Environmental
Planning
Management
Consultancy

Environmental & Social Impact Assessment

for 350 MW Kallam Wind Power Project
at Washi taluka Osmanabad district of Maharashtra

Submitted to:

serentica

Submitted by:

EPMCind

Contents

EXECUTIVE SUMMARY

Project Background

Serentica Renewables provides round-the-clock renewable energy enabling the transition of large-scale, energy-intensive industries to clean energy. The company is focused on industrial decarbonization, by making renewables the primary source of energy for the commercial & industrial segments.

The Company vision is to lead clean energy platform by supporting growth and providing sustainable energy solutions in a socially responsible manner and developing utility scale renewable projects in various geographies of the world. The mission of company is to add 1.4 GW of renewable energy in India by 2025.

M/s Serentica Renewable India Private Limited, (hereinafter referred to as '**SRIPL-4**') is setting-up a 350 MW wind power project in 27 villages of Osmanabad district of Maharashtra. Serentica intends to undertake an Environmental and Social Impact Assessment (ESIA) for the project, in accordance with International Finance Corporation (IFC) Performance Standards 2012. The aim of the study is to understand the environmental and social sensitivities associated with the wind power project as well as assess the ability of the project to comply with the requirements of the above-mentioned guidelines and implement mitigation measures during the Project's lifecycle. For this purpose, Environmental Planning Management Consultancy (EPMC) has been appointed to carry out the ESIA study.

Project Overview

The 350 MW wind power plant is proposed to be developed on approx. 752 acres of private land in Osmanabad District, Washi and Bhum tehsil of Maharashtra. The latitude and longitude of the proposed wind farm project site is range between 18°39'35.5" N to 18°27'33.29" N latitude and 75043'09.6" E to 75051'23.82" E longitude. Washi is the nearest town at a distance of ~ 2.4 km from the proposed project site and the nearest railway station is in Aurangabad at an aerial distance of ~ 140 km. The proposed project site is approachable through National Highway (NH-52) connecting to village road.

Power generated from the proposed project will be steeped up to 220 kV PSS at Shelgaon village and will be evacuated through a 220 KV single circuit transmission line of about 19km to Kalamb PGCIL substation (GSS) at Selu village. At the time of EPMC site assessment the project was at the pre-construction stage.

Applicable Regulations, Required Permits, Approvals

SRIPL-4 will follow all the legal permissions and procedures and will comply with the obligations mentioned therein for the proposed Wind Project site at Osmanabad district for 350 MW Wind Power Plant.

The following reference framework is applicable to the proposed project:

- Applicable environmental and social regulations and policies in India and the State of Maharashtra;
- Institutional Framework for the implementation of the regulations; and
- International Standards including:
  - IFC Performance Standards (2012);
  - IFC/World Bank General EHS Guidelines (2007);
  - IFC/World Bank EHS Guidelines for Electric Power Transmission and Distribution (2007);
  - IFC/World Bank EHS Guidelines for Wind Energy (2015);
  - Equator Principles (2020)

Baseline Environment, Ecological and Social Aspects

To understand and assess the environmental, ecological, and social risks associated with the project, baseline data were collected within the study area considering:

(1) core area covering project site and it's surrounding up-to 500 m and

(2) buffer area covering 5 km radius around the project site covering WTG and PSS. 2 km buffer area on either side of the transmission line has also been studied for this project.

Topography of the study area is mostly undulating and plain with vegetation consists of shrubs, agricultural and grassland. No river is flowing through the project area. The climate of the districts is characterized by a hot summer and dryness throughout the year except during the south-west monsoon season, i.e., June to September while October and November constitute the post-monsoon season. The winter season commences towards the end of November and December is considered as the coldest month with a minimum temperature of 10.4 °C in the month of January. Mean Rainfall (1991-2020) is 829.2mm.

The project site is located in seismic zone III. As for natural hazards, the project lies in the moderate damage risk zone in terms of earthquake occurrence and the drought frequency in the area is increasing due to climate change and declining monsoon rain in the region with the severe drought events return period of 4–5 years.

During primary survey, 68 bird species were recorded, out of which 4 species viz. Asian Woolly-necked Stork, Black-headed Ibis, Painted Stork, and Red Necked Falcon are in Near-threatened category as per IUCN Red List. Apart from this, River tern was recorded which is in Vulnerable category by IUCN Red List. Jawahar Lal Nehru GIB Sanctuary is around 45 kms from the proposed project area. No protected area was found within the project study area.

Avian biodiversity and bird populations are directly affected by renewable energy expansion. AVISTEP assessment indicates all the proposed WTGs are falling under "**Low to Moderate"** avian sensitivity grid.

The proposed wind power project is recognized as not a critical habitat but IFC PS6 will be applicable due to a definite possibility of the natural habitat and the water bodies providing habitat to birds and mammals during the project life.

According to PS-5 of IFC guideline, the project proponent is in process of procuring land for the WTGs as well as access road and transmission line from the interested landowners under sale deed and leased deed agreement. In this land acquisition process, neither any forceful eviction nor any adverse impact on the community in study villages is observed at the time of site assessment through community consultation exercise. Hence, this land acquisition exercise has no negative impact on lives and livelihood of the people residing in project influenced area.

Local peoples are looking for employment with project development. Overall, the project will provide local community an opportunity to increase income from employment, improve economic status with higher land price for better livelihood.

Key Impacts & Mitigation

- During construction, land clearing, levelling, excavation, grading activities, vehicle movement and DG set operation and other activities will be required, which in turn, increase the emission in ambient air, but expected to be restricted within the designated area. SRIPL-4 will implement mitigation measures like

water sprinkling, covered transportation, maintaining speed limit, regular PUC checks, green area development etc. During operation phase, impact on ambient air will be insignificant.

- The project site is located in agriculture and scrub land, where there are no continuous noise generating sources in the vicinity of the project site. The major noise generating activities during construction phases are site preparation, excavation of WTG foundation, transportation of WTG components and construction materials, erection of wind turbines and transmission towers, access road widening, construction of site office and labour camp etc. SRIPL-4 will implement the mitigation measures like use of PPE, restriction of work within time limit, regular checks, etc. During operation phase, no impact is envisaged on ambient noise.

- The noise modelling results have identified 32 receptors located within 500 m of the proposed WTG locations including 6 residential pucca houses and 26 temporary structures. The predicted maximum noise level on these receptors falls in the range of 45 – 52.6 dB (A), which is well within range if compared with day-time noise limit of residential area i.e., 55 dB (A) and on the little higher side, if compared with night-time noise limit i.e., 45 dB (A).

  The following mitigation measures should be incorporated to avoid/reduce potential impacts-

  - WTG models should be selected having inbuilt noise control mechanism.
  - Regular maintenance of WTGs should be carried out for attenuation of noise.
  - In case of complaints of high noise levels from inhabitants, possibility of putting noise barriers such as development of green belt plantation between source and receptors should be considered.
  - Noise monitoring should be carried out quarterly to understand the extent of noise generation near the turbines and its impact on local community.

- A total of 123 receptors have been identified within 2000 m from shadow flicker modelling. Out of these, 28 receptors are permanent in nature. As, shadow flickering impact is more within 500 m, where there are total 98 receptors along with 17 Residential pucca houses, 4 restaurants and rest are temporary in nature. The maximum shadow flicker will occur at residential receptor SR 60 (BH), which is located close to WTG KLM-030 with mximum shadow flickering in a year of 298:48:00 hr/yr.

  The following mitigation measures should be incorporated to avoid/reduce potential impacts-

  - There needs to be close monitoring through engagement with residents during the operational phase where there are predicted impacts from shadow flicker. The likelihood of direct line of sight to the location of proposed turbine locations can be assessed visually and the potential for using screening like higher fencing and planting trees can be explored at problem locations. The use of curtains can also be explored.

- The excavated material generated will be reused for site filling and levelling to the maximum extent possible. The old turbine blades (at the end of their lifespan) will be properly packed and sent back to manufacturer/ approved vendors. Any hazardous waste generated will be disposed as per hazardous waste management rules.

  It is recommended to prepare and implement water conservation scheme like rainwater harvesting.

- Risk of Electrocution is anticipated in the operational phase of the project, which could be mitigated through boundary wall, bird deterrents, bird guards, diverters, and restricted entry in project site. Use of reflectors and bird flappers to be used at suitable intervals to avoid easy visibility of transmission wires and the risk of electrocution.

- CSR initiatives/ community development plan should be implemented in the project affected villages. Grievance Redressal mechanism should be followed onsite. Complaints from the locals should be timely registered, investigated and resolved.

Environment and Social Management Plan

SRIPL-4 is committed to execute all construction and operation related activities for the proposed wind power project as per the best-established environmental, social, health and safety standards. Mitigation measures are proposed for identified and quantified impacts. Some residual impact will however persist after all mitigation measures are employed, the Environmental and Social Management Plan intends to delineate monitoring and management measures to minimize such impacts by allocating management responsibility for implementation of these measures during construction and operational phase.

Project Categorizations and Justification

The IFC criteria for the project categorization are based on the assessment of environmental impacts of the project and the Project has been categorized as **Category B** based on the following reasoning:

- Environmental and social impacts of the project are anticipated during the construction phase and will encompass changes in land-use, increased noise levels, changes in air quality, use and changes in water quality, impacts on terrestrial ecology, occupational health & safety, etc.;
- Environmental Impact Assessment (EIA) Notification 2006 and subsequent amendments is not applicable for this project as the project is White Category of Industry. No forest land is involved for the development of this project; thus, Forest Act is also not applicable.
- The site location of the project does not involve any anticipated settlements and physical displacement; No child labour is engaged at site for construction or operation works.
- Consent to establish from Maharashtra State Pollution Control Board (MPCB) before operation of the project.

- IFC PS 1, PS 2, PS 3, PS 4, and PS 6 are applicable for this project, PS 5 applicability could not be determined in this project as land procurement is still under progress during the site assessment and rest PS 7 and PS 8 are not applicable.
- Wind based energy development is a non-polluting source of energy and thus is not likely to lead to any adverse impacts on the baseline environment during the operation phase.

Conclusion

The Project is a green energy project proposing to generate 350 MW power through wind energy. It is based on clean technology, devoid of any pollution and will help to reduce GHG emissions. The project is categorized as "***Category B"*** as per IFC on the condition that the mitigation measures implemented throughout the life cycle of the project. The project should be constructed and operated as per the latest legal regulation**.**

The Project and its key components such as site office building, WTGs, transmission lines, etc. are likely to have minor to negligible impacts on baseline environmental parameters such as soil, noise, water, air, after suggested mitigation measures are implemented. There is no adverse impact on the nature of habitat or any natural existing land resources. The E&S impacts during operation phase are likely to be minor to negligible.

The project will throw opportunities to local people for both direct and indirect employment. The project development is beneficial in terms of local employment and overall local area development like infrastructure, education, health, housing, water, electricity etc. Project development will increase the economy, revenue potential and industrialization of the region. The Environmental and Social Management Plan (ESMP) describes mitigation measures for impact specific to Project activities and also discuss implementation mechanism. To conclude, the implementation of ESMP/ Management plans will help SRIPL-4 in complying with its internal E&S requirements as well as national/state regulatory framework requirements.

1 Introduction and Background

India is now amongst the fastest developing countries in the world in terms of GDP as well as the electricity consumption. The challenge is to meet the energy needs of high economic growth & electricity consumption of people of the country. Because of the oil crisis, fluctuation in oil prices, high energy demand, stabilizing future energy securities, and a need for reducing greenhouse gas emissions (GHG) in the earth's atmosphere, Renewable energy sources are used and explored for generation of electric power.

Wind energy is accepted as one of the most developed, cost-effective and proven renewable energy technologies to meet increasing electricity demands in a sustainable manner. Reduced or shifted energy usage can directly translate into less air pollution, less carbon emissions and thereby reducing the potential environmental threats associated with global warming.

Role of Wind Energy

The promotion of wind energy in India should be seen from a broader and long-term perspective. Harnessing the wind energy offers energy security & environmental benefits and other benefits namely:

- Contribute to enhancing power availability, reducing the energy shortage & addressing the peak demand deficit faced by the state of Maharashtra.
- Providing clean & reliable energy: wind energy helps in meeting the energy requirements of people in remote rural areas.
- Leads to sustainable development: Promotion of wind energy will contribute directly towards the overall improvement of living standard of rural populace. It will also help maintain ecological balance, replacing conventional energy use, generate additional employment opportunities, improve health and increase access to education to rural children.

1.1 Project Background

Serentica Renewables provides round-the-clock renewable energy enabling the transition of large-scale, energy-intensive industries to clean energy. The company is focused on industrial decarbonization, by making renewables the primary source of energy for the commercial & industrial segment which consumes more than 50% of the electricity generated in India. Serentica aims to provide assured renewable energy through a combination of solar, wind, energy storage and balancing solutions.

In the medium-term, Serentica aims to install 5000MW of carbon-free generation capacity coupled with different storage technologies. Eventually, it aims to supply over 15 billion units of clean energy annually and displace 20 million tonnes of CO_2 emissions.

As India looks to meet its energy demand on its own, which is expected to reach 15,820 TWh by 2040, renewable energy is set to play an important role. Serentica Renewables and its 350 MW Kallam wind power project also play an important role in it.

Environmental Planning Management Consultancy (EPMC) as an environmental consultant has been appointed by ***M/s Serentica Renewables 4 India Pvt Ltd (SRIPL-4)*** to undertake the Environmental and Social Impact Assessment (ESIA) study for 350 MW WPP in Osmanabad district of Maharashtra. The ESIA was conducted to assess any potential impacts (both negative and positive) that may arise from the construction, operation and decommissioning of the WPP. Environmental sustainability in relation to the wind power

project will be enhanced by designing the power plant that gives competitive advantage over existing energy resources. The overall benefits of the wind power system are expected to outweigh the potential negative impacts. The ESIA study for the project has been undertaken in accordance with terms of reference as approved by IFC's Performance Standard. IFC has issued Environmental, Health, and Safety Guidelines for Wind Energy on August 7, 2015. These are a compilation of - Environmental, Health, and Safety General Guidelines for Wind Energy.

