#### Impacts on Water Quality and Resources

The decommissioning activities which are likely to have adverse impacts are dismantling of the built up structures, access roads and other infrastructure facilities within the power plant area. The impacts would be similar to the construction stage. It will be ensured that debris and other waste materials are not disposed in the surface water bodies.

But due to end of project operation extraction of ground water will be stopped and it will reduce the stress on ground water environment. Impact would be minor regional long term positive.

#### Impact on Air Quality

At the time of decommissioning of the solar PV Park it is expected that the activities will generate dust and exhaust emissions. The Activities involved include dismantling, disassembly of the various components of power plant. This activity will generate air pollution and impacts would be moderate local short term negative.

Mitigation Measures

• Proper handling, using mask will reduce impact of air pollution

#### Impact on Noise Quality

The decommissioning activity will generate noise due to dismantling, disassembly of the various components of solar power plant. The contractor needs to comply with occupational health safety guideline during this stage. Impact would be moderate local short term negative.

#### Impact on Soil & Land Use

The decommissioning activities are likely to have impacts on soil erosion due to demolition activities. Therefore, proper environmental protection measures should be adopted to prevent any adverse incidences. Parcels of land under permanent structures e.g. roads / buildings / warehouse etc. need to be restored to its near original state by re-laying of the topsoil. This



phase will not create negative impact to the flora and fauna present in and around the site. Impact would be moderate local long term positive.

### Impact on Social Environment

### Employment

Decommissioning activities will create few temporary jobs by the contractor and all long term jobs will not be there anymore.

### Aesthetics

The site needs to be restored to its near original state before being handed over the original landowners.

## **Public Health and Safety**

The maintenance of transmission line needs to be done on regular basis, accidental failing of live wire of transmission line will create life threat to human being, grazing and other animal. The transmission line will also run on the water body in a few places, such location may create major accident potential. Impact would be significant local short-term negative.

Mitigation Measures

• Impact could be mitigated through regular monitoring and maintenance of the transmission line.

## 4.9 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

An Environment and Social Management Plan has been developed following the delineation of impacts and mitigation measures. These measures will be adopted by the SECI and imposed as conditions of contract of the sub-contractor employed for respective phases of the power project.

The measures identified for different phases, are tabulated in Tables 4-7, 4-8 and 4-9 which describes the nature of the potential environmental impact, the measures, which have or will be taken, the implementing agency and responsible organization.



Table 4-7: Environmental and Social Management Plan (ESMP) for Solar Park

| Environmental         |                    |   | <b>T</b> (*  |   | Institutional Re | sponsibility |
|-----------------------|--------------------|---|--------------|---|------------------|--------------|
| component /<br>Issues | Potential Impact   | Mitigation Measures   | Location     | Time Frame                                  | Implementation   | Supervision  |
| Design and Pre-O      | Construction Phase |   |              |   |                  |              |
| Land<br>Environment   | Loss of access     | <ul> <li>The land identified is owned<br/>by the government thus there<br/>will not be any land<br/>acquisition and resettlement<br/>impacts. The land identified is<br/>free of encroachment and<br/>other encumbrances.</li> <li>The developer will ensure<br/>access to cultivation sites<br/>located in the south.</li> <li>Any unidentified impact will<br/>be mitigated as per the<br/>entitlement matrix of RPF of<br/>the agreed ESMF. Any such<br/>issue if identified will be<br/>recorded in CESMP.</li> <li>Any loss of access will be<br/>avoided. Developer will<br/>consult the community around<br/>the site before barricading of<br/>the site.</li> </ul> | Project Site | Design and<br>Pre-<br>Construction<br>Stage | SECI             | SECI         |



| Environmental                           |   |   | Turnet  | <b>(D)</b>   | Institutional Responsibility                                 |             |
|---|---|---|---|--|--|-------------|
| component /<br>Issues                   | Potential Impact  | Mitigation Measures   | Location  | 1 ime Frame  | Implementation   | Supervision |
| Drainage Pattern<br>and Water<br>Bodies | The blocking of<br>water course will in<br>turn affect the<br>water tank/storage. | <ul> <li>The Solar panels, building and battery housing as well as substation should be constructed away from these natural drains.</li> <li>For internal access road network balancing culverts of sufficient capacity will be provided across these drains to allow free flow of water.</li> </ul>  | Drainage<br>converging<br>into nearby<br>areas                | Design &<br>Preconstruction<br>Construction<br>Stage | Contractor<br>(Site-in charge /<br>Head-EHS /<br>Head-Civil) | SECI        |
| Construction Pha                        | ase   |   |   |  |  |             |
| Land Resources                          | Loss of Vegetation  | <ul> <li>Vegetation will be removed<br/>from the construction zone<br/>before commencement of<br/>construction. All works will be<br/>carried out such that the<br/>damage or disruption to flora<br/>other that those identified for<br/>cutting is minimum.</li> <li>Only ground cover/shrubs that<br/>impinge directly on the<br/>permanent works or necessary<br/>temporary works will be<br/>removed with prior approval<br/>from the Environmental<br/>Expert.</li> </ul> | Road<br>network,<br>drainage,<br>building etc.<br>within park | Construction<br>stage                                | Contractor<br>(Site-in charge /<br>Head-EHS /<br>Head-Civil) | SECI        |



| Environmental<br>component / Potential Impact<br>Issues |                              | Mitigation Massuras   | Location    | Time Frame     | Institutional Responsibility |  |
|---|------------------------------|---|-------------|----------------|------------------------------|--|
|   | Mitigation Measures Location | Location  | 1 ime Frame | Implementation | Supervision                  |  |
|   |                              | <ul> <li>The Contractor, under any circumstances will not cut or damage trees.</li> <li>Trees identified under the project will be cut only after receiving clearance from the Forest Department and after the receipt of written permission from Engineer.</li> <li>Access to areas of the natural vegetation that are to be considered must be prohibited. A temporary fence should remain on site until all construction activities have completed.</li> <li>Construction vehicles, machinery and equipment will move or be stationed in the designated area only to prevent compaction of vegetation outside the construction area.</li> <li>Collection of firewood is prohibited.</li> </ul> |             |                |                              |  |



| Environmental         |                  |  | <b>T</b>   | Time Frame            | Institutional Responsibility                                 |             |
|-----------------------|------------------|--|------------|-----------------------|--|-------------|
| component /<br>Issues | Potential Impact | Mitigation Measures  | Location   |                       | Implementation   | Supervision |
|                       |                  | • No fires may be ignited with<br>the intent to destroy the flora<br>on the site and surrounding   |            |                       |  |             |
|                       | Site Clearance   | <ul> <li>The earth material generated due to excavation will be used to optimum quantity to reduce impact on land resources.</li> <li>Road layout will ensure that as much as possible avoidance of disturbance of natural drainage.</li> <li>The proposed access roads inside project area do cut cross several non-perennial drainage channels and would require construction of adequate number of cross-drainage structures to mitigate the adverse impacts on the surface runoff</li> <li>It should be ensured that no additional access roads other than those proposed as per the layout plan are created.</li> <li>It will be ensured that no trees are required to be cut while installation of solar PV panels.</li> </ul> | Solar Park | Construction<br>Phase | Contractor<br>(Site-in charge /<br>Head-EHS /<br>Head-Civil) | SECI        |



| Environmental         |                  |   | <b>T</b>                 | Time Frame            | Institutional Res                            | sponsibility |
|-----------------------|------------------|---|--------------------------|-----------------------|--|--------------|
| component /<br>Issues | Potential Impact | Mitigation Measures   | Location                 |                       | Implementation                               | Supervision  |
|                       |                  | <ul> <li>If any tree is still required to be cut, permission from the state forest department need to be obtain along with compensatory plantation as per the guidelines issued by the state forest department.</li> <li>The Construction camps will be located preferably on barren land and sufficiently away from settlements and water bodies.</li> <li>The Construction camp will be provided with necessary sanitation arrangements and basic facilities.</li> <li>After dismantling of Camp the natural condition of the land will be restored.</li> <li>No site will be left unattended after excavation activity.</li> </ul> |                          |                       |  |              |
| Soil                  | Loss of Top soil | • In case of good quality topsoil<br>comes under the construction<br>area it should be preserved<br>with utmost care and need to  | Within the<br>Solar Park | Construction<br>Phase | Contractor<br>(Site-in charge /<br>Head-EHS) | SECI         |



| Environmental<br>component /<br>Issues |                       | Mitigation Measures  | Location                 | Time Frame            | Institutional Responsibility                                 |             |
|--|-----------------------|--|--------------------------|-----------------------|--|-------------|
|  | Potential Impact      |  |                          |                       | Implementation   | Supervision |
|  |                       | <ul> <li>be used for gardening or agricultural area.</li> <li>No construction materials should be stacked in the agriculture field.</li> </ul>   |                          |                       |  |             |
|  | Contamination of soil | <ul> <li>The earth material generated due to excavation will be used to optimum quantity to reduce impact on soil environment.</li> <li>Proper Stripping and stockpiling of soil layers to reduce dust pollution.</li> <li>The Construction camp will be provided with necessary sanitation arrangements and basic facilities to avoid soil contamination</li> </ul> | Within the<br>Solar Park | Construction<br>Phase | Contractor<br>(Site-in charge /<br>Head-EHS)                 | SECI        |
|  | Soil Compaction       | <ul> <li>The excavation activities and vegetation clearance will strictly be limited to the pegged area, road and drains formation and other construction area.</li> <li>All the usable excavated materials will be re-used as fill materials and aggregates.</li> </ul>   | Within the<br>Solar Park | Construction<br>Phase | Contractor<br>(Site-in charge /<br>Head-EHS /<br>Head-Civil) | SECI        |



| Environmental         |                                       | Mitigation Measures  | Location                 | Time Frame            | Institutional Responsibility                                 |             |
|-----------------------|---------------------------------------|--|--------------------------|-----------------------|--|-------------|
| component /<br>Issues | Potential Impact                      |  |                          |                       | Implementation   | Supervision |
|                       |                                       | <ul> <li>The movement of construction vehicles and equipment will be restricted to only designated route.</li> <li>It should be ensured that no additional access roads other than those proposed as per the layout plan are created.</li> </ul>   |                          |                       |  |             |
|                       | Soil Erosion                          | <ul> <li>Designated storage site for fill materials and adequate stockpiling to prevent erosion and runoff related problem.</li> <li>Garland drains around excavated soil will trap silt. Silt trap will reduce siltation load in the nearby drainage and surface water body.</li> </ul>               | Within the<br>Solar Park | Construction<br>Phase | Contractor<br>(Site-in charge /<br>Head-EHS /<br>Head-Civil) | SECI        |
| Water                 | Water Requirement<br>for Construction | <ul> <li>Building artificial ground water recharge structures through rain water harvesting.</li> <li>Lined drains will be provided with cut in between to facilitate ground water recharging. The cut will be made of granular coarse material, which will increase the infiltration rate.</li> </ul> | Solar Park               | Construction<br>Phase | Contractor<br>(Site-in charge /<br>Head-EHS /<br>Head-Civil) | SECI        |



| Environmental         |                  | DATA STATE DATA   | gation Measures Location Time Frame                                     | Institutional Responsibility |  |             |
|-----------------------|------------------|---|---|------------------------------|--|-------------|
| component /<br>Issues | Potential Impact | Mitigation Measures   |   | Time Frame                   | Implementation                               | Supervision |
|                       | Water Quality    | <ul> <li>Rainwater Harvesting pits will<br/>be provided in consultation<br/>with Ground Water Board in<br/>the project area.</li> <li>The Contractor will arrange<br/>separate water supply<br/>arrangement for construction<br/>work and will not interfere<br/>with the normal public water<br/>supply.</li> <li>Requisite permissions need to<br/>be obtained before<br/>withdrawing ground water<br/>from bore well s/ tube wells<br/>from the competent authority.</li> <li>All water and liquid wastes<br/>arising from construction<br/>activities will be properly<br/>disposed off and will not be<br/>discharged into any water<br/>body/ stream course without<br/>adequate treatment.</li> <li>Littering or unauthorized<br/>discharge will not be<br/>permitted.</li> <li>Permission of the engineer and<br/>the concern regulatory</li> </ul> | Water Body,<br>Local<br>Stream,<br>Drainage<br>within the<br>Solar Park | Construction<br>Phase        | Contractor<br>(Site-in charge /<br>Head-EHS) | SECI        |



| Environmental         |                    | Midian diana Managara  | T 4"                     | Time Frame            | Institutional Res                            | sponsibility |
|-----------------------|--------------------|--|--------------------------|-----------------------|--|--------------|
| component /<br>Issues | Potential Impact   | Mitigation Measures  | Location                 | 1 ime Frame           | Implementation                               | Supervision  |
| Air                   | Generation of Dust | <ul> <li>authorities will be obtained for<br/>disposal of the waste as the<br/>designated disposal point.</li> <li>The stream course and drain<br/>will be kept free from<br/>dumping of solid wastes and<br/>earth materials.</li> <li>The construction materials<br/>and debris will be stored away<br/>from water bodies or water<br/>ways and only on the<br/>designated sites along the<br/>construction zones.</li> <li>Water will be sprayed during<br/>construction phase, in earth<br/>handling sites, other<br/>excavation areas for<br/>suppressing fugitive dust.</li> <li>Water sprinkling and<br/>transporting construction<br/>materials with tarpaulin<br/>coverage during the<br/>construction stage.</li> <li>During the sub-grade<br/>construction, sprinkling of<br/>water will be carried out on<br/>regular basis during the entire</li> </ul> | Within the<br>Solar Park | Construction<br>Phase | Contractor<br>(Site-in charge /<br>Head-EHS) | SECI         |