Other relevant best practice guideline has also been referred. The study will assess the compliance of the project with respect to the local and national regulations related to concessions, land acquisition and resettlement, labour and working condition, public and occupational health and safety, ethnic group/indigenous people, environmental protection and other relevant signatory international conventions, protocols, treaties etc.

1.2 Brief of Project

The project will consist of 106 Wind Turbine Generators (WTGs), a 220 kV Pooling Sub Station (PSS) at Shelgaon and approximately 19km 33 kV transmission line, which will connect the proposed PSS to a Grid Sub Station (GSS) at Selu village.

Approximately, in total 752 acres of land is required for this proposed Wind Power Project (WPP). During site assessment, it was confirmed that 150 acres of private land has been purchased and/or leased. Approximately, 10 acres of land will be required for Pooling Sub-Station (PSS) at Shelgaon village.

The land is mix of agriculture and scrub land, exclusively privately owned. Negotiation process for remaining plots of land, as well as, for access roads and RoW (right of way) of transmission line is under process.

1.3 Purpose of ESIA Study

The purpose of the ESIA study is to identify and evaluate the environmental and social sensitivities and impacts associated with the wind firm that may arise due to the implementation and operation of the proposed project and also to suggest mitigation measures in order to avoid adverse impact during project lifecycle. The document has been made to comply with the requirements of applicable local, national and lender guidelines. The objectives of ESIA study are:

- To identify and establish the baseline environmental, ecological and socio-economic conditions prevalent in the proposed project area.
- To analyse environmental, ecological and social risk impacts associated with the project and its allied components (i.e., Facilities like transmission line, access road etc.).
- To categorize the project with reference to identified environmental, ecological and social risks.
- To carry out shadow flicker assessment and noise modelling to assess the flickering as well as noise level impact of WTG on nearby sensitive receptors and communities.
- To carry out an ecological surveying and around the project site prior to implementation of the project to evaluate the possible impacts on wildlife, bird and bats, if any.
- To identify of established migratory flyway of birds (if any) through secondary resources.
- To review of the land lease process/purchase to assess any legacy or current/existing issues (like informal settlers, livelihood dependence, other usage etc.) on the purchased land using appropriate survey instruments.

- To conduct socio-economic survey involving consultation with local community, relevant stakeholders, household surveys both with landowner and non-landowners to identify the needs, problems and impact of community with respect to the project activities.
- To suggest appropriate safeguards and mitigation measures for the associated environmental, ecological and social risk & impacts.
- To develop action plans for implementation and monitoring of the mitigation measures to safeguard the project interventions.

1.4 Proposed Project Site and Area of Influence

Project Area of Influence has been defined up to 500 m surrounding each WTG where the impacts are considered to be direct and 5 km surrounding area considering all WTGs have been considered as buffer of the project site. In case of transmission-line, a buffer of 2 km has been considered as study area.

1.5 Approach and Methodology of the ESIA Study

Preliminary documentation review was undertaken prior to mobilization for the site visit. During site visit, potential environmental, ecological and social risks associated with the proposed project were assessed. Mitigation measures / further studies were proposed based on the assessment. Approach and methodology adopted to conduct ESIA for the project is described as below-

- Preliminary Discussion with project proponent
- Desktop Review of the proposed project area
- Review of relevant secondary information
- Site Investigation through field visit
- Investigation of Project Components
- Environmental Baseline
- Ecological Assessment
- Community Consultations
- Consultation with land aggregator
- Identification of Potential Environmental and Social Impacts: The Environmental & Social Impact Assessment (ESIA) has been undertaken considering the following:
    - Applicable National Regulations
    - International Finance Corporation (IFC) Performance Standards.
    - Equator Principles
    - IFC's and EBRD's Guideline note on Worker's Accommodation, Process and Standard (2009)
    - Information and data gaps to be addressed through the ESIA baseline studies.
    - Key risk identified through desktop assessment.
    - Environmental and Social Risk Aspect Impact Scoping Matrix

1.6 Limitations of the study

Presented information and facts have been analysed and inferences have been drawn through professional judgement. Key limitations of the said study are listed below:

- The majority of land procurement procedures are still under process. Therefore, consultation with landowners and data availability is limited.
- Ground truthing of all WTG locations could not be completed due to the initial phase of the land acquisition process.

1.7 ESIA Team

EPMC has mobilized a diverse team of multidisciplinary experts for conducting the ESIA study. The experts have been continuously working with client and understand the modalities and procedures of evaluating and addressing environment, social and ecological risk associated with large scale investment.

2 Project Description

This section provides a description of the proposed project in terms of location, facilities and associated project infrastructure and activities during project lifecycle.

2.1 Project Location

The proposed 350 MW Wind power project located at Washi and Bhum tehsil in Osmanabad district of Maharashtra. The latitude and longitude of the proposed wind power project site range between 18°39'35.5" N to 18°27'33.29" N latitude and $75^0$43'09.6" E to $75^0$51'23.82" E longitude. The altitude of the site varies between 667m to 808 m above msl.

The proposed 106 WTGs are planned in 27 villages viz. Bavi, Bori, Bramhagaon, Dahiphal, Dasmegaon, Dongrewadi, Ghodki, Golegaon, Hatola, Indapur, Isrup, Jawalka, Jeba, Kanheri, Kelewadi, Lonkhas, Pangri, Para, Pimpalgaon, Pimpalwadi, Rui, Saramkondi, Sarola, Shelgaon, Shendi, Sonegaon, Tandulwadi at Washi tehsil and 3 villages viz. Chandwad, Dokewadi, and Ieet at Bhum tehsil of Osmanabad district, Maharashtra.

2.2 Connectivity

The nearest airport to the site is at Aurangabad airport (Approx. 140 km aerial distance). The accessibility to the site is via NH-52 and is directly connected to the village road. Nearest railway station is at Osmanabad which is at approx. 33 km aerial distance from the project site. Washi is the nearest town at ~ 2.4 km.

2.3 Project Components

The project comprises of requisite 106 WTGs. Salient features of the project are given in **Table: 2-1** and a brief description of technical specification of the project components are given in the following paragraphs.

Table: 2-1: Salient Features of Project

S. N.	Salient Features	Details
1.	Project Owner	Serentica Renewables -4 India Pvt. Ltd. (SRIPL - 4)
2.	Project Capacity	350 MW
3.	Location of Site	Washi and Bhum tehsil Osmanabad District Maharashtra
4.	Nearest Town	Washi is the nearest town at a distance of ~ 2.4 km from the proposed project site.
5.	Nearest Railway Station	Osmanabad Station (33 Km South-east – aerial distance)
6.	Nearest Airport	Aurangabad Airport (140 km North- aerial distance)
7.	Site connectivity	National Highway (NH-52)
8.	Land Requirement	752 acres (approximately)
9.	Land holding type	Private Land
10.	Type of Land use in study area	Terrain is plain to undulating, mixed of agricultural land and scrubland

S. N.	Salient Features	Details
11.	Present status of the project	Pre-construction Phase
12.	Rotor diameter	156 m
13.	Hub height	140.5 m
14.	Blade length	76.4 m
15.	Tower type	Tubular steel tower
16.	Project Life	25 years

2.4 Description of the Proposed Project Component

The wind turbines consist of a hollow steel tower with a nacelle to which the fibre-glass rotor with three blades is attached. The nacelle houses the generator, gearbox, and control systems. The make of the wind turbine is Envision. The rated capacity of each wind turbine is 3.3 MW. The blade length of the wind turbine is 76.4 m with the rotor consisting of 3 rotor blades made of high-quality glass fibre reinforced polymer.

The project comprises wind turbine generators, a pooling sub-station and transmission facilities. The associated facilities include access roads and operation and maintenance facilities.

2.5 Project Phases and Activities

The Project lifecycle can be broadly divided into four phases as follows:

- Planning and Pre-construction Phase
- Construction Phase
- Operation and Maintenance Phase
- Decommissioning Phase

The key activities at different phases are given in **Table: 2-2.**

Table: 2-2: Key Activities at different Project Phases

Project Phase	Key Activities	On-going Activities
Pre-Construction	❒ Micro siting of WTG locations ❒ Planning related to power evacuation process. ❒ Land purchase. ❒ Planning for access road towards WTG sites ❒ Obtaining various approval process from government department ❒ Planning for ancillary facilities	During the field assessment sale deed and or lease deed agreement has completed for 150 acres of land and remaining are under process of negotiation.

Project Phase	Key Activities	On-going Activities
Construction	❒ Site clearance ❒ Hauling of earth ❒ Movement of heavy vehicles carrying construction materials and machineries ❒ Erection of WTGs ❒ Access road generation ❒ Setting up of labour camp ❒ Construction material storage ❒ Storage and disposal of hazardous waste materials ❒ Waste disposal ❒ Wastewater management ❒ Construction of substation, transformer yard ❒ Erection of transmission poles and line laying	Project was in pre-construction phase during the field visit.
Operation & Maintenance	❒ Movement of vehicles for plant inspection ❒ O&M of ancillary facilities ❒ Addressing grievance of local people ❒ Undertaking CSR activities in the project area ❒ Substation operation monitoring and power generation	No activity at this stage.
Decommissioning	❒ Dismantling of turbines and transmission towers ❒ Site should be restored as far as possible to its original condition. ❒ Infrastructure should be handed over to respective authorities.	---

2.6 WTG Profiling

106 WTGs are proposed for the project. The environmental, social and ecological characteristics of the project vicinity were studied and have been analysed for sensitivity as part of the ESIA study. During site visit, 10 proposed WTG locations have been visited. Profiling of all the proposed WTG locations along with nearby habitation and other identified receptors within 500 m radius were done.

2.7 Resource Requirement

2.7.1 Land

The proposed 350 MW WPP is spread over approx. 752 acres of land parcels covering a total of 27 villages, in Washi and Bhum Tehsil of Osmanabad district. The land area is designated as private land and is procured through a sale deed and lease agreement for a period of 28 years and 11 months.

- ***Land for WTG***: A 7 acres plot of land is required for each WTG. Among the 7 acres, a 1-acre land is procured through a sale/lease deed agreement and another 6 acres is on the lease deed agreement. As informed by the Land Aggregator approximately 742 acres of land are required for the installation of the proposed 106 WTGs. At the time of the site assessment, out of the total 742 acres, land procurement is completed for approx. 150 acres.
- ***Land for Transmission Line:*** Land is required for the construction of a transmission line (approx. 19 km) connecting PSS and GSS. The procurement of land for the transmission line is in progress.
- ***Land for PSS:*** About 10 acres of private land is being procured for PSS. The private land procurement for PSS is based on a sale deed agreement.

2.7.2 Water Requirement

Reportedly, during the construction phase, water would be supplied through tankers by an authorized vendor to meet the water requirement of the proposed project for domestic as well as construction purposes. Drinking water requirements for both the construction and operation phases will be met through supplying packaged drinking water. The estimated quantities of water required during the construction phase for civil works shall be to the tune of 6460 kl (60 kl for each WTG location) and about 15.75 KLD for domestic use while the same for operation phases for domestic use will be 2.7 kld.

2.7.3 Manpower Requirement

About 350 workers will be required for peak construction time which includes about 30-40 skilled laborers. The maximum number of local employments would be undertaken depending on their skills and capabilities. Few female workers are also expected to be engaged. Some workers will be sourced from the nearby villages depending on their skills and capabilities and will also be trained before induction to the project site.

Around 60 site personnel will be required during operation phase including security guards, operation and maintenance officers, site engineers, for cutting grass, boundary maintenance and operation etc.

2.7.4 Raw Materials

Wind turbines are predominantly comprised of fire-resistant metal. The inflammable components of WTGs' is rotor blade, panel house, electrical cables, gear box, transformer, hydraulic oil, hose and other plastic components.

2.7.5 Wastewater Treatment and Disposal System

Wastewater generated from site office, kitchen and washing area should be disposed through soak pit and septic tanks. Proper storm water channels would be constructed along the periphery of the project site for draining of site run off.

2.7.6 Solid and Hazardous Waste Disposal

Solid waste during the construction phase consists primarily of scrapped building materials, excess concrete and cement, excavated material, rejected components and materials, packing materials (pallets, crates, plastics etc.) and human waste. Solid and hazardous waste should be separately stored at site. Domestic and other construction waste should be discarded to the designated disposal area through local authority. Recyclable materials should be returned to the authorized recycler. Further, hazardous waste should be disposed of through MPCB approved vendors.

2.7.7 Fire Safety and Security

The inflammable components of WTGs' is rotor blade, panel house, electrical cables, gear box, transformer, hydraulic oil, hose and other plastic components. During the construction period Fire extinguisher will be placed on all strategic locations such as site office, camp site, store yard, fuel storage, batching plant etc. One dry chemical powder fire extinguisher should also be kept at each WTG site during operation period. Besides this, emergency contact numbers should be displayed at

each WTG location and at the site office. As confirmed by project proponent the site office will consist of first aid kit, PPE room and the lock out/tag out station, etc.

2.7.8 Logistic Arrangement

Worker Accommodation: The project is in the pre-construction stage during the preparation of ESIA report. The project proponent will hire maximum number of the unskilled labours locally for reducing the requirement of labour camp. As reported by SRIPL-4, labour camp if constructed, will be in the scope of the contractor. All the basic facilities such as drinking water, kitchen, toilet etc. should be provided in the labour camp as per Indian regulation & IFC worker accommodation guideline.

Project Vehicles: Project vehicles such as water tanker, tractors, JCB, and cars will be hired to support various activities during construction phase and further for site inspection during operation phase. Local hire will be preferred. Validity of PUC and driver's license would be checked.

2.8 Organizational Structure

SRIPL-4 has its own Environmental and Social Management System to ensure smooth operation and completion of various activities during project lifecycle. During the project phase, project operations will be managed by Project Manager and environmental, health & safety issues will be monitored by their regional EHS Officer. Organizational Structure for the specific proposed 350 MW wind power plant, is appended in **Figure 2-4.** The given Organization Structure is subjected to change/ alter based on the altered situation and requirements.