| Environmental | al Defendiel Lener (Lenefing Viernen) | <b>T:</b>   | Institutional Responsibility    |                       |  |             |
|---------------|---------------------------------------|---|---------------------------------|-----------------------|--|-------------|
| Issues        | Potential Impact                      | Witigation Measures   | Location                        | 1 ime F rame          | Implementation                               | Supervision |
|               |                                       | <ul> <li>construction period especially<br/>in the winter and summer<br/>seasons.</li> <li>Dust emission from stock piles<br/>of excavated material will be<br/>controlled either by covering<br/>the stockpiled materials or<br/>water spraying over it.</li> <li>As soon as construction is over<br/>all the surplus earth will be<br/>utilized properly all loose<br/>earth will be removed from the<br/>site.</li> </ul>        |                                 |                       |  |             |
|               | Plants and<br>Equipment               | <ul> <li>The emissions will be limited to the project area and dispersed rapidly as the activities will be confined to project area and which is away from the locality.</li> <li>All the vehicles used during the construction stage to have valid PUC certificate</li> <li>Provision of effective air pollution control systems in Batch mix plants such as dust containment cum suppression system for the equipment,</li> </ul> | Plants and<br>equipment<br>area | Construction<br>Phase | Contractor<br>(Site-in charge /<br>Head-EHS) | SECI        |



| Environmental<br>component / Potential Im<br>Issues | Detential Imment  | Mitigation Measures   | Location             | Time Frame            | Institutional Responsibility                 |             |
|---|-------------------|---|----------------------|-----------------------|--|-------------|
|   | Potential Impact  |   |                      |                       | Implementation                               | Supervision |
|   |                   | Construction of wind breaking<br>walls along periphery of plant<br>sites, construction of the<br>metalled roads within the<br>premises, regular cleaning and<br>wetting of the ground within<br>the premises, etc.  |                      |                       |  |             |
|   | Gaseous pollution | <ul> <li>All the Construction vehicles<br/>and machineries will be<br/>regularly maintained to<br/>conform to the emission<br/>standards stipulated under<br/>Environment (Protection)<br/>Rules, 1986.</li> <li>All the DG sets will conform<br/>to the emission standards as<br/>stipulated under Environment<br/>(Protection) Rules, 1986.</li> <li>The workers working at Batch<br/>mix plants will be provided<br/>masks.</li> </ul> | Construction<br>area | Construction<br>Phase | Contractor<br>(Site-in charge /<br>Head-EHS) | SECI        |
| Noise   | Noise Level       | • The main stationary noise producing sources such as generator sets shall be provided with noise shields around them.  | Construction<br>Area | Construction<br>Phase | Contractor<br>(Site-in charge /<br>Head-EHS) | SECI        |



| Environmental |                  | Mitigation Managemen   | Location | Time Frame  | Institutional Responsibility |             |
|---------------|------------------|--|----------|-------------|------------------------------|-------------|
| Issues        | Potential Impact | wingation measures   | Location | 1 ime Frame | Implementation               | Supervision |
|               |                  | • The plants and equipment<br>used for construction will<br>strictly conform to CPCB<br>noise standards.   |          |             |                              |             |
|               |                  | • Vehicles and equipment used will be fitted with silencer and maintained accordingly.   |          |             |                              |             |
|               |                  | • Noise to be monitored as per<br>monitoring plan and if the<br>noise level at any time found<br>to be higher than immediate<br>measure to reduce noise in<br>that area will be ensured. |          |             |                              |             |
|               |                  | • Noise standards of industrial<br>enterprises will be strictly<br>enforced to protect<br>construction workers from<br>severe noise impacts.   |          |             |                              |             |
|               |                  | • All the workers working very close to the noise generating machinery shall be provided earplugs to avoid any ill impacts on their health.  |          |             |                              |             |
|               |                  | • An awareness programme will be organized for drivers   |          |             |                              |             |



| Environmental             |                         | NATATION AND AND AND AND AND AND AND AND AND AN  | T                        |                       | Institutional Re                             | sponsibility |  |  |
|---------------------------|-------------------------|--|--------------------------|-----------------------|--|--------------|--|--|
| Issues                    | Potential Impact        | Mitigation Measures  | Location                 | 1 ime Frame           | Implementation Supervision                   |              |  |  |
|                           |                         | and equipment operators to<br>make them aware of the<br>consequences of noise and to<br>act properly at site.  |                          |                       |  |              |  |  |
| Biological<br>Environment | Ecological<br>Resources | <ul> <li>Stockpiling of the construction materials should be avoided in and arounds trees in the site.</li> <li>The contractor shall ensure adequate measures to ensure that no illegal poaching of wild animals is being done by construction workers.</li> <li>The developer shall ensure compliance to the EMP measures for setting up of the labour camp sites etc.</li> </ul> | Within the<br>Solar Park | Construction<br>Phase | Contractor<br>(Site-in charge /<br>Head-EHS) | SECI         |  |  |
| Social                    | Aesthetics              | <ul> <li>The site will be cleaned immediately after the construction activity is over.</li> <li>The debris materials will be disposed off only at identified area for disposal and proper levelling will be done after disposing the materials and shall be covered with top soil</li> </ul>   | Solar Park               | Construction<br>Phase | Contractor<br>(Site-in charge /<br>Head-EHS) | SECI         |  |  |



| Environmental | Detential Immed             | Mitigation Magnung   | Logation   | Time Frome            | Institutional Res                            | sponsibility |
|---------------|-----------------------------|--|------------|-----------------------|--|--------------|
| Issues        | Potential Impact            | Wingation Measures   | Location   | 1 ime r rame          | Implementation                               | Supervision  |
|               |                             | and some Landscaping will be done at the disposal site   |            |                       |  |              |
|               | Public Health and<br>Safety | <ul> <li>The project will comply with the requirements of the EHS Guidelines of the World Bank Group and SECI.</li> <li>The plants and equipment will be installed sufficiently away from the settlement.</li> <li>All the construction equipment and vehicles will conform to the emission standards stipulated by the CPCB.</li> <li>Safe working techniques will be followed up and all the workers will be trained</li> <li>All the workers will be provided with proper personal safety equipment at construction as well as plant site</li> <li>Proper caution signage, barricading, delineators etc. will be installed at Construction zone and temporary diversions</li> </ul> | Solar Park | Construction<br>Phase | Contractor<br>(Site-in charge /<br>Head-EHS) | SECI         |



| Environmental                      | Defendent Immered  | Midian diana Managara   | T                    | <b>T</b> : <b>F</b>   | Institutional Res                            | sponsibility |
|------------------------------------|--|---|----------------------|-----------------------|--|--------------|
| Issues                             | Potential Impact   | Minigation Measures   | Location             | 1 ime F rame          | Implementation                               | Supervision  |
| Other<br>Environmental<br>Concerns | Labour Camp:<br>• Influx of migrant<br>labourer's<br>• additional<br>pressure on the<br>local resources<br>and social<br>infrastructures<br>• Risk of social<br>conflict | <ul> <li>Proper traffic management will be ensured at the Construction zone as per IRC.</li> <li>An Emergency Response system in case of any incidence will be developed and implemented</li> <li>Periodical health check facility will be provided at camp sites.</li> <li>The contractor will preferably engage local labour force except for the labourer's requiring special skills and non-availability of such skilled labourers from local area.</li> <li>Project to assess and manage labor influx risk based on risks identified in the ESIA. Depending on the risk factors and their level, appropriate site-specific Labor Influx Management Plan and/or a Workers' Camp Management Plan.</li> </ul> | Construction<br>Camp | Construction<br>Phase | Contractor<br>(Site-in charge /<br>Head-EHS) | SECI         |



| Environmental         |                  | Milia di mana  | T        | T:          | Institutional Res | sponsibility |
|-----------------------|------------------|--|----------|-------------|-------------------|--------------|
| component /<br>Issues | Potential Impact | Mitigation Measures  | Location | 1 ime Frame | Implementation    | Supervision  |
|                       |                  | <ul> <li>Project will incorporate social and environmental mitigation measures into the civil works contract. The responsibilities for managing these adverse impacts will be clearly reflected as a contractual obligation, with a mechanism for addressing non-compliance.</li> <li>Worker's Accommodation</li> <li>For migrant labourers the contractor will provide labour camps with all basic facilities sufficiently away from local habitation</li> <li>No labour camp will be provided within 1 km from Forest area, Wildlife Sanctuary, National Park or any other protected area.</li> <li>Provisioning adequate arrangements of drinking water, lighting, ventilation, bedding, bathing; sanitation facilities in the labour camps:</li> </ul> |          |             |                   |              |



| Environmental | Detential Immed  | Mitigation Magnung   | Location | Time Frome  | Institutional Res | sponsibility |
|---------------|------------------|--|----------|-------------|-------------------|--------------|
| Issues        | Potential Impact | Wingation Measures   | Location | 1 ime Frame | Implementation    | Supervision  |
|               |                  | <ul> <li>Ensuring proper health-check-ups of all labourer's employed at the project site;</li> <li>Awareness program on HIV aids and other communicable disease may be provided to the work force</li> <li>Providing separate toilet facilities for men and women at the accommodation as well as site; and</li> <li>Facilitating healthcare services and medical care in case of sickness.</li> <li>Locate handling sites away from populated areas</li> <li>Follow proper operation and handling measures to minimize exposure</li> <li>Provide prior warning /signals for blasting</li> <li>Provide sirens in vehicles to avoid any collision with human/animals</li> <li>Organise awareness programs on environmental resource management</li> </ul> |          |             |                   |              |



| Environmental         |                  |  | T        |             | Institutional Res | sponsibility |
|-----------------------|------------------|--|----------|-------------|-------------------|--------------|
| component /<br>Issues | Potential Impact | Mitigation Measures  | Location | 1 ime Frame | Implementation    | Supervision  |
|                       |                  | <ul> <li>Organise Health camps</li> <li>Use of child labour will be strictly prohibited. Contractor will maintain a labour register with name, age and sex with supporting document (preferably copy of Aadhar card or voter's ID card). This will be monitored by Environmental and Social office of contractor and SECI.</li> <li>Provide signage near construction sites and approach roads</li> <li>Avoiding Gender Based</li> <li>Violence</li> <li>Contractor will prepare and implement robust measures to address the risk of genderbased violence that include (i) mandatory and repeated training and awareness raising for the workforce about refraining from unacceptable conduct toward local community members, specifically women; (ii)</li> </ul> |          |             |                   |              |



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| Environmental         |                  |                                  | *        |            | Institutional Res | sponsibility |
|-----------------------|------------------|----------------------------------|----------|------------|-------------------|--------------|
| component /<br>Issues | Potential Impact | Mitigation Measures              | Location | Time Frame | Implementation    | Supervision  |
|                       |                  | informing workers about          |          |            |                   |              |
|                       |                  | national laws that make sexual   |          |            |                   |              |
|                       |                  | harassment and gender-based      |          |            |                   |              |
|                       |                  | violence a punishable offence    |          |            |                   |              |
|                       |                  | which is prosecuted; (iii)       |          |            |                   |              |
|                       |                  | introducing a Worker Code of     |          |            |                   |              |
|                       |                  | Conduct as part of the           |          |            |                   |              |
|                       |                  | employment contract, and         |          |            |                   |              |
|                       |                  | including sanctions for non-     |          |            |                   |              |
|                       |                  | compliance (e.g.,                |          |            |                   |              |
|                       |                  | termination), and (iv)           |          |            |                   |              |
|                       |                  | contractors adopting a policy    |          |            |                   |              |
|                       |                  | to cooperate with law            |          |            |                   |              |
|                       |                  | enforcement agencies in          |          |            |                   |              |
|                       |                  | investigating complaints about   |          |            |                   |              |
|                       |                  | gender-based violence.           |          |            |                   |              |
|                       |                  | • Additional measures can aim    |          |            |                   |              |
|                       |                  | to reduce incentives to engage   |          |            |                   |              |
|                       |                  | with the local community by      |          |            |                   |              |
|                       |                  | providing workers with the       |          |            |                   |              |
|                       |                  | opportunity to spend their time  |          |            |                   |              |
|                       |                  | on away from the nost            |          |            |                   |              |
|                       |                  | with a small transport           |          |            |                   |              |
|                       |                  | with a small transport           |          |            |                   |              |
|                       |                  | allowance, ideally allowing      |          |            |                   |              |
|                       |                  | workers to regularly return for  |          |            |                   |              |
|                       |                  | brief visits to their families,  |          |            |                   |              |
|                       |                  | spouses and friends, or to visit |          |            |                   |              |



| Environmental | Dotontial Impost    | Midian diana Managana   | Location Time | Time Frome            | Institutional Responsibility                 |             |
|---------------|---------------------|---|---------------|-----------------------|--|-------------|
| Issues        | Potential Impact    | Mitigation Measures   | Location      | 1 ime Frame           | Implementation                               | Supervision |
|               | Waste<br>generation | <ul> <li>nearby urban centers that<br/>provide a variety of legal<br/>social opportunities. For<br/>workers who need to travel<br/>further it may be attractive to<br/>forego weekends off in<br/>exchange for longer breaks<br/>that would allow for such<br/>home leave travel.</li> <li>Construction waste should be<br/>stored separately in a<br/>designate area.</li> <li>The waste can be used as filler<br/>material.</li> <li>The packing material will be<br/>segregate and stored for<br/>selling to the authorized<br/>recycler</li> <li>The plastic waste should me<br/>managed in accordance with<br/>Plastic Waste Management<br/>Rules 2016.</li> </ul> | Solar Park    | Construction<br>Phase | Contractor<br>(Site-in charge /<br>Head-EHS) | SECI        |