Figure 1-1: Organizational Structure of Corporate and Site Office for 350 MW - Kallam Wind power project at Osmanabad District, Maharashtra

Source: SRIPL-4 Team

3 Applicable Regulations, Guidelines and Standards

The wind power plant is a clean option for power generation in comparison to non-Renewable fossil fuels. Ministry of Environment, Forest and Climate Change (MoEF&CC) in its Office Memorandum No. 86/195/97- WE (PG) dated 20th November 1997 stated that the wind power projects are not covered under the ambit of EIA Notification, 2006 and therefore does not require prior environmental clearance. Moreover, CPCB in its order published on 7th March 2016 (File No. B-29012/ESS (CPA)/ 2015-16) has directed to all the SPCB about the categorization of industries. This categorization has been done based on potential of industries to cause pollution. All the non-polluting industries has been categorized under white category and does not require consent to operate (CTO). Only, intimation to SPCB while starting the industry will suffice. The WPP has been categorized under white category and thus exempted to obtain consent to operate (CTO) from state pollution control board.

3.1 Institutional Framework of National Regulations

In India, the Ministry of Environment, Forests and Climate Change (MoEF&CC) is the apex administrative and regulatory body for (i) regulating and ensuring environmental protection; (ii) formulation of the environmental policy framework in the country; (iii) conservation of biological diversity and (iv) planning, promotion, co- ordination and overseeing the implementation of environmental and forestry programmes. The government of India has formed a new regulatory body to ensure healthy and orderly growth of Renewable energy sector projects i.e., Ministry of New and Renewable Energy (MNRE). Electricity generation from renewable sources of energy is an important element in the Government's National Action Plan on Climate Change (NAPCC) announced in the year 2008 and it is committed to provide a conducive environment for harnessing wind energy in India.

3.2 International Guidelines and Regulations

3.2.1 Social and Environmental Performance Standards of the International Finance Corporation (IFC)

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

Table 3-1: IFC's Environmental and Social Performance Standards

Title of Performance Standard	Requirement of PS in brief	Applicability in the Project	Actions Taken
PS1: Social & Environmental Assessment and Management System	The project should have a social and environmental management system that incorporates the following: (i) policy; (ii) identification of risks and impacts; (iii) management programs; (iv) organizational capacity and competency; (v) emergency preparedness and response; (vi) stakeholder engagement; and (vii) monitoring and review	The proposed project is a wind power project and will have environmental and social impacts resulting from loss of agricultural / grazing land, generation of noise, construction activities etc. ***Hence, PS 1 is applicable for the proposed project.***	SRIPL-4 has developed an Environmental and Social Management System (ESMS) for its wind projects at corporate level. SRIPL-4 is required to adhere the requirements as per management system developed as the project level and needs to fulfil the following requirements: ❒ Environmental and social action plan; ❒ Identification of risks and impacts; ❒ Management program; ❒ Organizational capacity and competency; ❒ Training for security and safety workers; ❒ Emergency preparedness and response; ❒ Stakeholder engagement/ grievance redressal; ❒ Monitoring, reporting and review.
PS2: Labour and Working conditions	❒ Establishment of a Human Resources Policy consistent with the requirements of this Standard that informs employees of their rights under national labour and employment laws. ❒ Document and communicate to all employees' conditions and terms of employment. ❒ Practice non-discrimination and equal opportunity in making employment decisions. ❒ Provide a mechanism for workers to raise workplace concerns.	The applicability of PS2 will be more important during the construction phase as operation phase will only have limited number of staff. It not only covers the main plant employees, but all employees/workers, even those working through O&M contractors. Migrant workers are engaged for the proposed project will stay in labour camps or rented accommodation in nearby towns. ***Hence, PS2 is applicable in this project.***	❒ SRIPL-4 has HR policies at the corporate level. EPC contractor should inform their employees their rights under national labour and employment laws. ❒ SRIPL-4 should hire local labour during construction phase of the project. ❒ SRIPL-4 should engage labours through contractors as such the contractors would be supervised by SRIPL-4 so that the engagement of workers is in accordance to applicable rules and regulations. SRIPL-4 should provide adequate provisions such as access to clean water, sanitary facilities and other necessary facilities at the labour camps and construction sites. ❒ SRIPL-4 should provide adequate provisions such as access to clean water, sanitary facilities and other necessary

Title of Performance Standard	Requirement of PS in brief	Applicability in the Project	Actions Taken
	Provide workers with a safe and healthy work environment, taking into account risks inherent to the particular project sector.		facilities at the labour camp and construction sites. ❒ Equal opportunity should be given to both men and women depending on their skills and capacity wages, work hours and other benefits should be as per the national labour and employment Laws. IFC labour accommodation guideline presented in **Annexure D.** ❒ SRIPL-4 must ensure health, safety and protection of all the workers and their working condition during construction and operation phase aligned with Indian regulation & IFC worker accommodation guideline. ❒ Grievance Redressal Mechanism has been framed by SRIPL-4 at the corporate level. The same will be implemented during construction and operation phase supervised under SRIPL-4.
PS3: Resource Efficiency & Pollution Prevention	❒ SRIPL-4 requires to consider (i) sustainable resource utilization (water consumption); (ii) pollution prevention (wastes, hazardous materials management, pesticide use and management)	This Performance Standard is applicable to the Project. The proposed project is a clean energy project and will not have major pollution sources associated with it. The construction works for the erection of WTG entail generation of dust and wastes like wastewater and construction debris. The operation phase will result in noise emissions and generation of minor quantities of waste such as transformer oil. ***Hence, PS 3 is applicable in this project.***	❒ SRIPL-4 will plan and implement pollution control measures. Practices like minimal release of waste, handling of hazardous waste, safe disposal of waste, wastewater management etc. will be considered prior to each phase.

Title of Performance Standard	Requirement of PS in brief	Applicability in the Project	Actions Taken
PS4: Community Health, Safety and Security	❒ Performance Standard 4 recognizes that project activities, equipment, and infrastructure can increase community exposure to risks and impacts. In addition, communities that are already subjected to impacts from climate change may also experience an acceleration and/or intensification of impacts due to project activities. While acknowledging the public authorities' role in promoting the health, safety, and security of the public, this Performance Standard addresses the client's responsibility to avoid or minimize the risks and impacts to community health, safety, and security that may arise from project related activities, with attention to vulnerable groups. ❒ Evaluation of risks and impacts of the project on health & safety of the affected community during the project lifecycle and establish preventive/mitigation measures to reduce/minimize the impacts. Disclosure of action plans to affected community and the	PS-4 is applicable when there are any potential risks that might pose a threat to the affected community as an outcome of proposed project activities. In this context, the proposed project activity will involve transportation of large component, which may pose safety risks to the affected communities. Impacts due Electrocution and Firing due to short-circuit, Accidents during cutting, chipping and piling, Physical injuries, Trip and fall hazards or by Diseases due to unhygienic condition etc. ***Hence, PS 4 is applicable in this project.***	❒ In addition to the movement of heavy machinery / vehicles and blasting operations during the construction phase, effects due to shadow flickering and noise generated due to wind turbines will pose an impact on the community if not properly mitigated. ❒ The Action Plan and any other relevant project-related information is to enable the influenced communities and relevant government agencies to understand these risks and impacts, and will engage the influenced communities and agencies on an on-going basis consistent with the requirements of PS.

Title of Performance Standard	Requirement of PS in brief	Applicability in the Project	Actions Taken
	government agency. ❒ Design, construct, operate and decommission of Structural elements or components in accordance with good industrial practice to reduce impact on community health & safety. ❒ Minimization of impacts on the health and safety of the community caused by natural hazards that could arise from the land use changes due to project activities. ❒ Prevent or minimize the potentials for community exposure to communicable diseases during project activities.		
PS5: Land Acquisition and Involuntary Resettlement	❒ Specifies requirements on (i) project design to avoid or minimize physical and/or economic displacement; (ii) compensation and benefits for displaced persons; (iii) community engagement; (iv) grievance mechanism; (v) resettlement and livelihood restoration planning and implementation; (vi) physical and economic displacement; (vii) private sector responsibilities under government-managed resettlement	Land procurement process has been going on. It was found during interaction with the landowners at the project site that, the land purchased for the project is mix of agriculture and scrubland. During the time of site visit. 150 acres of land has been procured for WTG installation. Land procurement process has been going on. ***Hence, PS 5 applicability could not be determined during site assessment as land procurement is in initial stage.***	❒ SRIPL-4 have identified a total of approx. 750 acres of land requirement for the proposed project. The site is moderately plain with mild undulation and is sufficient to install requisite modules for 350 MW of Wind Turbine Generator.

Title of Performance Standard	Requirement of PS in brief	Applicability in the Project	Actions Taken
PS6: Biodiversity Conservation and Sustainable Natural Resource Management	Specifies requirements on (i) protection and conservation of biodiversity (modified, natural, critical habitat, legally protected and internationally recognized areas, invasive alien species); (ii) management of ecosystem services; (iii) sustainable management of natural resources; and (iv) supply chain.	During primary survey 68 bird species belonging to 34 families were identified and recorded from the study area. Among this 68 bird species, 31 species were recorded in vantage point survey and 42 species were recorded in point count survey. Out of these 68 birds, 4 bird species viz. Asian Woolly-necked Stork, Black-headed Ibis, Painted Stork, and Red Necked Falcon are in Near-threatened category as per IUCN Red List. Apart from this, River tern was recorded which is in Vulnerable category by IUCN Red List. Proposed project area does not have such habitat which can support GIB population. In addition, the study conducted in 2017 by Wildlife Institute of India did not have any direct sighting of GIB. Same were not sighted during primary survey as well. It is also not reported as per the consultations carried out with locals as a part of this ESIA study. Therefore, possibility of finding GIB in the proposed project area is low. Jawahar Lal Nehru GIB Sanctuary is around 28 kms from the proposed project area.	❒ SRIPL-4 should try to avoid the impacts on biodiversity of the project area. When avoidance of impacts is not possible, proper mitigation measures and its implementation to conserve the floral and faunal Diversity in and around project area (as suggested in the ESIA report), should be adopted.

Title of Performance Standard	Requirement of PS in brief	Applicability in the Project	Actions Taken
		As per the IFC Performance Standard 6, the study area does not fall under critical habitat. ***However PS 6 will be applicable due to the presence of conservation important species and possibility of finding more such species during the project life cycle.***	
PS7: Indigenous Peoples	Performance Standard 7 recognizes that Indigenous People, as social groups with identities that are distinct from mainstream groups in national societies, are often among the most marginalized and vulnerable segments of the population. Indigenous People are particularly vulnerable if their lands and resources are transformed, encroached upon, or significantly degraded. Their languages, cultures, religions, spiritual beliefs, and institutions may also come under threat. Therefore, Indigenous People may be more vulnerable to the adverse impacts associated with project development than non-indigenous communities	Referring to census data 2011 and during consultation with relevant stakeholders, it has been observed that there is no presence of indigenous people at the proposed project site. ***Hence, PS7 is not applicable in this project.***	❒ -

Title of Performance Standard	Requirement of PS in brief	Applicability in the Project	Actions Taken
PS8: Cultural Heritage	Performance Standard 8 recognizes the importance of cultural heritage for current and future generations. Consistent with the Convention Concerning the Protection of the World Cultural and Natural Heritage, this Performance Standard aims to ensure that clients protect cultural heritage in the course of their project activities. In addition, the requirements of this Performance Standard on a project's use of cultural heritage are based in part on standards set by the Convention on Biological Diversity.	As observed during the site visit there is no designated archaeological site present within 5 km radius of any of the proposed WTG locations. ***Hence, PS8 is not applicable in this project.***	❒ To ascertain that there is no heritage or archaeological site is located within the affected area, Chance Find Procedure could be formulated under PS 8 of IFC.

3.2.2 World Bank Group General and Industry Specific EHS Guideline

World Bank has issued Environmental, Health, and Safety Guidelines for Wind Energy on August 7, 2015.

This area is compilation of:

- Environmental, Health, and Safety General Guidelines, 2007
- Environmental, Health, and Safety Guidelines for Wind Energy, 2015.
- The summarized table is showing the key requirements as stated in the EHS guidelines as well as World Bank's EHS guideline for Electric Power Transmission and Distribution (2007).

4 Description of Baseline Environment

This chapter describes the existing environmental settings of the project site and its immediate surroundings. This includes physical environment, biological environment and socio-economic environment.

4.1 Study Area

The proposed project site is located in Osmanabad district of Maharashtra. To understand and assess the environmental and social risks associated with the project, the study area has been divided into core area (i.e., Project area and 500 m surrounding from each WTGs) and buffer area (5 km around each WTG locations and 2 km around transmission line).

4.2 Environmental Monitoring

The project is in the preconstruction stage during ESIA study. Baseline environmental monitoring has been carried out within the project study area for ambient air quality, ambient noise level, and water quality. Monitoring has been conducted by Ultra Tech Environmental Consultancy Laboratory (a NABL accredited laboratory) as per the applicable standard methods and analysis from 09/01/2023 to 10/01/2023.

4.2.1 Ambient Air Quality

A detailed assessment of the existing ambient air environment was undertaken for the purpose mentioned above. The ambient air quality monitoring (particulate matters and gaseous pollutants) has been conducted at 2 representative locations from 09/01/2023 to 10/01/2023.

Under the provisions of the Air (Prevention & Control of Pollution) Act, 1981, the CPCB has notified fourth version of National Ambient Air Quality Standards (NAAQS) in 2009. This revised national standard aims to provide uniform air quality for all, irrespective of land use pattern, across the country.

The ambient air quality monitoring has been carried out as per the above guidelines for the following parameters:

- Particulate Matter (<PM_{10})
- Particulate Matter (<$PM_{2.5}$)
- Sulphur dioxide (SO_2)
- Nitrogen oxide (NO_x)
- Carbon monoxide (CO)

Interpretation of Air Quality Results

The value of PM_{10} and $PM_{2.5}$ are observed well below the permissible limit if compared with the National Ambient Air Quality (NAAQ) Standards. The obtained values of SO_2, NO_2 and CO are also well within the prescribed standards.

4.2.2 Ambient Noise Quality

Ambient noise level measurements in dB (A) have been recorded for every hour continuously for 24 hours for the monitoring stations and equivalent noise levels in the form of Leq day and Leq night. The results obtained were compared with the standard specified in Noise Pollution (Regulation and Control) Rules, 2000.

Interpretation of Noise Quality Results

The ambient noise levels during the daytime and night time are found within permissible limit if compared with the permissible limits of CPCB as compared to the commercial / mixed area standard.