TABLE 4-8: ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP) FOR INFRASTRUCTURE DEVELOPMENT AND SOLAR PARK FOR OPERATION AND DECOMMISSIONING PHASE

| Environment            | Potential                     |  |                                    | Institutional Re         | sponsibility |
|------------------------|-------------------------------|--|------------------------------------|--------------------------|--------------|
| Issues                 | Impact                        | Mitigation Measures  | Time Frame                         | Implementation           | Supervision  |
| <b>Operation Phase</b> |                               |  |                                    |                          |              |
| Water                  | Water Quality<br>and resource | <ul> <li>Installation of alternative waterless cleaning technology for Solar PV</li> <li>Used water should be properly channelled to settling tank for stabilization and treatment so that recycled water could be reused for PV washing which will reduce the load on ground water.</li> <li>Adequate capacity of Rain Water storage will be built to harvest rain water which will be connected with drainage network. The stored water can be used for washing of Solar PV to promote optimal use of surface and ground water.</li> <li>Building of artificial ground water recharge structures as per guideline of Ground Water Board to promote ground water from bore wells/ tube wells from the competent authority.</li> </ul> | Operation and<br>Maintenance phase | EHS Engineer of<br>O & M | SECI         |
| Noise                  | Noise Level                   | • Plantation of vegetation around the Grid substation;   | Operation and<br>Maintenance phase | EHS Engineer of<br>O & M | SECI         |



| Environment | ent<br>nt / Potential<br>Impact Mitigation Measures | Potential Mitigation Measures  |                                    | Time Frome               | Institutional Responsibility |  |
|-------------|---|--|------------------------------------|--------------------------|------------------------------|--|
| Issues      |   | 1 ime Frame  | Implementation                     | Supervision              |                              |  |
| Waste       | Cleaning<br>of/Broken<br>Solar Panel                | <ul> <li>Storing area of such waste should be on an impervious platform.</li> <li>The storing area should have the arrangement of arresting of spillage and cover from above.</li> <li>The waste should be stored separately and handed over to the authorized vender for proper disposal as per Hazardous and other waste Act 2016.</li> </ul>  | Operation and<br>maintenance Phase | O&M engineers<br>at site | SECI                         |  |
|             | Generation of<br>E-Waste                            | <ul> <li>E waste should be stored separately</li> <li>Maintain records of e-waste generated</li> <li>End-of-life electrical and electronic equipment<br/>are not admixed with e-waste containing<br/>radioactive material if any.</li> <li>SECI should ensure that e-waste generated by<br/>them is channelized through collection centre<br/>or dealer of authorised producer or dismantler<br/>or recycler or through the designated take back<br/>service provider of the producer to authorised<br/>dismantler or recycler;</li> <li>E waste should be managed in compliance of<br/>E-Waste (Management) Rules, 2016.</li> </ul> | Operation and<br>maintenance Phase | O&M engineers<br>at site | SECI                         |  |



| Environment /   | Potential          |  | <b>T:</b>                          | Institutional Responsibility |             |
|-----------------|--------------------|--|------------------------------------|------------------------------|-------------|
| Issues          | Impact             | Mitigation Measures  | 1 ime Frame                        | Implementation               | Supervision |
|                 | Battery Waste      | <ul> <li>Batteries should be maintained properly so that any kind of leakage and spillage from batteries can be avoided.</li> <li>Batteries should be disposed off by depositing with the dealer, manufacturer, importer, assembler, registered recycler, reconditioner or at the designated collection centres,</li> <li>Batteries waste should be managed in compliance with the Batteries (Management and Handling) Rules, 2001 in case of lead acid battery. Additional measures in line with Draft Rules of 2020 should be considered.</li> </ul> | Operation and<br>maintenance Phase | O&M engineers<br>at site     | SECI        |
|                 | Solid Waste        | <ul> <li>Waste should be segregate at source.</li> <li>Organic waste will be converted in to soil conditioner by composting.</li> <li>Recyclable waste will be sold to the authorized recycler.</li> <li>Inert waste will be disposed off in to low lying area.</li> </ul>   | Operation and<br>maintenance Phase | O&M engineers<br>at site     | SECI        |
| Decommissioning | g Stage            |  |                                    |                              |             |
| Air             | Dust<br>Generation | • Proper handling, using of PPEs   | Decommissioning<br>Stage           | SECI                         | SECI        |
| Noise           | Noise level        | • Use of PPEs  | Decommissioning<br>Stage           | SECI                         | SECI        |



| Environment ( | Environment Potential | Mitigation Maggung   | Time Frome               | Institutional Responsibility |             |
|---------------|-----------------------|--|--------------------------|------------------------------|-------------|
| Issues        | Impact                | Mugation Measures  | Time Frame               | Implementation               | Supervision |
| Land          | Soil and land<br>use  | • Parcels of land under permanent structures e.g.<br>roads / buildings / warehouse etc. will be<br>restored to its near original state by re-laying<br>of the topsoil                                  | Decommissioning<br>Stage | SECI                         | SECI        |
| Social        | Employment            | • Temporary employment provided in the park<br>will be discontinued. Developer will<br>undertake CSR activities during operation that<br>will include training for alternative or self-<br>employment. | Decommissioning<br>Stage | SECI                         | SECI        |
|               | Aesthetics            | • Site to be restored in its original shape  | Decommissioning<br>Stage | SECI                         | SECI        |



### Table 4-9: Environmental and Social Management Plan (ESMP) for Transmission Line

| Activities            | Potential Impact                        | Mitigation Measures   | Time Frame                                  | Institutional Responsibility                               |             |
|-----------------------|---|---|---|--|-------------|
|                       |   |   |   | Implementation   | Supervision |
| Design and Pre-constr | ruction Phase                           |   |   |  | •           |
| Land Issues           | Right to use land for transmission line | <ul> <li>Careful route selection to avoid existing settlements</li> <li>Analysis of alternative to minimize alignment passing over agriculture land</li> </ul>  | Design and<br>Pre-<br>Construction<br>Stage | Contractor<br>(Site-in charge /<br>Head-EHS / All<br>HoDs) | SECI        |
|                       |   | Compensate for the land under tower pads<br>as well as ROW as per Guidelines<br>issued by Ministry of Power for<br>payment of compensation towards<br>damages caused by tower and Right of<br>Way for transmission lines and assist<br>for loss of livelihood or sources of<br>livelihood as per the agreed<br>entitlement framework of RPF |   |  |             |
|                       |   | • All the affected persons will be identified in advance prior to commencement of construction works.   |   |  |             |
|                       | Loss of forest land<br>and tree         | <ul> <li>Obtain statutory forest clearances from the Government</li> <li>Compensatory plantation to be done against the tree felling as per rule</li> <li>The condition of the forest clearance/ tree felling permission to be strictly complied.</li> </ul>  | Design and<br>Pre-<br>Construction<br>Stage | Contractor<br>(Site-in charge /<br>Head-EHS)               | SECI        |



| Activities   | Potential Impact  | Mitigation Measures  | Time Frame                                  | Institutional Responsibility                 |             |  |
|--|---|--|---|--|-------------|--|
|  |   |  |   | Implementation                               | Supervision |  |
| Encroachment into<br>farmland                                    | Loss of agriculture<br>productivity                         | <ul> <li>Minimise encroachment into farmland<br/>by careful alignment selection.</li> <li>Farmers / landowners compensated<br/>for significant trees that need to be<br/>trimmed / removed along ROW.</li> <li>Statutory approvals for tree trimming<br/>/ removal</li> </ul>  | Design and<br>Pre-<br>construction<br>stage | Contractor<br>(Site-in charge /<br>Head-EHS) | SECI        |  |
| Interference with<br>drainage<br>patterns/Irrigation<br>channels | Flooding hazards<br>/ loss of<br>agricultural<br>production | • Appropriate siting of towers to avoid channel interference   | Design and<br>Pre-<br>construction<br>stage | Contractor<br>(Site-in charge /<br>Head-EHS) | SECI        |  |
| Water Bodies   | Interference in water tanks.                                | • All the water tanks in the alignment of transmission lines will be avoided by change of alignment in these sections  | Design and<br>Pre-<br>Construction<br>Stage | Contractor<br>(Site-in charge /<br>Head-EHS) | SECI        |  |
| Construction Phase   |   |  |   |  |             |  |
| Land Resources   | Loss of Vegetation  | <ul> <li>Vegetation will be removed from the construction zone before commencement of construction. All works will be carried out such that the damage or disruption to flora other that those identified for cutting is minimum.</li> <li>Trees allowed growing up to a height within the RoW by maintaining adequate clearance between the top of</li> </ul> | Construction<br>Stage                       | Contractor<br>(Site-in charge /<br>Head-EHS) | SECI        |  |



| Activities | Potential Impact | Mitigation Measures   | Time Frame            | Institutional Responsibility |             |
|------------|------------------|---|-----------------------|------------------------------|-------------|
|            |                  |   |                       | Implementation               | Supervision |
|            |                  | <ul> <li>tree and the conductor as per the regulation</li> <li>Only ground cover/shrubs that impinge directly on the permanent works or necessary temporary works will be removed with prior approval from the Environmental Expert.</li> <li>The Contractor, under any circumstances will not cut or damage trees.</li> <li>Trees identified under the project will be cut only after receiving clearance from the Forest Department and after the receipt of written permission from Engineer.</li> <li>Construction vehicles, machinery and equipment will move or be stationed in the designated area only to prevent compaction of vegetation outside the construction area.</li> <li>Collection of firewood is prohibited.</li> <li>No fires may be ignited with the intent to destroy the flora on the site and surrounding</li> </ul> |                       |                              |             |
|            | Site Clearance   | • The earth material generated due to<br>excavation will be used to optimum<br>quantity to reduce impact on land<br>resources.  | Construction<br>Phase | Contractor                   | SECI        |
|            |                  |   |                       |                              | 1           |



| Activities | Potential Impact | Mitigation Measures  | Time Frame            | Institutional Responsibility                                  |             |
|------------|------------------|--|-----------------------|---|-------------|
|            |                  |  |                       | Implementation  | Supervision |
|            |                  | <ul> <li>The proposed access roads inside project area do cut cross several non-perennial drainage channels and would require construction of adequate number of cross-drainage structures to mitigate the adverse impacts on the surface runoff</li> <li>It will be ensured that no trees are required to be cut while installation of Towers. If any tree is still required to be cut, permission from the state forest department need to be obtain along with compensatory plantation as per the guidelines issued by the state forest department.</li> <li>No scare will be left unattended after excavation activity.</li> </ul> |                       | (Site-in charge /<br>Head-EHS / Head-<br>Civil)               |             |
| Soil       | Loss of Top soil | <ul> <li>On the proposed alignment of the transmission line, at the time of construction good quality top soil should be kept sufficiently away from the construction zone to avoid contamination and needs to be reused in the agriculture field.</li> <li>No construction materials should be stacked in the agriculture field.</li> </ul>   | Construction<br>Phase | Contractor<br>(Site-in charge /<br>Head-EHS / Head-<br>Civil) | SECI        |
|            | soil             | • The earth material generated due to excavation will be used to optimum   | Phase                 | Contractor  | SECI        |