4.2.3 Surface Water Quality

Surface water characteristics were assessed against water quality criteria as per CPCB guidelines for water resources. The surface water samples were collected from Manjara Dam on 18/12/2022.

All parameters of both the samples have been found within the specified limit as per IS: 2296 Class C Specifications.

4.2.4 Ground water Quality

One ground water sample was collected from Khanapur Village on 12/01/2023. The samples were analysed for physicochemical and bacteriological parameters and results compared with IS: 10500 (2012) drinking water standards to identify and interpret any deviation in the statutory limits set for parameters under this standard.

Interpretation of Ground Water Quality Results:

pH- The pH value is observed 7.5, which is within the desirable limit of IS: 10500 drinking water standards.

Total Dissolved Solids (TDS)- The concentration of TDS in ground water is a measure of its suitability for domestic use. The TDS value for the ground water sample of Ghat Pimpari Village analysed was found within the desirable limits.

Chlorides-Chloride concentration in ground water sample was 13 mg/l, which is within the desirable limit of chloride is 250 mg/l.

Total Hardness- Total hardness values for the ground water sample of Ghat Pimpari Village were found within acceptable limits.

Iron and Fluoride- The concentration of Iron and Fluorides in ground water sample was observed within the permissible limit in the study area.

5 Biological Environment

The environmental baseline of the proposed wind project and its surroundings including the transmission route has been established for the biological aspects under consideration. This has been achieved largely through consultations with relevant stakeholders, a desktop review of available literature, and the primary baseline survey carried out on 9th January 2023 and 10th January 2023.

5.1 Methodologies for Ecological Surveys

5.1.1 Desktop Review

A desktop review was conducted to determine the land use and land cover (Toposheet, Satellite imagery), forest type (Champion and Seth, 1962), bio-geographic Zones (Rodgers, Panwar and Mathur, 2000) and floral & faunal assemblage in the study area from published documents. To provide representative ecological status for the project, existing critical habitats, scrubs/vegetative cover and water bodies around the project area and other factors were documented for the ecological study. The survey was attempted to recognize the threatened birds and animal species, population and environmental networks under Indian Wildlife Protection Act (1972), and IUCN Red List utilizing information from eBird, Avibase and Birdlife International database; and the territories and specific niche of target bird species present in proposed project area.

5.1.2 Flora Survey

Free check listings for trees, shrubs and for herbs and grasses were carried out to understand the floral diversity in the project area.

5.1.3 Fauna Survey

To assess the presence of fauna in the project site, a walk-through survey was carried out. Certain WTG locations were visited to find out the presence of faunal species in and around the project site. The faunal survey focused mainly on three groups' viz. mammals, avifauna and herpetofauna of the project area.

Exclusive for birds, 9 vantage point (VP) surveys, and 12point counts (PC) surveys were conducted, covering the entire project profile.

5.2 Analysis

The data collected during the field survey and desktop assessment was utilized to understand the ecology of the proposed project area and potential impacts of the project activities on the biodiversity of the area.

Biodiversity around the Project location

As per Avibase – The World Bird Database, 323 bird species have been found in the Osmanabad district, out of which 26 bird species are globally threatened species. As per eBird, 229 bird species have been observed. These lists include numerous critical species like raptors, water birds, waders

etc. There are several bird species that are either endangered, critically endangered, vulnerable, or near-threatened category by IUCN.

A list of target bird species has been made using the Birdlife International data, Avibase and ebird database of Osmanabad district and 26 species have been identified as priority species. These species have been recorded in the past from the Osmanabad district but not necessarily from the proposed project area itself.

The proposed project area is dominated by mix of rain fed agriculture and habitat is modified. There are very few tall trees which can be utilized by bird species like raptors to breed/nest. Shrubs and grasses are interspersed in the landscape. Water bodies and drainage channels serve as habitat for waders and water birds.

The mammalian species found in the area are Chinkara, Black-buck, Blue Bull, Wild Boar, Jungle Cat, Indian Grey Wolf, Black-naped Hare, Common Mongoose, and Porcupine are also found in suitable habitats.

Protected Areas

There are 5 protected areas within 50 kms of the proposed project area i.e., Jawahar Lal Nehru Great Indian Bustard Sanctuary, Yedsi Wildlife Sanctuary and Naigaon Peacock Sanctuary. Jawahar Lal Nehru GIB Sanctuary is around 45.09 km from the proposed project while Naigaon Peacock Sanctuary is around 29.05km northwards from the proposed wind project, while, Yedsi Ramlinghat WLS is around 12.22 kms from the proposed project.

AVISTEP Analysis

The Avian Sensitivity Tool for Energy Planning (AVISTEP) was developed by BirdLife International and the Asian Development Bank (ADB). AVISTEP is designed to identify areas where renewable energy resources could impact birds and biodiversity.

Assessment Result:

Avistep analysis of the project shows that all the WTGs fall in grids having “Low to Moderate” avian sensitivity (40-44%). On the other hand, the Transmission Line falls in “Moderate” avian sensitivity grids (58%). The list of sensitive bird species in the project area for WTGs is around 54 with sensitivity score ranging from 1.7% to 100%. Species with highest sensitive score are White-rumped Vulture (100%), Egyptian Vulture (85.9%), Steppe Eagle (85.9%), and Indian Spotted Eagle (77.1%). The list of sensitive bird species in the project area for Transmission Line is around 59 with collision risk from 2.6% to 100%. Species with highest collision risk are Great Indian Bustard (100%), Lesser Florican (88.7%).

5.2.1 Flora Survey

The diversity and phytosociological attributes of plant species (trees, shrubs and herbs) in Osmanabad is published in the working plan of the division. The forest area in the region is not contiguous and is scattered in patches. The area is covered with scrub type of forest. Neem, bar, babul, khair, tarwad and climbers of acacia species are in marked predominance.

Major tree species are: Sitaphal (Anona squamosa), Salai (Boswellia serrata), Tembhrun (Diospyros melanoxylon), Khair (Acacia catechu), Bahawa (Cassia fistula), Palas (Butea monosperma), Lokhandi (Ixora arborea), Ghatbor (Zizyphus xylopyrus), Apta (Bauhinia racemosa), Bhutikes (Mussaenda

frondosa), Dhawda (Anogeissus latifolia), Aonla (Phyllanthus embilica) and Chandan (Santalum album).

On the other hand, the major forest types present in the Osmanabad division are Southern Tropical Dry Mixed Deciduous Forest (5A/C3) and Dry Deciduous Scrub Forest (SD/S1).

5.2.2 Faunal Diversity

As per the working plan of Osmanabad Division, below is the list of mammals found in the divisions. Some of these animals are Vulnerable (Leopard and Bonnet Monkey) while some of the species are near-threatened (Hyena, and Monitor Lizard) as per IUCN Red List. While Leopard, Indian Wolf, Chinkara, and Indian Black Buck are protected under Schedule I of Wildlife Protect Act, 1972.

The Osmanabad Division is inhabited by a variety of animal life. Besides the members of vertebrata numerous species of insects, butterflies and micro fauna inhabit the forests.

Field Survey Results

Vegetation Survey

The primary vegetation Survey was conducted in and around the project area. The line transects surveys and free check listing was done for the floral diversity. The area is mostly agriculture with crops like Bajra, Cotton, Harbhara, Maize, Sugarcane, Tur and Wheat were recorded during the field survey. Among the trees, Acacia species was found during the survey. None of them are under any threat category.

Fauna Survey

Proposed project area/project footprint and buffer areas of 5km were surveyed using Vantage Point (VP) surveys and Point Count (PC) Survey. The 5 km buffer was proposed to intensively survey the area. The faunal survey focused on mammals, and avifauna of the project area.

Avifauna

During primary survey 68 bird species belonging to 34 families were identified and recorded from the study area. Among this 68 bird species, 31 species were recorded in vantage point survey and 42 species were recorded in point count survey. Out of these 68 birds, 4 bird species viz. Asian Woolly-necked Stork, Black-headed Ibis, Painted Stork, and Red Necked Falcon are in Near-threatened category as per IUCN Red List. Apart from this, River tern was recorded which is in Vulnerable category by IUCN Red List.

Bat Survey

Bats are killed at wind turbines as they hunt for insects that accumulate around the turbine towers. Along with migratory species bat that rely on tree roosts, are susceptible to injury or mortality by barotrauma or direct collision with rotor blades (Erickson et al. 2002; Cryan & Barclay 2009) and studies have shown that bat casualties often outnumber avian mortality rates (Barclay et al. 2007). During our survey we searched for potential bat roosting site by scrutiny for appropriate habitat like old, ancient or abandoned buildings and by stakeholders' consultation.

During primary survey no bat population was observed in the study area. As throughout the project life cycle we cannot over-ruled the impact/risks on Bats collision under operated wind turbines. It is advised and recommended to conduct Bat mortality study during operation phase for the study area.

5.2.3 Types of Habitats in the Study area

Major habitat types in the project area are water bodies, drainage channels and open scrub land. Among these land use types, following can be the potential habitats for birds.

Open Scrub Land: This type of vegetation is extensively found in non-cultivated lands, particularly revenue lands/patta land located within the study area. This type of land gets grown by *Prosopis juliflora* and other shrubs. Tall trees were generally found absent or sparsely distributed.

Agriculture fields: This is a modified habitat, where natural landscape has long been converted for cultivating agricultural crops. The fields are either under seasonal cultivation or fallow lands, with interspersed seasonal drainage channels. This type of habitat is preferred by certain avifauna like parakeets, weavers, munias and doves etc; butterflies and insects.

Land Use and Land Cover around Transmission Line (2 km Buffer):

The land use land cover map of 2 km buffer around the transmission line shows that the agricultural land is the most dominant land use type with 87.95 percent share, followed by waterbodies with 3.46 percent of the land cover. Other land use types have small contributions to the total land use around the transmission line. Built-up area is 1.75% and open scrub is around 5.94%.

5.2.4 Critical Habitat Assessment Analysis

To evaluate the proposed project as per IFC PS6 for habitat criticality, flora and fauna data was collected during the field survey.

The land use of the project area is dominated by agriculture and habitat is modified.

- ***Criterion 1*** is not applicable due to absence of critically endangered and endangered species during the field survey in the proposed project area.
- ***Criterion 2*** is not applicable due to the absence of endemic and restricted range species from the area.
- ***Criterion 3*** is also not applicable due to the absence of migratory or congregatory birds with more than ≥1% but <95 % of the global population. However, Black-shouldered Kite, Black-winged Kite, White-eyed buzzard, Red Necked Falcon, and Asian Spoonbill were observed during the surveys which are protected under Schedule-I of WPA, 1972. But their numbers were not high enough to qualify for more than 1% of their global population.
- ***Criterion 4*** is also not applicable due to the absence of Highly Threatened and/or Unique Ecosystems in the project area.
- ***Criterion 5*** is also not applicable since landscape features were not found to support key evolutionary processes.

The proposed wind power project is recognized as not a critical habitat but IFC PS6 will be applicable due to a definite possibility of the natural habitat and the water bodies providing habitat to birds and mammals during the project life.

6 Socio Economic Environment

The social assessment was primarily based on the analysis of the secondary data obtained from the census survey (2011), district portal website, community consultations, and primary survey with the help of framed sample questionnaire for village profiling. It was designed to capture occupational patterns, societal setup, access to basic amenities, and socio-economic profiling of villages and communities considering the nature of the project operations and understanding of the demographic characteristics of the area from the secondary data.

Table 6-1: Study Area Villages

State	District	Tehsil	Village
Maharashtra	Osmanabad	Washi	Bavi, Bori, Bramhagaon, Dahipal, Dasmegaon, Dongrewadi, Ghodki, Golegaon, Hatola, Indapur, Isrup, Jawalka, Jeba, Kanheri, Kelewadi, Lonkhas, Pangri, Para, Pimpalgaon (I), Pimpalwadi, Rui, Saramkundi, Sarola, Shelgaon, Shendi, Sonegaon, Tandulwadi
		Bhum	Chandwadi, Dokewadi, Ieet

6.1 Demographic Profile of Project Study Area

According to the Census of India 2011, Osmanabad district had a total population of 1657576 with male population of 861535 and female population of 796041. The district had a Sex ratio of 924.

The household size in each village from all the study villages varies from 1 to 5. Male percentage varies from 49 to 54, whereas the female percentage varies from 46 to 51. The gender ratio in all the study villages ranges from 839 to 1021. Within the study villages Ieet village holds the highest population and Jeba is the least.

6.1.1 Social Category of Study area villages

All the project villages except Nageshwadi has SC population. The biggest percentage of SC people (38%) is found in Rui village. The highest ST population among the study area villages is found in Lonkhas (24%). Overall, it can be said that the majority of the project-intervened villages have a higher concentration of SC residents.

6.2 Economic Activity of Study area villages

The factors on which the economic activity of the study area depends are described in this section.

6.2.1 Irrigation in the Study Area

Ground water is predominantly used for irrigation, as it is the major ground water utilising sector. As per the data available for year 2006-07, area irrigated by ground water is 1692.59 sq. km., whereas surface water accounts for only 41.08 sq. km. and the net irrigated area is 1917.13 sq.km. Thus, it is clear that ground water is the major source of irrigation as it accounts for about 74.50 % of net irrigated area.

6.2.2 Agriculture in the Study Area

Osmanabad District: Agriculture in Osmanabad district is dependent upon rainfall, irrigation tanks, wells (dug well, borewell), streams, government-subsidized wells, handpumps, etc. Mainly seasonal crops or climate favorable crops are grown in the region. The area under kharif crops was mostly dominated by

foodgrains, especially cereals predominantly bajra and then pulses. Among oilseeds, the main crops cultivated were soybean and sunflower. The other oilseed crop grown in the district is groundnut. Besides foodgrains and oilseed crops, commercial crops viz. sugarcane and cotton are grown. Agriculture in these areas is dominated by rabi crops. Among rabi crops, food grains are dominant. Rabi jowar is also grown in these areas. The main pulse crop which is produced is the gram. The major area under rabi oilseeds is under safflower. The main pulse crop[13] is moong and groundnut is the main oilseed crop cultivated in summer.