| Activities | Potontial Impact  | Mitigation Measures  | Timo Fromo            | Institutional Responsibility                                  |             |
|------------|-------------------|--|-----------------------|---|-------------|
| Activities | i otentiai impact | Wiligation Weasures  |                       | Implementation  | Supervision |
|            |                   | <ul><li>quantity to reduce impact on soil<br/>environment.</li><li>Proper Stripping and stockpiling of soil<br/>layers to reduce dust pollution.</li></ul>   |                       | (Site-in charge /<br>Head-EHS / Head-<br>Civil)               |             |
|            | Soil Compaction   | <ul> <li>The excavation activities and vegetation clearance will strictly be limited to the Row of the Transmission line.</li> <li>All the usable excavated materials will be re-used as fill materials and aggregates.</li> <li>The movement of construction vehicles and equipment will be restricted to only designated route.</li> <li>It should be ensured that no additional access roads other than those proposed as per the layout plan are created.</li> </ul> | Construction<br>Phase | Contractor<br>(Site-in charge /<br>Head-EHS / Head-<br>Civil) | SECI        |
|            | Soil Erosion      | <ul> <li>Designated storage site for fill materials<br/>and adequate stockpiling to prevent<br/>erosion and runoff related problem.</li> <li>Garland drains around excavated soil<br/>will trap silt. Silt trap will reduce<br/>siltation load in the nearby drainage and<br/>surface water body.</li> </ul>   | Construction<br>Phase | Contractor<br>(Site-in charge /<br>Head-EHS / Head-<br>Civil) | SECI        |
| Water      | Water Requirement | • The Contractor will arrange separate<br>water supply arrangement for<br>construction work and will not interfere<br>with the normal public water supply.   | Construction<br>Phase | Contractor<br>(Site-in charge /<br>Head-EHS)                  | SECI        |



| Activities | Dotontial Impact   | Mitigation Massuras   | Timo Framo            | Institutional Responsibility                 |             |
|------------|--------------------|---|-----------------------|--|-------------|
| Activities | i otentiai impact  | Willgation Weasures   | Thie Frame            | Implementation                               | Supervision |
|            |                    | • Requisite permissions need to be obtained before withdrawing ground water from bore well s/ tube wells from the competent authority.  |                       |  |             |
|            | Water Quality      | <ul> <li>All water and liquid wastes arising from construction activities will be properly disposed off and will not be discharged into any water body/ stream course without adequate treatment.</li> <li>Littering or unauthorized discharge will not be permitted.</li> <li>Permission of the engineer and the concern regulatory authorities will be obtained for disposal of the waste as the designated disposal point.</li> <li>The stream course and drain will be kept free from dumping of solid wastes and earth materials.</li> <li>The construction materials and debris will be stored away from water bodies or water ways and only on the designated sites along the construction zones.</li> </ul> | Construction<br>Phase | Contractor<br>(Site-in charge /<br>Head-EHS) | SECI        |
| Air        | Generation of Dust | • Water will be sprayed during construction phase, in earth handling sites, other excavation areas for suppressing fugitive dust.   | Construction<br>Phase | Contractor<br>(Site-in charge /<br>Head-EHS) | SECI        |



| Activities | Potontial Impact  | Mitigation Massuras  | Time Frame            | Institutional Responsibility                 |             |
|------------|-------------------|--|-----------------------|--|-------------|
| Activities | i otentiai impact | Wingation Weasures   |                       | Implementation                               | Supervision |
|            |                   | <ul> <li>Water sprinkling and transporting construction materials with tarpaulin coverage during the construction stage.</li> <li>As soon as construction is over all the surplus earth will be utilized properly all loose earth will be removed from the site.</li> <li>The workers working at Mixing machine will be provided with masks</li> </ul> |                       |  |             |
| Noise      | Noise level       | <ul> <li>The main stationary noise producing sources such as generator sets shall be provided with noise shields around them.</li> <li>The mixing equipment used for construction will strictly conform to CPCB noise standards.</li> </ul>  | Construction<br>Phase | Contractor<br>(Site-in charge /<br>Head-EHS) | SECI        |
|            |                   | • Vehicles and equipment used will be fitted with silencer and maintained accordingly.   |                       |  |             |
|            |                   | • All the workers shall be provided earplugs to avoid any ill impacts on their health.   |                       |  |             |
|            |                   | • An awareness programme will be organized for drivers and equipment operators to make them aware of the   |                       |  |             |



| Activitios                | Potontial Impost                       | Mitigation Massures  | Time Frome            | Institutional Responsibility                 |             |
|---------------------------|--|--|-----------------------|--|-------------|
| Acuvities                 | rotentiai impact                       | wingation weasures   | Time Frame            | Implementation                               | Supervision |
|                           |  | consequences of noise and to act properly at site.   |                       |  |             |
| Biological<br>Environment | Ecological<br>Resources                | <ul> <li>Stockpiling of the construction materials should be avoided in and arounds trees in the site.</li> <li>The contractor shall ensure adequate measures to ensure that no illegal poaching of wild animals is being done by construction workers.</li> <li>The developer shall ensure compliance to the EMP measures for setting up of the labour camp sites etc.</li> </ul> | Construction<br>Phase | Contractor<br>(Site-in charge /<br>Head-EHS) | SECI        |
| Social                    | Aesthetics                             | <ul> <li>The site will be cleaned immediately after the construction activity is over.</li> <li>The debris materials will be disposed off only at identified area for disposal and proper levelling will be done after disposing the materials and shall be covered with top soil and some Landscaping will be done at the disposal site</li> </ul>                                | Construction<br>Phase | Contractor<br>(Site-in charge /<br>Head-EHS) | SECI        |
|                           | Worker and Public<br>Health and Safety | • The project will comply with the requirements of the EHS Guidelines of the World Bank Group, 2007. The relevant ones are General guidelines and those for Power Transmission and Distribution.   | Construction<br>Phase | Contractor<br>(Site-in charge /<br>Head-EHS) | SECI        |



| Activities                        | Potontial Impact              | Mitigation Monsuros  | Time Frame            | Institutional Responsibility                 |             |
|-----------------------------------|-------------------------------|--|-----------------------|--|-------------|
| Activities                        | i otentiai impact             | Willigation Weasures   |                       | Implementation                               | Supervision |
|                                   |                               | <ul> <li>Safe working techniques will be followed for all the workers, who will be trained at the time of induction into the site workforce.</li> <li>All the workers will be provided with proper personal safety equipment</li> <li>An Emergency Response system in case of any incidence will be developed and implemented</li> <li>Periodical health check facility will be provided at camp sites.</li> </ul> |                       |  |             |
| Other<br>Environmental<br>Concern | Waste generation              | <ul> <li>Construction waste should be stored separately in a designate area.</li> <li>The waste can be used as filler material.</li> <li>The packing material will be segregate and stored for selling to the authorized recycler</li> <li>The plastic waste should me managed in accordance with Plastic Waste Management Rules 2016.</li> </ul>  | Construction<br>Phase | Contractor<br>(Site-in charge /<br>Head-EHS) | SECI        |
|                                   | • Influx of migrant labourers | • The contractor will preferably engage<br>local labour force except for the<br>labourer's requiring special skills and  | Construction<br>Phase | Contractor<br>(Site-in charge /<br>Head-EHS) | SECI        |



| Activities | Dotontial Impact   | Mitigation Massuras   | Timo Fromo | Institutional Responsibility |             |
|------------|--|---|------------|------------------------------|-------------|
| Acuvities  | i otentiai impact  | wingation wieasures   | 1 me Frame | Implementation               | Supervision |
|            | <ul> <li>additional<br/>pressure on the<br/>local resources<br/>and social<br/>infrastructures</li> <li>Risk of social<br/>conflict</li> </ul> | <ul> <li>non-availability of such skilled labourers from local area.</li> <li>Project to assess and manage labor influx risk based on risks identified in the ESIA. Depending on the risk factors and their level, appropriate site-specific Labor Influx Management Plan and/or a Workers' Camp Management Plan.</li> <li>Project will incorporate social and environmental mitigation measures into the civil works contract. The responsibilities for managing these adverse impacts will be clearly reflected as a contractual obligation, with a mechanism for addressing non-compliance.</li> </ul> |            |                              |             |
|            |  | <ul> <li>Worker's Accommodation</li> <li>For migrant labourers the contractor will provide labour camps with all basic facilities sufficiently away from local habitation</li> <li>No labour camp will be provided within 1 km from Forest area, Wildlife Sanctuary, National Park or any other protected area.</li> </ul>  |            |                              |             |



| Activities | Dotontial Impact  | Mitigation Massuras  | Timo Fromo | Institutional Responsibility |             |
|------------|-------------------|--|------------|------------------------------|-------------|
| Acuvities  | i otentiai impact | Wingauon Measures  | Time Frame | Implementation               | Supervision |
|            |                   | <ul> <li>Provisioning adequate arrangements of drinking water, lighting, ventilation, bedding, bathing and other basic facilities in the labour camps;</li> <li>Ensuring proper health-check-ups of all labourer's employed at the project site;</li> <li>Providing separate toilet facilities for men and women at the accommodation as well as site; and</li> <li>Facilitating healthcare services and medical care in case of sickness.</li> <li>Locate handling sites away from populated areas</li> <li>Follow proper operation and handling measures to minimize exposure</li> <li>Provide prior warning /signals for blasting</li> <li>Provide sirens in vehicles to avoid any collision with human/animals</li> <li>Organise awareness programs on environmental resource management</li> <li>Organise Health camps</li> <li>Use of child labour will be strictly prohibited. Contractor will maintain a labour register with name, age and sex with supporting document (preferably copy of Aadhar card or voter's ID card).</li> </ul> |            |                              |             |



| Activities | Dotontial Impact  | Mitigation Maggurog  | Time Frame | Institutional Responsibility |             |
|------------|-------------------|--|------------|------------------------------|-------------|
| Acuvities  | r otentiai impact | Wingation Weasures   | Time Frame | Implementation               | Supervision |
|            |                   | <ul> <li>This will be monitored by<br/>Environmental and Social office of<br/>contractor and SECI.</li> <li>Provide signage near construction sites<br/>and approach roads</li> </ul>  |            |                              |             |
|            |                   | Avoiding Gender Based Violence   |            |                              |             |
|            |                   | • Contractor will prepare and implement<br>robust measures to address the risk of<br>gender-based violence that include (i)<br>mandatory and repeated training and<br>awareness raising for the workforce<br>about refraining from unacceptable<br>conduct toward local community<br>members, specifically women; (ii)<br>informing workers about national laws<br>that make sexual harassment and<br>gender-based violence a punishable<br>offence which is prosecuted; (iii)<br>introducing a Worker Code of Conduct<br>as part of the employment contract, and<br>including sanctions for non-compliance<br>(e.g., termination), and (iv) contractors<br>adopting a policy to cooperate with law<br>enforcement agencies in investigating<br>complaints about gender-based<br>violence. |            |                              |             |



| Activities   | Dotontial Impact                 | Mitigation Massures  | Timo Framo | Institutional Responsibility  |             |
|--|----------------------------------|--|------------|-------------------------------|-------------|
| Activities   | i otentiai impact                | Wiligation Weasures  |            | Implementation                | Supervision |
|  |                                  | • Additional measures can aim to reduce<br>incentives to engage with the local<br>community by providing workers with<br>the opportunity to spend their time off<br>away from the host community, where<br>feasible with a small transport<br>allowance, ideally allowing workers to<br>regularly return for brief visits to their<br>families, spouses and friends, or to visit<br>nearby urban centers that provide a<br>variety of legal social opportunities. For<br>workers who need to travel further it<br>may be attractive to forego weekends off<br>in exchange for longer breaks that would<br>allow for such home leave travel |            |                               |             |
| <b>Operation and Mainte</b>  | enance Phase                     |  |            |                               |             |
| Location of<br>transmission towers<br>and transmission line<br>alignment and<br>design | Exposure to safety related risks | Setback of dwellings to overhead line<br>route designed in accordance with<br>permitted level of power frequency and<br>the regulation of supervision at sites.  | O&M Stage  | SECI / O&M<br>Contractor SECI | SECI        |



| Activities   | Potential Impact                                  | Mitigation Monsures   | Time Frame | Institutional Res                      | sponsibility |
|--|---|---|------------|--|--------------|
| Activities   | i otentiai impact                                 | Witigation Weasures   | Time Frame | Implementation                         | Supervision  |
| Oil spillage   | Contamination of<br>land / nearby water<br>bodies | Substation transformers located within<br>secure and impervious sump areas with a<br>storage capacity of at least 100% of the<br>capacity of oil in transformers and<br>associated reserve tanks  | O&M Stage  | SECI / O&M<br>Contractor (Head<br>EHS) | SECI         |
| Inadequate Provision<br>of staff/workers health<br>and safety during<br>operations | Injury and sickens<br>of staff / workers          | <ul> <li>Careful design using appropriate technologies to minimize hazards</li> <li>Safety awareness raising for staff</li> <li>Preparation of fire emergency action plan and training given to staff on implementing emergency action plan</li> </ul>  | O&M Stage  | SECI / O&M<br>Contractor (Head<br>EHS) | SECI         |
| Electric shock hazards   | Injury / mortality to<br>staff and public         | <ul> <li>Careful design using appropriate technologies to minimize hazards Regular monitoring of faults and immediate repair/ replacement of damaged wires/ towers</li> <li>Issue of warning to the local public regarding the malfunctioning and scheduling of repairs/replacement</li> <li>Barriers to prevent climbing on /dismantling of transmission towers</li> <li>Appropriate warning signs on facilities</li> <li>Electricity safety awareness raising in project areas</li> </ul> | O&M Stage  | SECI / O&M<br>Contractor (Head<br>EHS) | SECI         |



| Activities                       | Potential Impact                               | Mitigation Measures   | Time Frame | Institutional Responsibility                       |             |
|----------------------------------|--|---|------------|--|-------------|
|                                  | i otentiai impact                              |   |            | Implementation                                     | Supervision |
| Transmission line<br>maintenance | Exposure to<br>electromagnetic<br>interference | Transmission line design to comply with<br>the limits of electromagnetic interference<br>overhead power lines | O&M Stage  | SECI / O&M<br>Contractor (Head-<br>EHS/Electrical) | SECI        |



#### 4.10 CONSTRUCTION & OCCUPATIONAL HEALTH AND SAFETY

Prior to the start of the construction of the activities, the EPC contractor has to frame a site specific Occupational Health and Safety (OHS) plan in line with the best industrial practises and Occupational Health and Safety guidelines of the World bank and get it approved from SECI.