6.2.3 Livelihood Pattern of Study area villages

Osmanabad district is primarily agrarian in nature. Major land use in the district is for cultivation of crops and other allied activities. Horticulture, animal husbandry and fisheries are major allied activities supplementary to agricultural activities. Traditionally, the rural populations have engaged themselves in dairying and horticulture. Brick manufacturing, Sugar mill industry, labour work, and transport work are some other livelihood practices adopted by the rural population of the district.

6.2.4 Status of Women in Study area villages

As observed in the study area, women play a significant role in agriculture and allied activities including crop production, livestock production, horticulture, post-harvest operations, etc. Involvement of women in farming activities is a common feature in the study area villages. Animal husbandry is also one of the important economic activities next to agriculture in study area villages. Many of the important tasks in animal husbandry are performed by women apart from their responsibilities as home makers. In general, women in rural homes make a significant contribution to the growth of the rural economy as well as to their families, communities, and the world at large.

6.2.5 Livestock in Study area Villages

The majority of households in the study communities had animals, which was determined during the stakeholder engagement. Cows, buffaloes, poultry and goats make up the majority of the domesticated livestock owned by villages. During the field survey, interactions with the villagers indicated that milk from cattle is mostly utilized for residential purposes, although occasionally for commercial ones as well.

6.3 Amenities and Infrastructure in the Study Area Villages

The main amenities of the inhabitants in the project areas were evaluated during a site visit in order to assess the current standard of lives of the inhabitants.

6.3.1 Educational facilities

In Osmanabad district, pre-primary school, primary school and middle school are there in all the study area villages. The facility of Higher or Upper Primary schools are not available in all the villages as they are available in a few villages within a radius of 1 km from villages where primary schools are located. The Pre-University college and degree college are also located in Washi tehsil. It is understood that all the villagers have easy access to pre-primary as well as primary education facilities in their villages but access to higher education is a little away from many of the villages. This is the present educational scenario in study villages as confirmed during the site assessment.

6.3.2 Health Facilities

In the study area, there are many different kinds of health facilities, including hospitals, public health centres and Anganwadi centres.

All the study villages have easy access to the benefits of the Anganwadi centre. Primary health sub-center is also present in study area villages.

6.3.3 Source of Fuel for Cooking

It is revealed during the community consultation exercise, that villagers are using both firewood as well as LPG connection as a source of fuel for household cooking and associated activities.

6.3.4 Electricity

Households in every study area village were using electricity in the planned project area, and the availability of power was confirmed by the locals to be nearly constant barring a very rare daily power outage. The fees are assessed in accordance with the amount of electricity used per unit.

6.3.5 Communication and Transportation

Transportation facilities are available at the district, tehsil and village level for the Osmanabad district. The government bus services with the facility of a bus stand inside every village are available and considered to be an important mode of transportation in the project village area. It is imperative to note that, the roads in rural areas are quite good and smooth for communication purposes.

6.3.6 Sanitation

The majority of households in the study area have their own sanitation facilities in form of sanitary latrines whereas few households have pit latrines. Though open defecation is being practiced, a majority of households in study villages use sanitary latrines provided by the government under Swachh Bharat Abhiyan (SBA) as shared by the villagers during community consultation.

6.4 Stakeholder Consultation

Consultation with community members were held separately at study villages. Various consultation exercises were carried out with representative of Project Proponent, Land Owners, Village Panchayat Members, and other Community Members from project area villages. The consultant has carried out stakeholder consultation exercise as a part of the primary data collection process at the project site to understand different stakeholders' views and the community's perspectives about the proposed project and at the same time to identify any potential threat either direct or indirect on landowners and the community due to the proposed project.

6.4.1 Key Findings of Consultation

- Most of the land parcels in the project area have been found to practice drip irrigation for their agricultural land which is mostly dependent on rainfall. Besides this, uses of borewells and farm ponds are also there.
- No SC and ST land is acquired for the project. Also, no impact is envisaged on any vulnerable groups.
- There are government-subsidized agricultural ponds, which are rainwater storage tanks used to irrigate farmland. It is a significant method of irrigation used in all of the study area's settlements. It aids agriculture by holding rainwater.
- Adequate household piped drinking water facilities are available in the study area. Osmanabad Municipal Corporation levies a water tax of Rs. 500 per family per year for using piped water in the study area of Osmanabad district.

- Pre-primary and primary schools are distributed around the area in a relatively uniform manner. But many villages are a little away from higher education facilities.
- All of the study areas have simple access to PHC and Anganwadi center amenities. For emergency purposes, the villagers are referred to the rural health center, and district rural hospital which is well equipped and not far away from the study area villages.
- At the district, tehsil, and village level study areas are well connected to available transport facilities by bus, auto, private car etc.
- The livelihood pattern in the study village areas is dependent upon agriculture and allied activities, animal husbandry, poultry farming, labour work in sugarcane factories, stone quarries and hotels, and driving occupations.

7 Environmental and Social Impact Assessment

There may be potential environmental and social impacts due to the project activities during construction and operation phases. This section assesses the manner in which the project will interact with its surrounding physical, ecological and social receptors or resources throughout various phases of the project lifecycle and thereby assessing the impact (positive/ negative) and also suggesting appropriate mitigation measures.

7.1 Approach & Methodology

The methodology adopted to assess the significance of impact associated with project activities during construction and operation phase has adopted the following screening criteria given in **Table 7-1**.

Table 7-1: Environmental &Social Impact Assessment Screening Criteria

Impact	Distribution of impact	Duration of Impact	Intensity
Low/ Short	Influence of impact within the project site boundary and RoW of Transmission line (Site)	Limited for duration of tentatively 6 months (Short)	Limited local scale impact resulting in temporary disturbance/ loss of environment/ social components (Low)
Moderate/ Medium	Spread of impact within 5 km from the of the project site boundary (Buffer)	Impact may extend up to 2 years (Medium)	Local scale impact resulting in short term change and/ or damage to the environment components. (Moderate)
High/ Long	Influence of impact beyond 5 km from the project site boundary (Widespread)	Impact extends beyond 2 years (Long)	Regional impact resulting in long term changes and/ or damage to the environment components. (High)

7.1.1 Significance Evaluation Matrix

The significance evaluation matrix (**Table 7 -2**) which is used to evaluate the significance of identified potential impacts has included the criteria as discussed above. The colour codes have been given to signify the impact intensity. As WPP is considered as clean category project, environmental impacts are limited with minor significance and can be controlled through mitigation measures only.

Table 7-2: Impact Significance Matrix

Distribution	Duration	Intensity	Significance
Within Site	Short	Low	LOW
Within Site	Short	Moderate	
Within Site	Medium	Low	
Within Site	Medium	Moderate	
Within site	Long	Low	
Buffer area	Short	Low	
Widespread	Long	Low	
Within Site	Short	High	
Within Site	Medium	High	
Within Site	Long	Moderate	
Within Site	Long	Low	

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

Key project related activities for the proposed WPP during pre-construction, construction, operation and maintenance and decommissioning phases are listed below:

Table 7-3: Key Activities at different Project Phases

Project Phase	Activities
Pre-Construction	❒ Micro siting of WTG locations ❒ Planning related to power evacuation process ❒ Land purchase processing ❒ Planning for access road towards WTG sites ❒ Various approval process from government department ❒ Planning for ancillary facilities
Construction	❒ Site clearance ❒ Hauling of earth ❒ Movement of heavy vehicles carrying construction materials and machineries ❒ Access road construction ❒ Setting up of labour camp ❒ Construction material storage ❒ Storage and disposal of hazardous waste materials ❒ Solid waste disposal ❒ Wastewater management ❒ Erection of WTGs ❒ Construction of substation, transformer yard ❒ Erection of transmission poles and line laying

Project Phase	Activities
Operation & Maintenance	❒ Movement of vehicles for plant inspection ❒ O&M of ancillary facilities ❒ Addressing grievance of local people ❒ Undertaking CSR activities in the project area ❒ Substation operation monitoring and power generation
Decommission	❒ Site-office clearance, gates and fences are removed ❒ Movement of heavy vehicles carrying decommission materials ❒ Storage and disposal of hazardous waste materials ❒ Solid waste management ❒ Decommissioning of wind turbine ❒ Tracks used for maintenance vehicles will be restored and can be kept as agricultural routes

Table 7-4 represents the overall impact activity matrix for different project activities on nearby resources and receptors. The cells that are coloured **red** indicates ***high impact***, **orange** with ***moderate impact***, **yellow** with ***minimum impact*** and **green** with ***positive impacts***.

Table 7-4: Impact Aspect Matrix for Construction and Operation Phase

	PHYSICAL ENVIRONMENT										BIOLOGICAL ENVIRONMENT							SOCIO-ECONOMIC								
Activity	Aesthetics & Visual Impacts	Topography	Land Use	Air Quality	Noise Impact	Top soil removal / Soil Quality	Shadow Flicker Impact	Local Drainage and Physiography	Surface water quality	Ground Water Resources	Ground water quality	Aviation Hazard	Terrestrial habitat	Ecological Sensitive Areas	Aquatic Habitat and resources	Migratory Birds	Impact on Avifauna	Agriculture	Domesticated Animals	Loss of land and livelihood source	Common Property Usage Conflict	Local Job and Economic Opportunity	Cultural and Behavioural Conflict	Community Health and Safety	Occupational Health and Safety
Pre-Construction																										
Micro siting of WTG locations			P											P												
Land purchase processing																						P				
Planning for access road towards WTG sites																					P					
Construction																										
Site Clearance	M		L	L	L	L							L				L	L	L			P			L	
Sourcing and transportation of construction material etc.	L			M	L								L				L	L			L	P		L	M	
Storage and handling of raw material and debris	L		L	L				L			L							L				P		L	M	
Access road construction	M		L	L	L	L		L					L				L	L		L		P		L	L	
Foundation excavation	M		L	L	L	L		L					L				L	L							L	
Establishment of labour camp and labour working condition.	M		L	L	L	L		L					L				L					P			M	
Operation of DG sets				L	L																				L	
Transportation of WTG components to site and storage				L	L								L									P		M	M	
Erection of WTGs	M	M	M	L	L	L				L			L				L					P			M	
Construction of Transformer Yard and Substation	M		M	L	L	L		L		L			L				L	L				P			M	
Laying of transmission line	M		L	L	L	L		L					M			M	M	M		L		P		L	L	
Operation & Maintenance																										
Vehicular movement for routine inspection, maintenance and operation of all WTG locations																						P	M	M	M	
Periodic maintenance of all WTG modules																						P	M	M	M	

Activity	PHYSICAL ENVIRONMENT										BIOLOGICAL ENVIRONMENT								SOCIO-ECONOMIC							
	Aesthetics & Visual impacts	Topography	Land Use	Air Quality	Noise Impact	Top soil removal / Soil Quality	Shadow Flicker Impact	Local Drainage and Physiography	Surface water quality	Ground Water Resources	Ground water quality	Aviation Hazard	Terrestrial habitat	Ecological Sensitive Areas	Aquatic Habitat and resources	Migratory Birds	Impact on Avifauna	Agriculture	Domesticated Animals	Loss of land and livelihood source	Common Property Usage Conflict	Local Job and Economic Opportunity	Cultural and Behavioural Conflict	Community Health and Safety	Occupational Health and Safety
Maintenance of ancillary facilities such as store, yard, site office																						P	M	M	M
Inspection of transmission line																									
Security of WTG in operation																						P			
Operation of Wind Turbines		M			L		M									L	H					P		M	

7.2 Impacts on Physical Environment

7.2.1 Impact on Land Use

Pre-construction Phase

As the impacts at this stage are restricted within planning, processing and various approval from different departments, there was **"No Impact"** or any changes in the land use in the pre-construction phase.

Construction Phase

Impact of proposed project on land use are envisaged due to following project activities such as site clearance, levelling, excavation of tower foundations, internal road construction, storage of materials, construction of site office etc.

The residual impact significance will remain Low as the change in land-use will be evident for only the 6–7-month period when construction activities are ongoing.

Operation Phase

Long term change in land use due to installed wind turbines; transmission line etc. would not create any significant impact in the surrounding area during operation phase.

Decommissioning Phase

Long-term changes in land-use including erected WTGs, access roads and transmission towers would not create a significantly noticeable change in land use character and can be restored to pre-project levels after the decommissioning phase of the project. So, there will be **"Low Impact"** on land use in decommissioning phase.

Mitigation measures

- Site levelling should be done with minimum alteration in contour level.
- Excavated earth material will be utilized for site development and levelling work.
- Land use in and around the project area should not be disturbed.
- Any temporary structure erected during construction phase such as site office and labour camp should be dismantled directing to restoration of the site.
- Inspections of the works should be carried out always to ensure the proposed measures are properly implemented.

7.2.2 Impact on Air Quality

Pre-construction Phase

There will be **"No Impact"** on air quality in the pre-construction phase.

Construction Phase:

During construction phase, various project activities such as site preparation, transportation of WTG

components and construction materials, erection of wind turbines and transmission towers, laying of transmission cable, access road widening, construction of site office and labour camp will require land clearing, levelling, excavation, grading activities, vehicular movement, DG set operation. Most of these project activities are expected to be restricted within the project boundary considering the small size of the project. The construction activities have been planned for a short duration of time (tentatively 6 months). However, the intensity of the impact is considered as **Low** and can be managed of if the following mitigation measures are adopted.

Operation Phase:

During operational phase, there would be minimal vehicular movement about 2-3 numbers of project vehicles for commuting and O&M purpose. Therefore the impact on ambient air quality during O&M phase can be considered as insignificant.

Decommissioning Phase

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

- Fugitive dust emissions from the clearing, excavation work. Stacking of soils, handling of construction materials, transportation of materials, vehicular movement, and heavy construction machineries.
- Emissions from emergency power diesel generators used during decommissioning activities.

Based on the assessment, the receptor sensitivity is assessed to be moderate. But the decommission activities are likely to occur for a very small period of time and therefore the impact magnitude has been assessed as **"Low"**.

Mitigation Measures:

- All the project vehicles shall have valid Pollution Under Control (PUC) certificate. Ensure regularly maintenance of project vehicles during construction and operational phase.
- Vehicles speed to be restricted to 20-30 km/hr on unpaved road.
- Raw material should be covered with tarpaulin sheet during transportation and in storage area.
- Water sprinkling on transportation road/ haul road to minimize the dust generation.
- Emission from the DG set should be monitored as per the MoEF &CC/ CPCB guidelines. Ensure use of DG set having acoustic enclosures and adequate stack height in all cases.
- Suggest mitigation measures for batching plants as well.
- Periodic inspections should be conducted at nearby sites (e.g., villages) to determine whether harmful levels of dust from construction activities exist;
- Minimize stockpiling by coordinating excavations, spreading, re-grading and compaction activities.