During the complete Project execution faces, EPC contractor has to follow the OHS plan. EPC contractor must have to conduct regular training session for its employees to get them accustomed with the site specific OHS plan.

#### 4.11 IMPLEMENTATION ARRANGEMENT

SECI is proposed to develop the Solar Park with battery storage project in Build Own Operate model. CI. Project would be set up in a turnkey EPC mode, with EPC contractor being determined through a transparent international competitive bidding process. The implementation arrangement of the project is given **Figure 4-1**.

#### SECI

- Borrower of World Bank loan
- To provide counterpart funding for the project
- To enter into long term PPA
- Invite tenders for EPC contractor
- Monitor Progress of project, including ESMP
- Own and operate the project
- Interface with the World Bank and other agencies

#### STATE GOVERNMENT

- To provide land for the project
- Provide necessary clearance for project
- To offtake power generated from the project through long term PPA

#### CONTRACTOR

- Preparation of ESIA and ESMP report for the Project
- Implementation of ESMP measures as per Contract
- Report on progress and shortcomings of the measures implemented to Environmental Specialist of SECI

#### FIGURE 4-1 IMPLEMENTATION ARRANGEMENT



#### 4.12 GRIEVANCE REDRESS MECHANISM

Effective environmental and social grievance redressal mechanism gives an opportunity to the organization to implement a set of specific measures to ensure good governance accountability and transparency in managing and mitigation of environmental and social issue of a particular project. This consists of defining the process for recording/receiving complaints and their redressal in respect of environmental and social matters.

Three-tier appropriate grievance redressal mechanism will be established at project level to ensure speedy resolution of disputes. An integrated system will be established with Grievance Redressal Cell (GRCs), with necessary officers, officials and systems, at the state as well as SECI. Grievances if any, may be submitted through various mediums, including in person, in written form to a noted address, e-mail, or through direct calls to concerned officials. The Social and Environmental Expert in the concerned agency shall be responsible for coordination of grievance/complaints received.

Grievances of PAPs, in writing, will be brought to GRC for redressal by the ESMP implementation agency. The ESMP implementation agency will provide all necessary help to PAPs in presenting his/her case before the GRC. In case an aggrieved person is illiterate or any vulnerable person (differently abled or woman), can use toll free number to register the grievance or can approach NGO responsible for implementation of ESMP. An aggrieved person can keep his or her identify confidential. The GRC will respond to the grievance within 15 days. The GRC will normally meet once in a month but may meet more frequently, if the situation so demands. Time period of 45 days will be available for redressing the grievance of PAPs. The decision of the GRC will not be binding to PAPs. This means the decision of the GRC does not debar PAPs taking recourse to court of law, if he/she so desires. Broad functions of GRC are as under:

- Record the grievances of PAPs, categorize and prioritize them and provide solution to their grievances related to resettlement and rehabilitation assistance
- The GRC may undertake site visit, ask for relevant information from Project Authority and other government and non-government agencies, etc in order to resolve the grievances of PAPs
- Fix a time frame within the stipulated time period of 45 days for resolving the grievance
- Inform PAPs through implementation agency about the status of their case and their



decision to PAPs and Project Authority for compliance.

The GRC will be constituted within 3 months by an executive order from competent authority (centre/ state) from the date of mobilization of ESMP implementation agency. The Social Officer of SECI will pursue the matter with assistance from implementation agency in identifying suitable persons from the nearby area for the constitution of GRC.

A three-tier appropriate grievance redressal mechanism will be established to ensure speedy resolution of disputes. An integrated system will be established with necessary manpower at the project level, state as well as in SECI. Grievances if any may be submitted through various mediums, including in person, in written form to a noted address, e-mail, or through direct calls to concerned officials. The Social and Environmental Expert in the concerned agency shall be responsible for coordination of grievance/complaints received. All grievances recorded either though GRC or toll free number or web based grievence registration, will be made public.

#### Grievance redressal through toll free number or web based mechanism

In case of grievances received through a toll free number or web based system, a person will be appointed in-charge of screening and resolution of the same/communicating with the concerned officials. The person in-charge based on the nature of complaint, will forward the same to the concerned official. A ticket or a unique number will be generated for all such complaints. The complainant will follow up based on that unique number. All calls and messages will be responded to within a two week time frame. If responses are not received within 15 days, the complaint will be escalated to project head. It is also recommended to maintain a grievance register on action taken and disposal of grievance.

#### Site level Grievance Redressal Cell

A site level GRC will be set up that is easily accessible to the affected community. The details of the system is given in table below.

| Tier | Representative                     | Roles and responsiblity  |
|------|------------------------------------|--|
| Ι    | Field Officer- Member<br>Secretary | Overall responsibility is to convene and conduct the meeting on monthly basis for the grievances received from the local community |

#### Table 4-10: Details of GRM Committee



| Tier | Representative                                      | Roles and responsiblity   |
|------|---|---|
|      | Representatives from<br>Community (Village<br>Head) | Will be part of GRC to protect rights of community.<br>Will be first level of contact for the community and<br>will also be responsible for informing the community<br>about the decisions taken. |
|      | Representatives from<br>Developers                  | Along with the community representative, will be<br>responsible for informing the community regarding the<br>decisions taken and will provide technical inputs.                                   |
| II   | SECI- Head or representative                        | If not resolved at site level, the grievances will be<br>escalated to tier 2. The Social Specialist of SECI will  |
|      | SECI- Social/Gender<br>Specialist                   | level inputs provided by field Officer of SECI.   |
| III  | Judiciary   | If unresolved, aggrieved persons have the right to<br>approach the Judiciary. Project will assist any PAPs<br>approaching judiciary.  |

#### 4.13 GENDER ASSESSMENT, DEVELOPMENT

According to ESMF, the objective of Gender Assessment and Development is to analyse gender issues during the preparation stage of sub projects, design interventions and primary data collection. The gender analysis shall be carried out based on findings from gender specific queries and requirements during data collection and community consultation process. The quantitative and qualitative analysis shall include sex disaggregated data, issues related to gender disparity, needs, constraints, priorities and understanding of gender based inequitable risks, benefits and opportunities as well as gender relevant indicators.

#### 4.14 GENDER BASED VIOLENCE (GBV)

GBV is an umbrella term for any harmful act that is perpetrated against a person's will and that is based on socially ascribed gender differences. GBV includes acts that inflict physical, mental, sexual harm or suffering; threats of such acts; and coercion and other deprivations of liberty, whether occurring in public or in private life. The project site includes both the actual locations where civil works are conducted and also the associated areas such as the locations of workers' camps, quarries, etc. These GBV risks need to be assessed throughout the project's life by monitoring the situation, assessing the effectiveness of risk mitigation measures, and adapting them.

Since a sub project involves construction work that will demand a constant supply of labourers, the influx of migrant workforce can be a potential risk for the host population. The influx of



labour force can lead to the risk of Gender-Based Violence. Hence, it is proposed that EPC shall conduct regular sensitization programme on gender equality for its employee and Project affected families. Code of conduct shall be framed for handling the cases of gender violence and proper records shall be maintained be the EPC contractor.

#### 4.15 INTEGRATION OF ESMAP WITH PROJECT

To ensure the implementation of safeguard measures by the EPC contratcor, the ESMAP including the suitable conditions for the preparation of project specific detailed ESAMP and necessary recommendation of ESDDR will be included in the bid document. The ESMAP clearly outlines the responsibility for various safeguard management actions associated with the project activities related to Labour Management, Assessment of Gender Based Violence and Grievance Redress Mechanism as well as to ensure compliance of the same in accordance with the safeguard requirements of the ESMF.

#### 4.16 REQUIREMENTS FOR PREPARATION OF ESHS MANAGEMENT STRATEGIES AND IMPLEMENTATION PLANS (ESHS-MSIP)

The EPC contractor shall submit comprehensive and concise Environmental, Social, Health and Safety Management Strategies and Implementation Plans (ESHS-MSIP) as part of Contractors' Environmental and Social Management Plan (CESMP). These strategies and plans shall describe in detail the actions, materials, equipment, management processes etc. that will be implemented by the EPC contractor, and its subcontractors. In developing these strategies and plans, the EPC contractor shall have regard to the ESHS provisions of the Contract Agreement including those as may be more fully described in the following:

- a) Works Requirements described in Contract Agreement;
- b) Environmental and Social Impact Assessment (ESIA);
- c) Environmental and Social Management Plan (ESMP);
- d) Consent Conditions (regulatory authority conditions attached to any permits or approvals for the project).

# 4.17 REQUIREMENTS FOR THE PREPARATION OF THE CODE OF CONDUCT

The EPC Contractor shall submit the Code of Conduct that will apply to the its employees and Sub-contractors. The Code of Conduct shall ensure compliance with the ESHS provisions of the Contract Agreement, including those as may be more fully described in the following:



- a) Works Requirements described in Contract Agreement;
- b) Environmental and Social Impact Assessment (ESIA);
- c) Environmental and Social Management Plan (ESMP);
- d) Consent Conditions (regulatory authority conditions attached to any permits or approvals for the project).

#### 4.18 MINIMUM REQUIREMENTS FOR THE CODE OF CONDUCT

A minimum requirement for the Code of Conduct should be set out, taking into consideration the issues, impacts, and mitigation measures identified in:

- a) Project reports e.g. ESIA/ESMP.
- b) consent/permit conditions
- c) required standards including World Bank Group EHS Guidelines
- d) national legal and/or regulatory requirements and standards (where these represent higher standards than the WBG EHS Guidelines)
- e) relevant standards e.g. Workers Accommodation: Process and Standards (Indian Standards, and in the absence of such Indian Standards those of IFC and EBRD) relevant sector standards e.g. workers accommodation
- f) grievances redress mechanisms

The types of issues identified could include risks associated with: labor influx, spread of communicable diseases, sexual harassment, gender based violence, illicit behavior and crime, and maintaining a safe environment etc. A satisfactory code of conduct will contain obligations on all project staff (including sub-contractors and day workers) that are suitable to address the following issues, as a minimum.

# 4.19 COMPLIANCE WITH APPLICABLE LAWS, RULES, AND REGULATIONS OF THE JURISDICTION

- Compliance with applicable health and safety requirements (including wearing prescribed personal
- protective equipment, preventing avoidable accidents and a duty to report conditions or practices that pose a safety hazard or threaten the environment)
- The use of illegal substances



- Non-Discrimination (for example on the basis of family status, ethnicity, race, gender, religion, language, marital status, birth, age, disability, or political conviction)
- Interactions with community members (for example to convey an attitude of respect and non-discrimination)
- Prohibition of child labour (for example employment of children below 14 years of age is prohibited in Building and Construction Industry)
- Sexual harassment (for example to prohibit use of language or behavior, in particular towards women or children, that is inappropriate, harassing, abusive, sexually provocative, demeaning or culturally inappropriate)
- Violence or exploitation (for example the prohibition of the exchange of money, employment, goods, or services for sex, including sexual favors or other forms of humiliating, degrading or exploitative behavior)
- Protection of children (including prohibitions against abuse, defilement, or otherwise unacceptable behavior with children, limiting interactions with children, and ensuring their safety in project areas)
- Sanitation requirements (for example, to ensure workers use specified sanitary facilities provided by their employer and not open areas)
- Avoidance of conflicts of interest (such that benefits, Concession Agreement, or employment, or any sort of preferential treatment or favors, are not provided to any person with whom there is a financial, family, or personal connection)
- Respecting reasonable work instructions (including regarding environmental and social norms)
- Protection and proper use of property (for example, to prohibit theft, carelessness or waste)
- Duty to report violations of this Code
- Non retaliation against workers who report violations of the Code, if that report is made in good faith. The Code of Conduct should be written in plain language and signed by each worker to indicate that they have:
  - received a copy of the code;
  - had the code explained to them;
  - acknowledged that adherence to this Code of Conduct is a condition of employment; and



 understood that violations of the Code can result in serious consequences, up to and including dismissal, or referral to legal authorities



## 5. FINDINGS OF GAP ANALYSIS

As prescribed in the ESMF, a Gap Analysis with respect to major environment and social attributes has been done and the major observations are presented in **Table 5-1** below :