7.2.3 Impact due to Noise and Vibration

Pre-construction Phase

"No Impact" is anticipated during the pre-construction phase in noise quality.

Construction Phase

Impact on Communities

The major noise generating activities during construction phases are site preparation, excavation of WTG foundation, transportation of WTG components and construction materials, erection of wind turbines and transmission towers, access road widening, construction of site office and labour camp etc. There will be

construction phase noise impacts on residential houses and temporary structures like store house and cattle sheds located within 500 m from the nearest WTGs. As the construction period will be continued for a short period of time, therefore the residual impact will be **"Low"**.

Impact on Construction Workers

During the construction phase, workers will be exposed continuously to high levels of noise of machinery, thus impact due to noise is anticipated. However, considering the temporary nature and short-term duration of project activities minor significant impact is anticipated and can be mitigated by following mitigation measures.

Mitigation measures

- Use DG set with acoustic enclosure.
- Restrict major noise generating activities during night time 10:00 pm to 6:00 am
- Provide personal protective equipment (e.g., Ear Muffs, ear plugs) to all workers wherever noise is generated due to machinery operation.
- The use of noise-producing signals, including horns, whistles, alarms, and bells shall be for safety warning purposes only.
- Orienting equipment away from sensitive receptors.
- Regular maintenance of the project vehicles.
- Regular monitoring and inspection should be carried out to ensure above practices are implemented properly.

Operation Phase:

During operational phase, wind turbine will be the main source of noise. The noise from operating wind turbines can be divided into two categories, mechanical sounds from the interaction of turbine components and aerodynamic sounds produced by the flow of air over the blades. Recent improvement in mechanical design of wind turbines have resulted in significantly reduced mechanical noise from both broadband and pure tones.

Noise Modelling Result Analysis

The noise modelling results have identified 32 receptors. The prescribed limit of ambient noise level as set for residential area is 55 dB (A) and 45 dB (A) for day and night time respectively. The predicted maximum noise levels on these receptors falls in the range of 45 – 52.6 dB (A), which is slightly on the higher side, if compared with night time noise limit and well within the specified limits, if compared with the day time noise limits. The impacted structures are 1 petrol pump, 1 sugar factory, 1 restaurant, 6 residential pucca house and 23 temporary structures i.e., crop storage houses, cattle sheds and poultry farms; thus, it may have "**Low Impact"** on the receptors.

Mitigation Measures

The following mitigation measures should be incorporated to avoid/reduce potential impacts-

- WTG models should be selected having inbuilt noise control mechanism.
- Regular maintenance of WTGs should be carried out for attenuation of noise.
- In case of complaints of high noise levels from inhabitants, possibility of putting noise barriers such as development of green belt plantation between source and receptors should be considered.

- Noise monitoring should be carried out quarterly to understand the extent of noise generation near the turbines and its impacts on local community.

Decommissioning Phase

During the decommissioning phase of the project, noise will generate from movement of vehicle, carrying dismantled structure and equipments. The receptor sensitivity is assessed to be low to moderate. But the impact magnitude is considered to be low considering the small time period. So, the overall impact is envisaged as "**Low**".

7.2.4 Impact due to shadow flicker

Shadow flicker is the light effect caused when the sun is positioned behind a rotating wind turbine. With the sun in the background, large moving shadows can be produced. The shadow flicker impact is the main significant impact of wind farm on nearby communities. The significance of this impact is associated with the acceptance level of community and may impact some people with distasteful experience.

Shadow Flicker Modelling

The shadow flicker modelling has been done through WindPro software. It is widely accepted software used globally for shadow flicker assessment of wind farm. This software uses the wind turbine technical specification, sunshine hour's data and topographical data as input to estimate the shadow flicker impact through worst case and real case approach. The results provide the total number of hours in a year when a theoretical shadow flicker will occur. This is most pronounced during sunrise and sunset when the sun's angle is lower and the resulting shadows are longer. However the actual shadow flicker could be substantially lower compared to theoretical values because shadow flicker does not occur where there is vegetation or other obstructions between the turbines and the shadow receptors; if windows facing a turbine are fitted with blinds or shutters; or if the sun is not shining brightly enough to cause shadows.

Shadow Flicker Results Analysis

A total of 123 receptors have been identified within 2000 m from shadow flicker modelling. Out of these, 28 receptors are permanent in nature.

As, shadow flickering impact is more within 500 m, where there are total 98 receptors along with permanent and temporary structures. Out of these 98 receptors, there are 17 Residential pucca houses, 4 restaurants and rest are temporary in nature. The maximum shadow flicker will occur at residential receptor SR 60 (BH), which is located close to WTG KLM-030 with mximum shadow flickering in a year of 298:48:00 hr/yr.

Impacts from shadow flicker from wind turbines during operation are considered of long-term duration as they will occur throughout the operation phase of the Project and of a negative nature.

Given the above, such an impact is considered to be **"Moderate"**.

Mitigation Measures:

- There needs to be close monitoring through engagement with residents during the operational phase where there are predicted impacts from shadow flicker. The likelihood of direct line of sight to the location of proposed turbine locations can be assessed visually and the potential for using screening like higher fencing and planting trees can be explored at problem locations. The use of curtains can also be

explored.

- If the impact of shadow flicker be identified, and the mitigation measures proposed above prove ineffective, further analysis can be carried out to identify the exact timings and conditions under which shadow flicker occurs, and a technical solution sought. This is likely to involve pre-programming the turbine with dates and times when shadow flicker would cause a nuisance for nearby receptors.

7.2.5 Impact on Water Resources

Pre-construction Phase

"No Impact" is envisaged during the pre-construction phase in water resources.

Construction Phase

As reported by project proponent, the water requirement for civil construction and domestic usage will be fulfilled by supplying tankers by local authorized vendors. Package drinking water will be supplied for construction as well as operation phase. Further, construction activities will be limited to a short duration of time (tentatively 6 months), therefore a long-term water requirement is not expected. No ground water will be abstracted at site. Considering the limited distribution of impact (within the site), short duration of activities and low intensity, significance of impact assessed as **"Low".**

Operation Phase

Water requirement during operational phase would be minimal, for domestic purpose only (for site personnel and security guards).

Decommissioning Phase

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 hybrid 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. Considering the distribution of the impact in within the site, long duration with low intensity and significance of impact is assessed as **"Low"**.

Mitigation Measures:

- Ensure water should be sourced from authorized resource only. As reported by SRIPL-4, water will be procured from authorized vendor during the project period.
- Ensure optimal usage of water viz., storage and reuse of wash water and plantation of low water requirement species.
- Water use and rainwater harvesting in the project will be a key performance indicator that will be monitored through the project O&M phase.

7.2.6 Solid and Hazardous Waste Disposal

Pre-construction Phase

"No Impact" is envisaged during the pre-construction phase in waste disposal.

Construction Phase:

Solid waste during the construction phase consists primarily of scrapped building materials, excess concrete and cement, excavated material, rejected components and materials, packing materials (pallets, crates, plastics etc.) and human waste. However, taking in consideration the impact within site, short duration and moderate intensity, the impact is considered as "**Low"**.

Operation phase:

There will not be any substantial generation of solid waste, other than rejected WTG components, used oil, hydraulic fluid and insignificant domestic waste during operation phase.

Solid and hazardous waste will be separately stored at site. Further, hazardous waste will be disposed of through MPCB approved vendors. By taking in consideration the limited distribution of impact (within the site), short duration and moderate intensity, the impact is considered as "**Low"**.

Decommissioning Phase

If the facility is to be decommissioned and the WTGs is to be removed at the end agreement, the impacts will be similar to the construction phase, but in reverse sequence. All decommissioning of electrical devices, equipments, and wiring or cabling will be conducted in accordance with local, national, and international standards and guidelines.

Mitigation Measures

- The excavated material generated will be reused for site filling and levelling to the maximum extent possible.
- Designated land within the project area should be allotted for the disposal of solid waste.
- Distribute appropriate number of properly contained litter bins and containers properly marked as "Municipal Waste".
- Solid waste should be collected and disposed off from the project site regularly to avoid any decomposition of solid waste. This will help to restrict the generation of foul smell from the designated site.
- Domestic and construction waste like recyclables viz. paper, plastic, glass, scrap metal waste etc. will be properly segregated and stored in designated waste bins/containers and periodically sold to local recyclers.
- Waste oil from transformer will be collected and stored in paved and enclosed area and subsequently sold to MPCB authorised recyclers.
- Any hazardous waste generated will be disposed as per hazardous waste management regulations.
- Awareness among the project workers/contractors should be increased regarding management of solid

waste.

7.2.7 Aviation Hazard

As per the guidelines of Airport Authority of India (AAI), "No objection Certificate" will be required for height clearance if the hub height is more than 150m above ground level[16]. In addition to this, as per Visual Flight Rules, structure located within 20 km from airport also requires NOC.

NOC is required since the structure height is 195 m, which is more than the maximum limit of MNRE conditions. Distance from airport is more than the MNRE limit.

Mitigation Measures

- Consultation with relevant aviation authorities before installation, in accordance with air traffic safety regulations.
- Avoid siting wind energy facilities close to airports and within known low-flying areas or flight paths.
- Consultation should be undertaken with the relevant aviation authorities to determine prevention and control measures.
- Consider wind energy facility design options, including geometric layout, location of turbines, and changes to air traffic routes.

7.3 Impact on Biological Environment

"No Impact" is envisaged on biological environment of the project area during the pre-construction and decommissioning phase.

The potential impacts envisaged on ecology during the construction and operation phase are enlisted below:

7.3.1 Impacts during Construction Phase

Construction and associated activity will be temporary in nature. However, following impacts are envisaged on local ecology during construction phase:

- A minor loss of vegetation and habitat due to site clearance, road construction, building, new power line construction etc. will take place. However, the landscape is mostly agriculture dominant.
- The activities carried out during the construction often lead to water, noise, dust, and light pollution. Dust generated during construction activity has negative effects on the vegetation by its accumulation on the leaf surface, especially during high winds.
- Kitchen waste generated from labour camps may attract certain wild animals and birds. The waste generated may attract rodents like mice and rats and which are further fed on by certain species of reptiles including lizards and snakes. If not controlled, this may lead to conflict scenarios and cases of snakebite, etc.
- Vehicular movement on access roads during construction phase can lead to multiple animal road kill cases.
- Animals can also be injured or die due to their fall in trenches or pits dug during the construction phase.

- Workers at labour camp may hunt animals such as Indian Hare, monitor lizard etc. for food, medicine or to sell.

Mitigation Measures

- The strict prohibition shall be implemented on trapping, hunting or injuring wildlife by subcontractors and shall bring a penalty clause under contractual agreements.
- As far as possible, abatement controls and measures to reduce emissions and pollutants (noise, erosion, waste) should be installed. Noise emitting equipment should be avoided during night. During the daytime, ambient noise quality standards should be maintained.
- Proper disposal and management of the kitchen and solid waste generated on the site should be undertaken.
- The footprints of the construction activities shall be kept to minimum to reduce disturbance to flora and fauna.
- There should be a speed limit for vehicles using the access roads during construction phase.
- Workers at labour should be instructed not to hunt animals for food or other uses. They should be made aware of the consequences of hunting wild animals. Signage should be there in the labour camp to stop hunting.
- During construction phase, blades should be painted with bright colours so that birds in flight could see the blades. In addition, bird guards should be implanted in the transmission line towers as well as transformer area to discourage birds from nesting, roosting and perching on these structures. Low tension transmission lines should be insulated in areas where these lines are close to water bodies to avoid collision and electrocution of birds during flight.

7.3.2 Impacts during Operation Phase

- Bats and birds are prone to collision with turbine blades and/ or transmission line. The wetlands, and the scrublands of the site host residential as well as migratory ducks, and other wetland birds.
- Birds flying in the turbine rotor swept zone are more vulnerable to collision leading to serious injuries or fatalities. Wetland present in the study area can attract migratory birds and these birds are also at risk of collision and mortality due to project infrastructure.

Mitigation Measures

- During the operation phase, bird and bat mortality study is recommended for the proposed project. Abatement controls e.g., restricting vehicle movements when sensitive species are present, reflectors, and bird flappers to be used at suitable intervals to avoid easy visibility of transmission wires and the risk of electrocution.
- Regular monitoring of project areas and transmission towers for any birds nesting activity and terrestrial mammal breeding activities. Raptors also use transmission line structures as a vantage point to locate their prey. Staff should be trained and promoted to discourage the nesting/denning via regular monitoring and clearing the potential nesting areas..
- Any dead animals/carcass shall be removed in time from the site so that it does not attract movement of

raptors.

- In case of any active nest, in the project area, the nest should not be disturbed by any means and it should be immediately reported to headquarter who will take prompt action.
- In order to avoid roadkill by vehicular collision certain precautions should be taken such as:
  - Maximum speed limit should be decided to curb the roadkill of animals in the project area, especially during night and early morning as mammals and reptiles are active during the night and tend to cross the road at night.
  - Speed breakers can be constructed to limit the speed of the vehicle to reduce road kills.
  - The edges of roadside bushes should be removed to increase visibility so that drivers can avoid accidents as well as increase the shyness for animals to cross the roads.
  - General awareness regarding wildlife shall be enhanced through trainings, posters, etc. among the staff and labourers.

7.4 Socio-economic Impact

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

7.4.1 Overall Impacts during Pre-Construction Phase

Development of the proposed project involves acquisition of land for wind turbine installation, site office, PSS, Transmission Line and administration and other facilities. And these activities will impact on socio economic condition of area. On the other hand, the site selection is directly related with surrounding environment. Acquisition of this private land may cause social disruption and economic loss for the project affected families/people. While implementing the project, there is a need to take into account these disturbances and losses due to the project, their impact on socio-economic condition of the people and plan for their mitigation measures to minimize any negative impacts.

Mitigation Measures:

- Avoid sourcing **Schedule V** area and **ST** land for the project
- Avoid procuring land near the cultural or archaeological heritage area.
- Follow all applicable state, national and international laws and regulations of land acquisition process for the proposed project.
- Monitor the entire land acquisition process so that neither physical nor economic displacement would occur in the project area.
- To ensure a transparent process for acquiring land, in consultation with all the stakeholders and local governing bodies.
- To provide fair compensation to the families who are affected or whose land has been acquired or

livelihood has been affected, because of the land acquisition.

7.4.2 Loss of land and livelihood

Construction Phase

The project site and surrounding area is mild undulating with mix of agricultural and scrubland.

It has been confirmed during interaction with agricultural workers that their dependency on land parcel purchased for the project is insignificant as agriculture is solely dependent on rain water and with the support of farm ponds which are also act as a rainwater storage system, used for farming activities during dry season.

The landowners who have voluntarily given their land for the proposed project still have sufficient lands remaining with them. However, they have regular income from government services, different businesses like hotel business, transport business, dairy farm, sugar industry etc. as confirmed by land aggregator.

As confirmed during stakeholder consultation the agricultural workers get involved with other agricultural work for large cultivators who possess significant portion of land parcel within that area. Hence, no impact is anticipated on agricultural worker, who don't have their own land.

The proposed project area is away from demarcated grazing land and also there are several scrublands which is and can be used for grazing purposes as confirmed by the livestock owner. Since the present land use is mix of agriculture and scrubland. Therefore, no impact is anticipated w.r.t. grazing land. No land from any tribal community is procured for this proposed project in study area. Therefore, no impact is anticipated on tribal people.

Hence, considering all the above points neither, impacts on livelihood is anticipated as low. Taking the distribution of impact within site for short duration and medium intensity, the impact significance can be termed as '**Low'.**

Mitigation Measures:

- Stakeholder engagement plan and community development plan should be implemented for project involved villages and if possible, it may extend up to the adjacent areas.
- It should be ensured that maximum employment is given to the locals w.r.t their capacity and skills.
- Grievance Redressal Mechanism should be followed onsite. Complaints from the locals should be timely registered, investigated and resolved.

Operation Phase:

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

Mitigation Measures:

- Based on need assessment, CSR initiatives should be implemented in the project affected villages.
- Community development plan should be implemented.

- It should be ensured that employment is given to the locals w.r.t their capacity and skills, wherever possible.
- Grievance Redressal Mechanism (GRM) should be followed onsite. Complaints from the locals should be timely registered, investigated and resolved in a transparent manner.

7.4.3 Community Engagement

Construction Phase:

The likelihood of chances of impact on the local community may be anticipated owing to the construction and operation of project in near future and such impact significance can be termed as “Moderate” and it can be addressed with participatory community engagement plan to mitigate such untoward impact on the people and the community as well.

Mitigation Measure:

During construction phase of the project, efforts will be geared to strengthen linkages with the local community through representatives of local Gram Panchayat and key community leaders of the project villages. This mitigation measure will be sustained and nurtured through participatory community engagement plan.

7.4.4 Labour Accommodation

As informed by the Project Proponent, the facility for the labours is not decided yet whether it will be labour camp in site areas or rented accommodation in nearest town. Unskilled labourers will be hired from the local community through contractor. Skilled personnel, who are hired from outside will accommodated in rented arrangements of labour camp near to the project area with all the applicable facilities and entitlement as indicated in IFC’s PS -2 principle in order to ensure safety and security of all the workers in the labour camp without any social as well as gender and economic discrimination.

Mitigation Measures:

- SRIPL-4 is already having an established ESMS and that should be followed at site also.
- SRIPL-4 will ensure that they will abide by the safeguard policy regarding the health and safety of the workers who will be working under the project.
- Ensure availability of all the basic facilities in the rented accommodation as per the standard guideline of IFC and Indian Labour Act.
- Regular inspection of worker’s rented facilities will be carried out by SRIPL-4 team to ensure compliance to above requirements.
- Ensure availability of all the basic facilities in the rented accommodation as per standard guideline of IFC.
- **Emergency Preparedness and Plan for On-Site Emergencies:** The plan will define nature of emergencies that can be encountered during operation of a wind farm. Requirements of an Emergency Control Centre (ECC), firefighting facilities and medical facilities will also be detailed out.

7.4.5 Social Issues for ROW and Such Matter

Construction Phase:

The project site is far distant from any human habitation but passing through agricultural land. Hence, there is no chance of any issues anticipated with regard to Right of Way for transmission line. Therefore, no

obstruction of places of importance at centre of the project site is observed. Considering the existing condition, available records, and information procured from the Project Proponent through stakeholders' consultation exercise- the proposed 350 MW Wind Power Plant's impact significance can be termed as "**Low**".

Mitigation Measures:

- The layout for access roads and transmission line should consider minimum land requirement and should minimise use of agricultural land and avoid human habitation;
- Site Management should ensure that all agreements will be executed properly and documented.
- Any waste generated during the construction phase should not be accumulated near the religious structure or any open space of the community as this might affect the sentiment of the locals leading to negative impression of the community against the operation of the project activities.
- Construction activities in TL RoW to be carried out with all precautionary measures to avoid any community health and safety related impacts.

7.4.6 Occupational Health & Safety Hazard

Construction Phase:

Occupational Health and safety hazard associated with wind power project activities (during construction phase) are identified as below:

- **Working at Height:** The installation and commissioning activities of wind turbines and transmission line will require working at height (> 2m). The workers engaged in such activities may fall or slip from the scaffolding or ladders which may result in minor (such as muscle sprain) or major injuries (such as ligament tear, fractures, haemorrhage) depending on the working height and ground conditions.
- **Lifting Operation:** Lifting operations are an integral component of construction of any wind energy facility. The management of lifting operations require use of competent personnel, thorough planning, effective communication, and a high level of supervision when carrying out a lift.
- **Physical injuries:** It may occur when workers are involved in loading/unloading activities of construction materials and not adhere to proper ergonomics discipline. Injuries like muscle strain, ligament tear, slip disc can occur which may prove to be fatal.
- **Fall injuries:** It may occur when the workers trip over/ fall on debris lying in the walkway/ passages.
- **Electromagnetic Field Impact:** Impacts due to electromagnetic field while working during operation and maintenance of transmission line is also envisaged as potential impact.
- **Electrocution and Fire Hazard due to short-circuit**: The maintenance activities of wind turbines may involve electrical work. The workers involved in such activities are susceptible to electrical shock/ burn, fire, or explosion hazard. Some identified risks are:
    - **Eye injuries:** Retina damage due to flash or sparks emerging from the welding arc.
    - **Electrical shocks**: It may happen, when the workers come in direct contact with live power lines. In some cases, it may lead to electrocution of the worker(s) involved in such works.
    - **Electrical burns:** It may happen, when the workers come in direct contact with live power lines.

The severity of the burn depends on voltage, current, time of contact etc. The burns can be classified as low voltage, high voltage, flash, flame, arc and oral burns depending on the factors.

- **Fire and/or explosion hazard:** It may happen, when the workers face short-circuiting of power supply lines. The injuries can range from burns to death of the workers involved in the work.

- **Diseases due to unhygienic condition:** Unhygienic living condition at workers' camp may lead to spreading of mosquito borne (malaria, dengue) or water borne (jaundice, typhoid) disease etc.
- **Diseases due to COVID-19 Pandemic:** This may be widespread among workers if they do not follow the COVID-19 appropriate behaviour laid down by the health department of the government to combat the spread of COVID 19 infection in way of use of face mask, frequent hand wash, use of sanitizer, maintain physical distance, complete vaccination, regular sanitization of workspace, living area, site office etc.

Hence, considering the distribution of impact within the project site, duration as short and intensity as moderate, the impact significance can be taken as "**Moderate"**.

Mitigation Measures:

- Prepare construction HSE plan and HIRA (Hazardous Identification and Risk Assessment) documents for all project activities.
- Prepare method statement of each activity with job safety analysis and get approved Permit to work (PTW) before carrying out any activity at site.
- Provide and ensure proper training like staff induction training (orientation training for new workers and daily Tool Box Talk (TBT)) for a specific job to every worker before initiation of any project activities.
- Provide and ensure use of appropriate Personal Protective Equipment (PPE) viz. helmets, safety jackets, safety shoes, goggles, gloves etc. as per the nature of work involved.
- Prepare emergency response team and emergency preparedness plan.
- All work at height to be undertaken during daytime with sufficient sunlight, work permit should be issued to all concerned workers before height work or heat jobs.
- Prior commencement of work, integrity of the structure should be inspected.
- Accident reporting and monitoring record should be maintained.
- Wind turbines should be equipped with earthing system.
- Substation should be provided with fire extinguisher and sand bucket at all strategic locations.
- Worksite access should be properly maintained.
- Loading and unloading operation of equipment should be done under the supervision of a trained professional.
- Material storage should arrange in a systematic manner.
- There should be arrangement for hygienic sanitation facilities for all the workers at site.

Operation Phase:

Occupational health and safety hazard during operation phase may only arise during routine maintenance of the WTG's, which require working at height and might have possibility of electrocution if proper mitigation measures are not taken.

- **Electromagnetic Field Impact:** Impacts due to electromagnetic field while working during operation and maintenance of transmission line is also envisaged as potential impact.
- **Electrocution and Fire Hazard due to short-circuit**: The maintenance activities of wind turbines may

involve electrical work. The workers involved in such activities are susceptible to electrical shock/ burn, fire, or explosion hazard. Some identified risks are:

- **Eye injuries:** Retina damage due to flash or sparks emerging from the welding arc.
- **Electrical shocks**: It may happen, when the workers come in direct contact with live power lines. In some cases, it may lead to electrocution of the worker(s) involved in such works.
- **Electrical burns:** It may happen, when the workers come in direct contact with live power lines. The severity of the burn depends on voltage, current, time of contact etc. The burns can be classified as low voltage, high voltage, flash, flame, arc and oral burns depending on the factors.
- **Fire and/or explosion hazard:** It may happen, when the workers face short-circuiting of power supply lines. The injuries can range from burns to death of the workers involved in the work.

Taking the distribution of impact as within site with longer duration and moderate intensity, the impact on occupational health and safety during project operation is anticipated and may be termed as **Moderate**.

7.4.7 Community Health and Safety

Construction Phase:

Local community in the project area of influence (AoI) will be impacted by various project activities during construction phase, such as; land clearing, levelling and excavation for foundation of transmission towers, erection of turbines, laying of transmission cable, switch gear, construction of approach road and internal road network, construction of site office, construction vehicle movement, material transportation, DG set operation etc. These activities will result in an increased level of dust and particulate matter emission, increasing noise level, traffic load etc. which in turn will directly or temporarily impact the local community. If not properly managed, there is a risk of nuisance and health effect. Considering the localized distribution of the impact, short duration (tentatively 6 months), the intensity of impact can be termed as "**Low"**.

Operation Phase:

According to World Bank's EHS guideline for community, health and safety hazard specific to wind power project following project features are to be considered during operation phase:

- Shadow Flicker
- Blade Throw
- Electromagnetic interference and radiation
- Public access

Blade Throw

Blade throw is a potential safety hazard which involves dropping of a rotor blade or the blade being thrown from the nacelle of the wind turbine in a high wind zone. The occurrence of blade throw can be due to two types of infrastructure failure:

- The whole blade detaching from the rotor and falling away from the turbine; or
- Part of the blade breaking off and falling away from the turbine;

Occurrences of these two scenarios could be caused by the factors such as - design or manufacturing defect, poor maintenance regime, excessive winds such as during a storm, exceeding maximum design loads, rotor over-speed or lightning or fire.

Turbines must be sited at an acceptable distance ("setback") between wind turbines and adjacent sensitive receptors to maintain public safety in the event of blade failure. For this project minimum setback distance is 327m (1.5*(140+1/2*156)).

The impact due to accidental blade throw is anticipated to be of localized and moderate intensity with application of mitigation measures; hence the overall impact is assessed to be **"Moderate"**.

Mitigation Measures

Mandatory safety standards in turbine design, manufacturing, and installation as well as more frequent maintenance have made the occurrence of blade throw a rare phenomenon. Wind turbines can also be equipped with vibration sensors that can react to any imbalance in the rotor blades and automatically shut down the turbine, if necessary, to avoid any chance of such occurrence.

Electromagnetic interference and radiation

Though wind power produces EMFs like any other source of power, safety benefits are more in WPP. The hub height of WTGs is 140m above the ground and therefore the EMF created by the wind turbine is generally well above any human interference who may enter the area. Therefore, the electromagnetic fields produced by the generation and export of electricity from a WPP do not pose a threat to public health. The maximum limit of grid connection is normally 132 kilovolts (kV), equivalent to the voltages used in domestic purpose. In addition, project developers would design the entire electrical system to adhere to applicable state guidelines and industry standards to minimize EMF exposure from any new overhead transmission line.

The grid connection lines are similar to other power lines and generate low levels of EMF, comparable to those generated by household appliances. Thus, it can be concluded that the electromagnetic fields produced by the WTGs during power generation and export of electricity do not pose threat to public health, hence considered as having '**No Impact'.**

7.4.8 Impact on Cultural Site/ Archaeological Site/ Site of Religious Importance

As observed during the site visit there is no designated archaeological site present within 5 km radius of any proposed WTG locations.

However, care should be taken during construction activity, particularly during "earth moving" operations. World Bank's Chance find procedure must be followed, in case of any accidental find of structures or objects of probable archaeological importance.

Hence, **no impact** is envisaged during construction as well as operation phased in terms of access to common property in study villages.

7.4.9 Overall Impacts during Decommissioning Phase

Employment

Decommissioning activities will create few temporary jobs by the contractor and all long-term jobs related to the project will not be there.

CSR Activities

At the project end, ongoing CSR activities will be discontinued. So, community benefit from the CSR activity will also stop.

Ancillary Industries

The decommissioning phase of the project will anticipate likelihood of adverse impact on ongoing ancillary service businesses associated with this project in project influenced villages and surrounding areas owing to cessation of core project activity.

Aesthetics

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

Public Health and Safety

The transmission line needs to be maintained regular basis, accidental falling of live wire of transmission line will create life threat to the human being, grazing and other animals.