#### **Key Principles and** Sl. No. GAP **Remarks** Attributes • As per ESDDR study and screening checklist, the present project is categorized as having 'Low Impact'. • The project does not trigger EIA notification 2006. To be complied • Construction of the proposed by EPC solar PV project along with Assessment of contractor Battery storage does not attract environmental and social 1 through their any land acquisition. Impacts ESIA consulting The duration of associated impact agency shall be during construction phase. This can be mitigated through proper project specific Environmental Management Plan (EMP) prepared and implemented by the EPC contractor under the supervision of SECI The EPC contractor is mandated to prepare the project specific ESAMP and the same ESAMP shall be implemented after the approval of SECI Bank. progress Periodic reporting To be complied Implementation of (Monthly, Quarterly and Yearly) during Mitigation and Status Reports and Annual Audit 2 construction and Management Measures Report on the implementation of operation stages environmental and social safeguard measures requires to be adhere by the EPC Contractor, and the frequency of submission to SECO shall also be revealed in the detailed ESMP. To avoid the disturbance to local Principle of Avoidance public, project is proposed to be Complied 3 setup on vacant government land

#### TABLE 0-1: GAP ANALYSIS FINDINGS



| Sl. No.  | Key Principles and<br>Attributes   | GAP            | Remarks   |
|----------|--|----------------|---|
| 4        | Linkages with other projects   | Not Applicable | This ESDDR is prepared for the<br>establishment of proposed 100<br>MW(AC) Solar PV Project<br>(200MWp DC capacity) along with<br>50MW/150 MWh Battery Energy<br>Storage System and associated<br>transmission line and there is no<br>linkage with other project.   |
| 5        | Involuntary restriction of<br>access to legally<br>designated parks and<br>protected areas               | Not Applicable | All the project components are<br>planned within government land;<br>there is no involvement of any<br>designated parks and protected<br>areas.   |
| 6        | Recognition of untitled<br>persons such as squatters<br>and encroachers<br>including customary<br>rights | Not Applicable | It is important to highlight that the<br>total available land area as per<br>government record is about 400<br>hectare. However, for the said<br>project configuration, the land<br>requirement is only about 200<br>hectare. SECI is in process of<br>conducting the topography<br>survey. After the conclusion of<br>the topographic survey, SECI will<br>finalize the tentative project<br>boundary, wherein, due care shall<br>be taken by to avoid tree cutting,<br>acquisition of private land, gothan<br>area, any damage to property of<br>cultural importance, community<br>building, schools etc. |
| 7        | Avoiding displacement<br>of Indigenous People  | Not Applicable | The project will neither displace nor<br>have any temporary disturbance on<br>the indigenous people. However, a<br>separate management plan for<br>indigenous people shall be framed<br>for local tribal population as part of<br>CESMP.  |
| Planning |  | 1              |   |
| 1        | Threshold for<br>Resettlement Plan (RP)  | Not Applicable | The project has neither trigger any<br>impact related to resettlement /<br>livelihood nor have any adverse<br>impact on encroacher and squatters.   |
| 2        | Need to replace / restore  | Not Applicable | The project does not have any   |



| Sl. No. | Key Principles and<br>Attributes                                     | GAP  | Remarks  |
|---------|--|--|--|
|         | CPRs   |  | impact on CPRs.  |
| 3       | Consultation and<br>participation of PAPs<br>during project planning | Complied   | Consultation with local residents<br>and various stakeholder groups are<br>conducted during planning stage.<br>The project is categorised as 'low-<br>impact' implying minimum or no<br>adverse impacts. Temporary<br>disturbances to public are envisaged<br>during excavation works, which will<br>be mitigated through appropriate<br>measures in ESMP.                     |
|         |  |  | Over and above, public consultation<br>will be carried out while updating<br>the ESMP.   |
| 4       | Participation of NGOs in project planning                            | To be complied<br>by<br>Implementation<br>authority<br>(SECI / EPC<br>contractor etc.) | NGOs are recognized as a major<br>stakeholder group in the project<br>implementation stage, for awareness<br>creation about project activities and<br>for ensuring community<br>participation. Consultation<br>Framework provided as part of<br>Social Management Plan (in ESMP)<br>suggests for conducting meetings<br>with NGOs to solicit feedback from<br>local community. |
| 5       | Cut-off date   |  |  |
| 6       | Definition of a family for R&R assistance                            |  |  |
| 7       | Need and scope of<br>census and socio-<br>economic surveys           |  |  |
| 8       | Compensation   |  | The project has neither trigger any  |
| 9       | Primary Authority for<br>Land Acquisition                            | Not Applicable   | impact related to resettlement /<br>livelihood nor have any adverse<br>impact on encroacher and squatters  |
| 10      | Principle to<br>restore/improve living<br>standards                  |  | impact on cheroacher and squatters.  |
| 11      | Compensation for land<br>at replacement value                        |  |  |
| 12      | Treatment of depreciation and Salvage                                |  |  |



| Sl. No.   | Key Principles and<br>Attributes  | GAP  | Remarks  |
|-----------|---|--|--|
| 13        | Transaction and transition fee  |  |  |
| 14        | Land for Land as an option for compensation   |  |  |
| Resettler | nent Assistance   |  |  |
| 1         | Cash assistance over and above compensation   |  |  |
| 2         | Assistance to poorest of<br>the poor or vulnerable<br>category of people            | Not applicable   | The project has neither trigger any<br>impact related to resettlement /<br>livelihood nor have any adverse |
| 3         | Provision of<br>infrastructure and public<br>services at resettlement<br>sites      |  | impact on encroacher and squatters.  |
| Implem    | entation  |  |  |
| 1         | Implementation of RP  |  |  |
| 2         | Participation of civil<br>society in<br>implementation of RP                        | Not applicable   | The project has neither trigger any  |
| 3         | Opportunity for PAPs to<br>participate in planning,<br>design and<br>implementation |  | impact related to resettlement /<br>livelihood nor have any adverse<br>impact on encroacher and squatters. |
| 4         | Disclosure of<br>Resettlement Plan  |  |  |
| Grievan   | ce Redressal Mechanism  |  |  |
| 1         | Procedure for dispute<br>resolution and appeals                                     | To be complied by  | GRM is already in place. Same  |
| 2         | Composition of<br>Grievance Redress<br>Committee                                    | Implementation<br>authority<br>(SECI / EPC<br>contractor etc.) | Project also.<br>(Refer section 4.12)  |



| Sl. No. | Key Principles and<br>Attributes  | GAP   | Remarks   |
|---------|---|---|---|
| 3       | Participation of<br>representative of PAPs<br>and civil society             |   |   |
| Monitor | ring  |   |   |
| 1       | Independent monitoring  | To be complied<br>by<br>Implementation<br>authority     | ESMF provides for independent<br>environment and social compliance<br>monitoring / audit by third party<br>inspection agency for each of the sub<br>projects. ESMP should be<br>accordingly amended for<br>implementation.  |
| 2       | Periodic evaluation and monitoring  | To be complied<br>by<br>Implementation<br>authority     | Internal Monitoring framework<br>provided in ESMP should be<br>updated to include parameters such<br>as, formation of GRC, site specific<br>restoration of excavated<br>roads/construction sites, dust<br>pollution, greenery maintenance<br>along the periphery of project site,<br>environmental monitoring (air,<br>noise, soil, water) and inclusion of<br>project specific EMP in the Bid /<br>Contract Document.<br>The reporting mechanisms of the<br>project including the periodic<br>progress reporting (Monthly,<br>Quarterly and Yearly), other Status<br>Reports and Annual Audit Reports<br>on the implementation of<br>environmental and social safeguard<br>measures shall be included in the<br>Bid / Contract Document. |
| 3       | Provision for<br>Environment and Social<br>Experts in Executing<br>Agencies | To be complied<br>by the<br>Implementation<br>Authority | The proposed project involve<br>numerous construction activities.<br>Accordingly, the available Project<br>Staffs of SECI; shall be trained and<br>assigned for monitoring as well as<br>ensure compliance of environmental<br>and social safeguard measures<br>associated with the day to day<br>construction activities of the<br>proposed project.   |



| Sl. No. | Key Principles and<br>Attributes | GAP | Remarks   |
|---------|----------------------------------|-----|---|
|         |                                  |     | The Environmental Social Experts<br>deployed at the SECI Corporate<br>Office, New Delhi can provide<br>necessary guidance/training to the<br>designated Project Staffs of<br>Executing Agencies, as and when<br>required, related to the<br>implementation of environmental<br>and social safeguard measures. |



## 6. IMPLEMENTATION SCHEDULE AND RESPONSIBILITY

The implementation schedule, responsibilities and respective time frame is tabulated below:

#### TABLE 0-1: IMPLEMENTATION SCHEDULE AND ASSOCIATED RESPONSIBILITIES

| Sl.<br>No. | Action   | Responsibility           | Timeframe   |
|------------|--|--------------------------|---|
| ENVI       | RONMENT SAFEGUARD  |                          |   |
| 1          | Prepare ESMP and incorporate<br>suitable conditions in Contract<br>to prepare & implement ESMP<br>by the EPC Contract. | SECI/ EPC<br>Contractor  | The ESMP shall be updated by EPC contractor before execution of the project.  |
| 2          | Obtain 'Consent' from State<br>Pollution control Board for<br>establishment and operation of<br>STPs.                  | SECI / EPC<br>Contractor | Immediate and ensure that the works<br>shall be initiated after receiving the<br>Consents.  |
| 3          | Initiate implementation of the recommended measures (presented in Sect. 7.1 and 7.2).                                  | SECI / EPC<br>Contractor | Throughout the project period.  |
| DETA       | ILED ENVIRONMENTAL MA  | NAGEMENT PLA             | AN  |
| 4          | Preparation of updated EMP & part of Contract and obtain the approval of the SECI/ Word Bank.                          | EPC Contractor           | Within 3 months of the commencement of Contract.  |
| SOCL       | AL SAFEGUARDS  |                          |   |
| 5          | Acquisition of land for construction of project.   | SECI / EPC<br>Contractor | SECI shall obtained the physical<br>possession of the land from Energy<br>Department, Govt. of Chhattisgarh<br>prior to award of work to the EPC<br>contractor.<br>EPC contractor shall follow all the<br>acts, rules and regulations land taking<br>for installation of transmission line. |
| 6          | Hiring of NGO/CBO for information dissemination  | SECI / EPC<br>Contractor | Immediate / Prior to disbursement of retroactive claim under the project.   |
| 7          | Prepare IEC material   | SECI / NGO               | One Month after Action No. 6.   |
| 8          | Establish GRC  | SECI                     | Immediate.  |
| 9          | Designate Grievance Officer  | SECI                     | Already designated  |
| 10         | Information dissemination  | SECI                     | Continuous after Action No. 7.  |
| 11         | In- Country disclosure of this DDR   | SECI                     | Immediate (Prior to initiation of Bidding process).   |



# 7. RECOMMENDATIONS

The Environmental and Social Due Diligence Report (ESDDR) is prepared by SECI, on the basis of Detailed Project Report. Based on the Environmental and Social Screening carried out as part of this due diligence exercise using the screening matrix of the Environmental and Social Management Framework (ESMF, June 2020), the present project of 100 MW(AC) Solar PV Project (200MWp DC capacity) along with 50MW/150 MWh Battery Energy Storage System and associated transmission line, falls under 'Low Impact' category.

The project does not trigger EIA notification 2006 and RFCTLARR Act, 2013. The project components have limited environment and social impacts during construction phase. These associated impacts can be mitigated through the adoption of suitable mitigation measures in the form of project specific Environmental Management Plan (EMP) prepared and implemented by the EPC Contractor under the supervision of SECI.

Based on the findings of due diligence exercise, the following recommendations are provided with an objective to ensure compliance with the ESMF:

#### 7.1 DESIGN AND PLANNING ASPECTS

- Suitable conditions shall be incorporated in the Bid/Contract documents to prepare and implement EAMP by the EPC Contractor during the execution/operation stages.
- A detailed project specific ESMP requires to be prepared by the EPC Contractor before execution of the project and shall obtain approval from the SECI/World Bank. The detailed ESMP shall include the information pertains to land/site layout, Project design, management practices, cumulative impact assessment (if any).
- Permission for tree felling (if any) shall be obtained from the Forest Department.
- Labour license requires to be obtained by EPC Contractor prior to construction.
- Construction materials shall be procured from the quarries approved / licensed from the competent authorities' viz. Department of mining of State Government; SEIAA; District Collector.
- Permission shall be obtained for the use of water for construction purpose from irrigation department/CGWA (for Surface or Ground Water) respectively.



- Pollution under Control Certificate should be obtained for Construction Vehicles.
- Higher capacity DG sets shall be complied with CPCB norms, adequate Stack Height and Acoustic Measure shall be mandated.
- Appropriate measures should be taken to control/channelize the discharge of untreated effluent directly into the river.
- Tree plantation along with landscaping around the Project is advised in order to improve the aesthetic value.
- Formal Intimation to line department to be given regarding excavation works in order to avoid or minimize the damages to existing utilities in the construction site.
- A Gender Action Plan to be prepared to address the risk of gender based violence in the project and adjoining communities.
- Orientation and sensitization training needs to be provided for all project staff and contractors, in particular, safety supervisors and engineers on GBV at all levels.
- ICC committees addressing GBV need to be constituted at site, corporate level.
- GBV needs to be integrated with GRM with special provisions, so, confidentiality/personal information can be controlled /maintained.
- Independent Environment and Social/Compliance Monitoring Audit by the third party independent inspection agency shall be carried out annually, as per the ESMF requirements of SECI.
- Periodic progress reporting (Monthly, Quarterly and Yearly) requires to be done by the EPC Contractor, and the frequency of submission to SECI shall be revealed in the ESMP.

#### 7.2 DESIGN AND OPERATIONAL SPECIFIC

- In coordination with the local agriculture / horticulture department, awareness programme shall be organized for the local farmers.
- services of local NGOs/CBOs may be hired for information dissemination and public consultations.
- To avoid inconvenience advance notice shall be circulated / given to the local residents, shop owners, vendors and squatters. Local community shall also be consulted before



commencement of works at respective locations; this shall be organized through awareness campaigns and disclosure of information related to the project components.

- SECI shall adopt the public relation activities to disseminate the necessary information about the project like (i) announcement on FM radio, (ii) space in local newspaper, (iii) printing and distributing pamphlets through local newspaper vendors, and (iv) putting up information boards at construction sites.
- SECI through the EPC contractor shall ensure (i) adequate safety measures during construction, (ii) ensure uninterrupted access to residences and shops, (iii) sprinkle water to control dust, and (iv) restoration of sites without delay.
- Excavated materials shall be used for backfilling of the trench area, low lying areas of the site.
- Consideration shall be given for constructing garland drain around the site with small opening intermittently in the boundary wall allowing rainwater to drain-off without accumulating in the adjacent residential areas.
- Efficient site restoration measure shall be developed and checked regularly by assigned engineer to avoid the public and traffic inconvenience.
- Maintenance of site health (Air, water, Noise, Soil Quality) and safety of worker (OHS) shall be checked on regular basis.
- A register should be consistently maintained at all project site offices to report the grievances. The grievances should be resolved by conducting monthly review meetings and if site team is unable to resolve the issue on its own, the complaint/matter is brought up to Senior Management of SECI.
- Apart from that, a separate register shall be maintained by the EPC Contractor in weekly meetings to address the grievances (if any discussed and resolved). If the matter will not be resolved in weekly meeting, it will be forwarded to higher level for decision.
- Independent Environment and Social/Compliance Monitoring Audit by the third party independent inspection agency as prescribed in the ESMF shall be carried out to understand the implementation of ESMF provisions.
- Periodic progress reporting (Monthly, Quarterly and Yearly) requires to be done by the Concessionaire, and the frequency of submission to SECI shall be revealed in the ESMP.







#### ANNEXURE – I

#### **Environmental and Social Screening Checklist**

| Environmental and Social Information Format for Screening  |
|--|
| <b>Project Title:</b> 100 MW(AC) Solar PV Project (200MWp DC capacity) along with 50MW/150 MWh Battery Energy Storage System |
| Implementing Agency: Solar Energy Corporation of India   |

Project Cost: Rs. 900 Cr. Approx.

Project Components: Solar PV panel, Inverter, Battery storage etc.

Project Location (Area / District): Rangakathera, Dundera, Dhaba, Kokha, Amlidih,

Girgaon, Margaon, Khukhwa, Odarbandh, and Tolagaon villages in the Rajnandgaon district in the state of Chhattisgarh,

| Sub pr | Sub project activities affecting the natural physical environment  |        |   |  |
|--------|--|--------|---|--|
| S. No. | Information/Checklist<br>confirmation  | Status | Detailed Information  |  |
| 1      | Preliminary secondary<br>data related to soil quality<br>and its bearing strength  |        | Hard rock available at a depth around 0.4 to<br>0.5 m.<br>In the initial 0.4 to 0.5 m depth, poorly graded<br>sand and gravel was present.  |  |
| 2      | State /National Boundaries   |        | District: Rajnandgaon<br>State: Chhattisgarh  |  |
| 3      | Anticipated change in<br>Topography (Cut and Fill<br>activity)   |        | Negligible – only due to site levelling<br>activity, as solar panels can be placed<br>following the ground profile.   |  |
| 4      | Clearance of land,<br>vegetation, any other<br>physiographic feature<br>(number and type<br>specify)? Specify area<br>under each feature (in<br>Hectare) |        | Project is proposed to be set up on<br>approximately 200 Ha of government land,<br>whereas the Govt. of Chhattisgarh has offered<br>over 405 Ha of land. Most of the land is free<br>from any habitation and there is no any<br>structure located in the area. SECI will<br>finalize the tentative project boundary,<br>wherein, due care shall be taken by to avoid<br>tree cutting, acquisition of private land,<br>gothan area, any damage to property of<br>cultural importance, community building,<br>schools etc. So, there will not be any physical<br>displacement of people due to the project. |  |
| 5      | Addition of new features to  |        | Negligible – only due to site levelling<br>activity, as solar panels can be placed  |  |



|    | topography due to project  | following the ground profile.   |
|----|--|---|
| 6  | Anticipated underground<br>works                                     | Not anticipated   |
| 7  | Anticipated changes in existing drainage pattern                     | Not anticipated   |
| 8  | Land Reclamation works   | Not anticipated   |
| 9  | Water source identified for activities                               | Ground Water is proposed to be used for construction activities   |
| 10 | Identification of erosion<br>prone areas                             | Not applicable  |
| 11 | Change in Land cover due<br>to project                               | Project is proposed to be set up on<br>approximately 200 Ha of government land,<br>whereas the Govt. of Chhattisgarh has offered<br>over 405 Ha of land. Most of the land is free<br>from any habitation and there is no any<br>structure located in the area. SECI will<br>finalize the tentative project boundary,<br>wherein, due care shall be taken by to avoid<br>tree cutting, acquisition of private land,<br>gothan area, any damage to property of<br>cultural importance, community building,<br>schools etc. So, there will not be any physical<br>displacement of people due to the project. |
| 12 | Site prone to any natural hazard                                     | Not anticipated   |
| 13 | Activities changing<br>hydrology or water courses<br>or aquifers     | Not anticipated   |
| 14 | Abstraction / transfers of<br>water from ground or<br>surface waters | Ground Water is proposed to be used for construction activities   |
| 15 | Water quality<br>characteristics and its<br>availability             | Water quality is not available.<br>However, likelihood of change in water<br>quality due to setting of the Project is very<br>low.  |
| 16 | Other activities impacting<br>the physical environment               | Project is proposed to be set up on<br>approximately 200 Ha of government land,<br>whereas the Govt. of Chhattisgarh has offered<br>over 405 Ha of land. Most of the land is free<br>from any habitation and there is no any<br>structure located in the area. SECI will<br>finalize the tentative project boundary,  |



|        |  |              | wherein, due care shall be taken by to avoid<br>tree cutting, acquisition of private land,<br>gothan area, any damage to property of<br>cultural importance, community building,<br>schools etc. So, there will not be any physical<br>displacement of people due to the project. |
|--------|--|--------------|---|
| 17     | Water body identified for<br>floating solar is reservoir /<br>backwater/ any other<br>(specify)          |              | Not applicable  |
| 18     | Does the identified water<br>body is used for water<br>supply?   |              | Not applicable  |
| 19     | Is water body used for fishing activities?   |              | Not applicable  |
| 20     | Is water body used for any other human activity?   |              | Not applicable  |
| 21     | Will project activity restrict access to the water body  |              | Not applicable  |
| 22     | Any order/policy specific to the site  |              | Not applicable  |
| Projec | t activities affecting the bio   | ological env | vironment   |
| S. No. | Information/Checklist<br>confirmation  | Status       | Aerial distance (within 05 km) of<br>proposed-project location boundary   |
| 1      | Vicinity to National Park,<br>Wildlife Sanctuary,<br>Reserved forests,<br>woodland, protected<br>forests |              | The various components of the proposed<br>project at Rajnadgaon is not located near any<br>eco-sensitive area and there is no such area<br>within 10 Kms.   |
| 2      | Vicinity to Migratory bird routes  |              | Project area is not in the vicinity of migratory bird route.  |
| 3      | Site in vicinity to<br>congregatory areas<br>(nesting, roosting,<br>breeding, foraging)                  |              | The various components of the proposed<br>project at Rajnadgaon is not located near any<br>eco-sensitive area and there is no such area<br>within 10 Kms.   |
| 4      | Vicinity to sensitive flora,<br>fauna  |              | The various components of the proposed<br>project at Rajnadgaon is not located near any<br>eco-sensitive area and there is no such area<br>within 10 Kms.<br>There is no endemic or endangered species of   |



|        |   |             | flora and fauna around the Project site.  |
|--------|---|-------------|---|
| 5      | Areas already<br>subjected to<br>pollution or<br>environmental damage                 |             | No  |
| 6      | Vicinity to eco-sensitive<br>areas (wetlands, CRZ,<br>water course, mountains<br>etc) |             | The various components of the proposed<br>project at Rajnadgaon is not located near any<br>eco-sensitive area and there is no such area<br>within 10 Kms. |
| 7      | Presence of endangered<br>species / habitat areas                                     |             | The various components of the proposed<br>project at Rajnadgaon is not located near any<br>eco-sensitive area and there is no such area<br>within 10 Kms. |
|        |   |             | There is no endemic or endangered species of flora and fauna around the Project site.   |
| 8      | Vicinity to island, coastal<br>marine or underground<br>water                         |             | No  |
| 9      | Loss of any native species<br>or genetic diversity                                    |             | Not anticipated   |
| 10     | Any season specific issues<br>with site regarding<br>ecological functions             |             | No  |
| P      | roject activities affecting th  | e visual en | vironment   |
| S. No. | Information/Checklist<br>confirmation   | Status      | Aerial distance (within 05 km) of<br>proposed-project location boundary   |
| 1      | Area with Outstanding<br>Natural Beauty (ANOBs)<br>or Natural Heritage sites          |             | No  |
| 2      | Area with Archaeological importance   |             | No  |
| 3      | Area with high scenic value   |             | Not applicable  |
| 4      | Existing viewpoints/ pause points   |             | Not applicable  |



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| Project activities affecting the settlement / infrastructure |  |        |   |  |
|--|--|--------|---|--|
| S. No.   | Information/Checklist<br>confirmation  | Status | Details thereof (quantification wherever possible) with source of information data  |  |
| 1  | Settlement area/Built up<br>environment in vicinity /<br>distance              | No     | There is some cultivation going on in the south of the identified land parcels but those  |  |
| 2  | Agricultural land/land<br>under livelihood (area in<br>Hectare)                | No.    | land parcels will not be considered for the park area.  |  |
| 3  | Type of crops grown /<br>number of crops                                       | No     |   |  |
| 4  | Source of Irrigation   | No     | Rain  |  |
| 5  | Drinking water sources   | No     | There are some natural drains that carries water to the downstream villages   |  |
| 6  | Area of sensitive receptors  | No     |   |  |
| 7  | Religious –Physical<br>Resources   | No     | Project is proposed to be set up on<br>approximately 200 Ha of government land,<br>whereas the Govt. of Chhattisgarh has offered  |  |
| 8  | Community-Physical<br>Resources  | No     | over 405 Ha of land. Most of the land is free<br>from any habitation and there is no any<br>structure located in the area. SECI will finalize<br>the tentative project boundary, wherein, due<br>care shall be taken by to avoid tree cutting,<br>acquisition of private land, gothan area, any<br>damage to property of cultural importance,<br>community building, schools etc. So, there will<br>not be any physical displacement of people due<br>to the project. |  |
| 9  | Underground utility lines<br>like electricity lines,<br>pipelines for gas, etc | No     | Not Applicable  |  |
| 10   | Defence Installations /<br>Airport Routes                                      | No     | The nearest airport to the District is at Mana<br>(Raipur), about 80 kms away   |  |
| 11   | Likely damage to existing infrastructure, public                               | No     | Project is proposed to be set up on<br>approximately 200 Ha of government land,<br>whereas the Govt. of Chhattisgarh has offered  |  |



|    | utilities, amenities etc.   |     | over 405 Ha of land. Most of the land is free<br>from any habitation and there is no any<br>structure located in the area. SECI will<br>finalize the tentative project boundary,<br>wherein, due care shall be taken by to avoid<br>tree cutting, acquisition of private land,<br>gothan area, any damage to property of<br>cultural importance, community building,<br>schools etc. So, there will not be any physical<br>displacement of people due to the project. |
|----|---|-----|---|
| 12 | Presence of Indigenous<br>/ vulnerable communities  | Yes | ST population is living in the Project affected<br>areas. No tribal family or community will be<br>adversely impacted due to the project.<br>However, It is proposed to prepared<br>management plan for indigenous / vulnerable<br>communities as part of CESMP.  |
| 13 | Major Movement Corridors<br>/Traffic  |     | NH – 6 is passing very close to project site.   |
| 14 | Anticipated waste<br>generation & Waste<br>Disposal Facility  |     | Municipal Solid waste from labor camps,<br>Battery waste and E-waste during the<br>operation phase  |
| 15 | Potential Water<br>sources for<br>project activities  |     | Ground Water  |
| 16 | Source of energy including<br>electricity and fuel for<br>various purposes for the<br>project (amount of fuel in<br>MT & electricity in MW) |     | Proposed project is 100 MW(AC) Solar PV<br>Project (200MWp DC capacity) along with<br>50MW/150 MWh Battery Energy Storage<br>System   |
| 17 | Facilitates for<br>transportation of<br>construction materials  |     | NH-6 shall be used for transportation material by road.   |
| 18 | Facilities for storage of construction goods & materials  |     | Construction goods and material shall be<br>stored in designated areas only. Applicable<br>Acts and rules shall be followed for the<br>storage of construction goods and material.  |
| 19 | Facilities for storage of any hazardous material  |     | Construction equipment and DG set operation<br>will generate some hazardous waste at<br>construction sites in terms of waste oil tanks,<br>used oil, etc. Such waste is being disposed off<br>in compliance with Hazardous and Other<br>Wastes (Management and Transboundary<br>Movement) Rules, 2016.  |


| 20 | Facilities for long term<br>housing for operational<br>workers   | Project is envisaging to be constructed in 18<br>Months. Peak labor influx during construction<br>phase is 400 approx. For providing<br>accommodation, temporary labor camp shall<br>be constructed during construction phase.<br>Labor camps will be equipped with drinking<br>water facility, one Community latrine per 20<br>persons and sewage treatment facility. At<br>construction sites and labor camps, separate<br>bins are placed for biodegradable and non-<br>biodegradable wastes. Hazardous/E-<br>waste/others are being stored for safe disposal<br>as per Hazardous and Other Wastes<br>(Management and Transboundary Movement)<br>Rules, 2016 and E-Waste (Management)<br>Rules, 2016. |
|----|--|--|
| 21 | List of construction works<br>(Permanent &Temporary)   |  |
| 22 | Facilities for construction<br>workers (temporary labour<br>camp, drinking water,<br>waste disposal, etc.) | Project is envisaging to be constructed in 18<br>Months. Peak labor influx during construction<br>phase is 400 approx. For providing<br>accommodation, temporary labor camp shall<br>be constructed during construction phase.<br>Labor camps will be equipped with drinking<br>water facility, one Community latrine per 20<br>persons and sewage treatment facility. At<br>construction sites and labor camps, separate<br>bins are placed for biodegradable and non-<br>biodegradable wastes. Hazardous/E-<br>waste/others are being stored for safe disposal<br>as per Hazardous and Other Wastes<br>(Management and Transboundary Movement)<br>Rules, 2016 and E-Waste (Management)<br>Rules, 2016. |
| 23 | Facilitates for disposal of<br>waste (dry or wet)  | At construction sites and labor camps,<br>separate bins are placed for biodegradable and<br>non-biodegradable wastes. Hazardous/E-<br>waste/others are being stored for safe disposal<br>as per Hazardous and Other Wastes<br>(Management and Transboundary Movement)<br>Rules, 2016 and E-Waste (Management)<br>Rules, 2016.  |
| 24 | Facilitates for disposal<br>liquid waste/effluents   | Project is envisaging to be constructed in 18<br>Months. Peak labor influx during construction<br>phase is 400 approx. For providing<br>accommodation, temporary labor camp shall  |



|    |  |     | be constructed during construction phase.<br>Labor camps will be equipped with drinking<br>water facility, one Community toilets per 20<br>persons and sewage treatment facility. |
|----|--|-----|---|
| 25 | New Road, rail etc during<br>construction or operational<br>phase  | No  | Not anticipated   |
| 26 | Any closure or diversion to<br>the current movement<br>pattern due to the project<br>during construction or<br>operational phase                                       | No  | Not anticipated   |
| 27 | New or diverted<br>transmission lines due to<br>the project  | Yes | Through overhead 132kV transmission line of<br>length 33 km approx. to the nearest 132 kV<br>CSPTCL's Substation at Thelkadi,<br>Chhattisgarh                                     |
| 28 | Is there a risk of long term<br>build-up of pollutants in<br>the environment from<br>storage of hazardous<br>material, disposal of<br>effluents and waste<br>disposal? |     | No  |
| 29 | Cumulative effects due to<br>proximity to other existing<br>or planned projects with<br>similar impacts  |     | Not anticipated   |

#### **Social Screening Checklist**

| S.<br>No. | Screening Criteria   | Assessmen<br>t of<br>Category<br>(High/ low) | Remarks /Explanatory note<br>for categorization   |
|-----------|--|--|---|
| 1         | Is the project in an eco-sensitive area<br>or adjoining an eco-sensitive area?<br>(Yes/No) If Yes, which is the area?<br>Elaborate impact accordingly. | No impact                                    | The various components of the<br>proposed project at Rajnadgaon<br>is not located near any eco-<br>sensitive area and there is no<br>such area within 10 Kms. |
| 2         | Will the project create significant/<br>limited/ no social impacts?  | Low Impact                                   | Project is proposed to be set<br>up on approximately 200 Ha<br>of government land, whereas  |



|   |  |            | the Govt. of Chhattisgarh has   |
|---|--|------------|---------------------------------|
|   |  |            | offered over 405 Ha of land.    |
|   |  |            | Most of the land is free from   |
|   |  |            | any habitation and there is no  |
|   |  |            | any structure located in the    |
|   |  |            | area. SECI will finalize the    |
|   |  |            | tentative project boundary,     |
|   |  |            | wherein, due care shall be      |
|   |  |            | taken by to avoid tree cutting, |
|   |  |            | acquisition of private land,    |
|   |  |            | gothan area, any damage to      |
|   |  |            | property of cultural            |
|   |  |            | importance, community           |
|   |  |            | building, schools etc. So,      |
|   |  |            | there will not be any physical  |
|   |  |            | displacement of people due to   |
|   |  |            | the project.                    |
| 3 | Land acquisition resulting in loss of  | Low Impact | Project is proposed to be set   |
|   | income from agricultural land,         | Ĩ          | up on approximately 200 Ha      |
|   | plantation or other existing land-use. |            | of government land, whereas     |
|   |  |            | the Govt. of Chhattisgarh has   |
|   |  |            | offered over 405 Ha of land.    |
|   |  |            | Most of the land is free from   |
|   |  |            | any habitation and there is no  |
|   |  |            | any structure located in the    |
|   |  |            | area. SECI will finalize the    |
|   |  |            | tentative project boundary,     |
|   |  |            | wherein, due care shall be      |
|   |  |            | taken by to avoid tree cutting, |
|   |  |            | acquisition of private land,    |
|   |  |            | gothan area, any damage to      |
|   |  |            | property of cultural            |
|   |  |            | importance, community           |
|   |  |            | building, schools etc. So,      |
|   |  |            | there will not be any physical  |
|   |  |            | displacement of people due to   |
|   |  |            | the project.                    |
| 4 | Land acquisition resulting in          | No Impact  | Project is proposed to be set   |
|   | relocation of households.              | _          | up on approximately 200 Ha      |
|   |  |            | of government land, whereas     |
|   |  |            | the Govt. of Chhattisgarh has   |
|   |  |            | offered over 405 Ha of land.    |
|   |  |            | Most of the land is free from   |
|   |  |            | any habitation and there is no  |
|   |  |            | any structure located in the    |
|   |  |            | area. SECI will finalize the    |
|   |  |            | tentative project boundary,     |
|   |  |            | wherein, due care shall be      |
|   |  |            | taken by to avoid tree cutting, |



|    |   |                              | acquisition of private land,<br>gothan area, any damage to<br>property of cultural<br>importance, community<br>building, schools etc. So,<br>there will not be any physical<br>displacement of people due to<br>the project.  |
|----|---|------------------------------|---|
| 5  | Any reduction of access to traditional<br>communities (to areas where they<br>earn for their primary or substantial<br>livelihood). | No Impact                    | No displacement of traditional communities.   |
| 6  | Any displacement or adverse impact<br>on tribal settlement(s).  | Low Impact                   | Project is proposed to be set<br>up on approximately 200 Ha<br>of government land, whereas<br>the Govt. of Chhattisgarh has<br>offered over 405 Ha of land.<br>Most of the land is free from<br>any habitation and there is no<br>any structure located in the<br>area. SECI will finalize the<br>tentative project boundary,<br>wherein, due care shall be<br>taken by to avoid tree cutting,<br>acquisition of private land,<br>gothan area, any damage to<br>property of cultural<br>importance, community<br>building, schools etc. So,<br>there will not be any physical<br>displacement of people due to<br>the project |
| 7  | Any specific gender issues.   | No Impact                    | No gender specific issue<br>directly related to the project is<br>envisaged. However, better<br>sanitation facility will improve<br>health status of women in the<br>area.  |
| 8  | Will the project create significant /<br>limited / no Social impacts during the<br>construction stage?                              | Low and short<br>term Impact | Construction activity<br>associated with labour influx<br>might have short term impact.   |
| 9  | Flooding of adjacent areas  | No Impact                    | Not anticipated   |
| 10 | Improper storage and handling of<br>substances leading to contamination<br>of soil and water  | No Impact                    | Project is envisaging to be<br>constructed in 18 Months.<br>Peak labor influx during<br>construction phase is 400   |



|    |                                   |  | approx. For providing<br>accommodation, temporary<br>labor camp shall be<br>constructed during<br>construction phase. Labor<br>camps will be equipped with<br>drinking water facility, one<br>Community toilets per 20<br>persons and sewage treatment<br>facility. At construction sites<br>and labor camps, separate bins<br>are placed for biodegradable<br>and non-biodegradable wastes.<br>Hazardous/E-waste/others are<br>being stored for safe disposal<br>as per Hazardous and Other<br>Wastes (Management and<br>Transboundary Movement)<br>Rules, 2016 and E-Waste<br>(Management) Rules, 2016. |
|----|-----------------------------------|--|---|
| 11 | Elevated noise and dust emission. | Low and short<br>term impact<br>during<br>construction<br>activities | Proper measure will be taken<br>during construction and<br>operation phases of the<br>proposed project to minimise<br>the noise and dust emissions.<br>Contractor / Concessionaire<br>should ensure the proper<br>acoustic measure for noise<br>generating unit like DG set as<br>per CPCB norm, etc.<br>The Contractor /<br>Concessionaire have to<br>submit the method statement<br>to comply with Air Act, 1981<br>and Noise Rules as per EP<br>Act, 1986 before initiation of<br>construction activities  |
| 12 | Disruption to traffic movements   | No Impact  | Not anticipated   |



ANNEXURE – 2

#### ENVIRONMENTAL AND SOCIAL GRIEVANCE FORM

| Complainant Name                |                          |
|---------------------------------|--------------------------|
| Contact Details                 | Address                  |
|                                 | Contact No.:             |
| Location of Complaint           |                          |
| Details of Complaints           |                          |
| Directions                      |                          |
| Confidentially Requested        | Yes                      |
| Signature of Complainant        | Date:                    |
| Reference No.:                  | For official use<br>only |
| Date Received:                  | For official use<br>only |
| Complaint taken by:             | For official use<br>only |
| Complaint assigned              | For official use<br>only |
| Date of complaint Acknowledged: | For official use<br>only |
| Complaint referred to           | For official use<br>only |



#### FORMAT FOR GRIEVANCE REDRESSAL MECHANISM REGISTER

| Sl.<br>No. | Name of the<br>Complainant | Unique<br>complaint<br>number | Address<br>&<br>Contact<br>No. | Gist of the<br>Complaint | Forwarded to<br>whom | Whether<br>grievance<br>redressed<br>or not | If yes,<br>Gist of<br>disposal | If<br>rejected,<br>gist of<br>reasons | If not<br>attended<br>reasons |
|------------|----------------------------|-------------------------------|--------------------------------|--------------------------|----------------------|---|--------------------------------|---------------------------------------|-------------------------------|
|            |                            |                               |                                |                          |                      |   |                                |                                       |                               |
|            |                            |                               |                                |                          |                      |   |                                |                                       |                               |
|            |                            |                               |                                |                          |                      |   |                                |                                       |                               |
|            |                            |                               |                                |                          |                      |   |                                |                                       |                               |

#### MONTHLY STATUS REPORT ON ENVIRONMENTAL AND SOCIAL GRIEVANCE REDRESSAL

| SI.<br>No. | Name<br>of the<br>unit | No. of<br>pending<br>complaints<br>at the end of<br>previous<br>month | No. of<br>complaint<br>received<br>during the<br>month | Action<br>initiated<br>during the<br>month | Completed<br>during the<br>month | No. of<br>complaint s<br>pending at<br>end of<br>month | No. of<br>grievance<br>redressed | No. of<br>dismissal | Total | Remarks |
|------------|------------------------|---|--|--|----------------------------------|--|----------------------------------|---------------------|-------|---------|
|            |                        |   |  |  |                                  |  |                                  |                     |       |         |
|            |                        |   |  |  |                                  |  |                                  |                     |       |         |