Mitigation Measures

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

7.5 Human Right Risk Assessment (HRRA)

As per UN guiding principle of Human Rights Risk assessment, it is an ongoing risk management process that a reasonable and prudent company needs to follow in order to identify, prevent, mitigate and account for how it addresses its adverse human rights impacts. It includes four key steps:

- Assessing actual and potential human rights impacts;
- Integrating and acting on the findings;
- Tracking responses;
- Communicating about how impacts are addressed

In order to minimize the potential for human rights risks or impacts to occur, management measures should be strengthened and developed concurrently with the ESMP and its associated management plans, such as the social enterprise program (SEP) and GRM. Assessment as per the Guiding Principles on Business and Human Rights are detailed in **Table 7-5**. A summary of the salient features of the HRRA, key human right risks and mitigation/safeguards that will accompany the ESMP to demonstrate SRIPL-4's commitment to respect human rights are provided in **Table 7-6.**

Table 7-5: Salient features of the HRRA, key risk and safeguards

Thematic area	Human Rights Risk	Mitigation Measures
Private land acquisition risk	❒ Looking at the urgency of completion of land acquisition process in meeting the deadline set by the project proponent, there may be possibility of payment variance amongst landowners given the understanding of the landowners about the project, location of area, area of land acquisition and urgency of the land acquisition for the proposed project. ❒ The probability of adverse impact on the lives and livelihood of the landowners may arise as an outcome of land acquisition exercise and it may or may not trigger the issue of any physical or economical displacement due to upcoming land acquisition of private land parcels in order to accomplish the entire land acquisition exercise before the deadline.	❒ A proper due diligence in connection with land acquisition exercise should be carried out during the land acquisition exercise in order to avoid any chance of discrimination or payment variance amongst landowners in study villages. ❒ If physical displacement occurs, the client will develop a Resettlement Action Plan for the physically displaced persons and will offer the choice of replacement property of equal or higher value, security of tenure, equivalent or better characteristics, and advantages of location or cash compensation where appropriate. ❒ In case of any issue of unexpected economic displacement triggers, the client will develop a Livelihood Restoration Plan to compensate affected persons and/or communities and offer to the affected persons a replacement cost on market price & transaction costs with a preferred land-for-land compensation. ❒ In order to address any potential threat to vulnerable households or community due to the operation of the project then, the project proponent needs to offer the choice of replacement property of equal or higher value, security of tenure, equivalent or better characteristics, and advantages of location or cash compensation whichever appropriate and feasible to the both the parties.
Labour worker conflict	❒ Due to involvement of large number of workers during construction phase, social impact associated with migrant labourer and possible conflict with local population is envisaged. ❒ There is a possible increased risk of exposure to communicable disease through the migrant	❒ The Project Proponent needs to carry out regular health check-up for its employee, workers and staff to promote health & safety of all its workers in line with applicable H&S protocol of the company to prevent any incidences of outbreak of infection amongst migrant workers at the site. ❒ The Project Proponent needs to organize health awareness for all its workers on a regular basis to prevent any health infection or outbreak throughout

Thematic area	Human Rights Risk	Mitigation Measures
	workers.	project period.
Vulnerability risk	❒ The said land acquisition exercise may trigger the adverse impact on the vulnerable group/households (share-cropper, tenant, part cultivator) whose livelihood is solely dependent upon land and land-based economy. ❒ On the other hand, the livestock owners who are either directly or indirectly dependent upon the land or land resources for their livelihood, are also considered as vulnerable. This vulnerable section of the community along with their families may face adverse impacts due to landlessness or no access to the land and work due to the said land acquisition exercise.	❒ The project proponent needs to undertake land due diligence exercise in line with Serentica's land acquisition policy in order to avoid any adverse impact on the vulnerable households whose livelihood is entirely dependent upon land and land-based income. ❒ The project proponent also needs to avoid acquisition of pastural land with land dependency of livestock owner at the time of land acquisition activity in order to protect the adverse impact on the lives and livelihood of the livestock owners while safeguarding the very interest of the vulnerable households residing within the project influenced villages.
Health and safety risk	❒ During the construction, operation full dependency on and decommissioning phase various kinds of risks can possibly be occurred to the local people. ❒ The health and Safety issues may arise with the public access to wind turbines or wind energy facility substation. ❒ Increasing vehicular movement for the WPP on village roads increases the noise generation, generation of dust and risk of accident in the surrounding areas.	❒ The Project Proponent needs to ensure special care to prevent any accident or health risk to the locals in study villages during construction, operation and decommissioning of the WPP while placing all the preventive action adhering to all the applicable guidelines of the project proponent. ❒ The project proponent is required to exercise extra precautions to restrict unnecessary movement of vehicles, limiting speed within project area, using sprinkler to reduce the dust, allowing sufficient lighting to avoid any road mishap during night. ❒ The project proponent also needs ensure that accident mitigation strategy is in place to deal with any accidental issue in a very effective way in line with company's applicable policy as well as human rights risk mitigation guidelines.

Table 7-6: Assessment as per the Guiding Principles on Business and Human Rights

Requirement	Applicability
States must protect against human rights abuse within their territory and/or jurisdiction by third parties, including business enterprises. This requires taking appropriate steps to prevent, investigate, punish and redress such abuse through effective policies, legislation, regulations and adjudication	SRIPL-4 need to follow law of the land.
States should set out clearly the expectation that all business enterprises domiciled in their territory and/or jurisdiction respect human rights throughout their operations.	SRIPL-4 needs to adhere to the clearly defined business expectations domiciled in their territory and or jurisdiction to respect human rights throughout their operations in line with State's guiding principle in connection with Human Rights.
General State regulatory and policy functions In meeting their duty to protect, States should: **(a)** Enforce laws that are aimed at, or have the effect of, requiring business enterprises to respect human rights, and periodically to assess the adequacy of such laws and address any gaps; **(b)** Ensure that other laws and policies governing the creation and ongoing operation of business enterprises, such as corporate law, do not constrain but enable business respect for human rights; **(c)** Provide effective guidance to business enterprises on how to respect human rights throughout their operations; **(d)** Encourage, and where appropriate require, business enterprises to communicate how they address their human rights impacts.	In line with State's general regulatory and policy functions linking with Human Rights principles, the SRIPL-4 needs to abide by all the applicable laws and guidelines to facilitate and cooperate State in enforcing laws requiring business enterprises to respect human rights along with timely addressing gaps if any. It further commits to abide by the state's effective guidance towards business enterprise to respect human rights throughout its operations and also assures effective and timely communication in addressing human rights impact in line with government's directives.
States should take additional steps to protect against human rights abuses by business enterprises that are owned or controlled by the State, or that receive substantial support and services from State agencies such as export credit agencies and official investment insurance or guarantee agencies, including, where appropriate, by requiring human rights due diligence.	SRIPL-4 is accountable in protecting any potential human rights abuses within its business jurisdiction in line with State's human rights policy and timely carrying out due diligence exercise around human rights violations.
States should exercise adequate oversight in order to meet their international human rights obligations when they contract with, or legislate for, business enterprises to provide services that may impact upon the enjoyment of human rights.	SRIPL-4 needs to ensure exercising adequate and timely oversight in meeting International Human Rights obligations in line with UN as well as ILO's human rights protocol to promote and protect abuses of any human rights within its business operations.

Requirement	Applicability
States should promote respect for human rights by business enterprises with which they conduct commercial transactions Supporting business respect for human rights in conflict affected areas Because- the risk of gross human rights abuses is heightened in conflict-affected areas, States should help ensure that business enterprises operating in those contexts are not involved with such abuses, including by: **(A)** Engaging at the earliest stage possible with business enterprises to help them identify, prevent and mitigate the human rights-related risks of their activities and business relationships; **(B)** Providing adequate assistance to business enterprises to assess and address the heightened risks of abuses, paying special attention to both gender-based and sexual violence; **(C)** Denying access to public support and services for a business enterprise that is involved with gross human rights abuses and refuses to cooperate in addressing the situation; Ensuring that their current policies, legislation, regulations and enforcement measures are effective in addressing the risk of business involvement in gross human rights abuses	SRIPL-4 needs to promote, respect and foster human rights within its business environment aligned with State's guiding principle in connection with promotion of human rights. In respecting human rights in conflict-affected areas, SRIPL-4 has to address any human rights violations or abuses within its business operations in line with State's guiding principles as well as international human rights protocol that entails the following: **(A)** SRIPL-4 will take immediate action to identify, prevent and mitigate any potential risks associated with activities and business relationships. **(B)** SRIPL-4 will ensure timely assistance in assessing any critical risks of abuses along with remedial measures in timely addressing gender-bias and sexual violence within its business environment and relationships. **(C)** SRIPL-4 will take strong action in addressing gross human rights abuses/violations in connection with denying access to public support, services and non-cooperation within business environment and operations. SRIPL-4 will adhere to all the current policies, legislation, regulations and enforcement measures in addressing risks of business linking with gross human rights abuses/violations.
States should ensure that governmental departments, agencies and other State-based institutions that shape business practices are aware of and observe the State's human rights obligations when fulfilling their respective mandates, including by providing them with relevant information, training and support.	Pursuant to the guidelines of government department and institutions towards observation of state human rights obligations within business space, SRIPL-4 has to ensure in extending its full cooperation towards fulfilling human rights mandates in way of sharing relevant information, imparting training and support in connection with human rights within its business domain.
States should maintain adequate domestic policy space to meet their human rights obligations when pursuing business-related policy objectives with other States or business enterprises, for instance through investment treaties or contracts.	In line with State's domestic policy in light of human rights obligations, SRIPL-4 is accountable to maintain and respect essential domestic policy within its business operations in meeting and respecting applicable human rights obligations.

Requirement	Applicability
States, when acting as members of multilateral institutions that deal with business-related issues, should: **(a)** Seek to ensure that those institutions neither restrain the ability of their member States to meet their duty to protect nor hinder business enterprises from respecting human rights; **(b)** Encourage those institutions, within their respective mandates and capacities, to promote business respect for human rights and, where requested, to help States meet their duty to protect against human rights abuse by business enterprises, including through technical assistance, capacity-building and awareness-raising; Draw on these Guiding Principles to promote shared understanding and advance international cooperation in the management of business and human rights challenges.	Embedded with Human Rights Principles in dealing with business related issues, the SRIPL-4 has to ensure the following: Facilitate network institutions and partners/ stakeholders to fulfil their responsibilities in protecting and respecting human rights within its business operations. **(b)** Motivate network partners/stakeholders to promote their businesses in protecting human rights violations through provision of capacity building initiative, awareness generation and technical assistance program. Promote shared understanding while advancing international cooperation in business management while addressing human rights challenges based on the acquired knowledge on human rights guiding principles.
THE CORPORATE RESPONSIBILITY TO RESPECT HUMAN RIGHTS	
Business enterprises should respect human rights. This means that they should avoid infringing on the human rights of others and should address adverse human rights impacts with which they are involved.	SRIPL-4 must undertake relevant commitments or activities to support and promote human rights, which may contribute to the enjoyment of rights and must ensure that it should not undermine States' directives/abilities to meet their own human rights obligations, including by actions that might weaken the integrity of judicial processes.
The responsibility of business enterprises to respect human rights refers to internationally recognized human rights – understood, at a minimum, as those expressed in the International Bill of Human Rights and the principles concerning fundamental rights set out in the International Labour Organization's Declaration on Fundamental Principles and Rights at Work.	SRIPL-4 has its obligation to respect human rights is distinct from issues of legal liability and enforcement, which remain defined largely by national law provisions in relevant jurisdictions. In addition to it, SRIPL-4 should respect the human rights of individuals belonging to specific groups or populations that require particular attention, where they may have adverse human rights impacts on them in compliance with ILO's declaration on Fundamental Principles and Rights at work as well as United Nations' Guiding Principles to promote and respect human right issue within the organization.

Requirement	Applicability
The responsibility to respect human rights requires that business enterprises: **(a)** Avoid causing or contributing to adverse human rights impacts through their own activities, and address such impacts when they occur; **(b)** Seek to prevent or mitigate adverse human rights impacts that are directly linked to their operations, products or services by their business relationships, even if they have not contributed to those impacts.	SRIPL-4 should address any adverse impact on human rights component under its mitigation plan either through their own activities or as a result of their business relationships with other parties with immediate effect in compliance with existing human rights guiding principles focusing business partners/stakeholders, entities in its value chain, and any other non-State or State entity directly linked to company's business operations, products or services.
The responsibility of business enterprises to respect human rights applies to all enterprises regardless of their size, sector, operational context, ownership and structure. Nevertheless, the scale and complexity of the means through which enterprises meet that responsibility may vary according to these factors and with the severity of the enterprise's adverse human rights impacts	It is prerogative of SRIPL-4 to meet its responsibility to respect human rights which may vary depending on whether, and the extent to which, it conducts business through a corporate group or individually. However, the responsibility to respect human rights applies fully and equally to all its business enterprises regardless of the size, sector, context, ownership and geography it operates.
In order to meet their responsibility to respect human rights, business enterprises should have in place policies and processes appropriate to their size and circumstances, including **(a)** A policy commitment to meet their responsibility to respect human rights; **(b)** A human rights due diligence process to identify, prevent, mitigate and account for how they address their impacts on human rights; **(c)** Processes to enable the remediation of any adverse human rights impacts they cause or to which they contribute	Encapsulated with guiding principles of Human Rights, SRIPL-4 has the responsibility to respect human rights while expressing its commitment to meet this responsibility through a statement of policy that draws in way of: **(a)** Internal and/or independent external human rights expertise, involves meaningful consultation with potentially affected groups and other relevant stakeholders, as appropriate to the size of the business enterprise and the nature and context of the operation. **(b)** Stipulates the enterprise's human rights expectations of personnel, business partners and other parties directly linked to its operations, products or services and on the other hand, the policy has to be available on public domain and communicated internally and externally to all personnel, business partners and other relevant parties and it should be reflected in operational policies and procedures of the company. **(c)** Monitor and review the human rights impact if any.

7.6 Climate Risk Assessment

7.6.1 Introduction

This section forms the Climate Change Risk Assessment (CCRA) for the project to ascertain on-going and expected changes in climate patterns and an evaluation of the climate related physical risks and transitional risk (as appropriate).

The CCRA provides a high-level review of the following:

- Applicable environmental and social regulations and policies in India and the State of Maharashtra;

- International Standards including: - IFC Performance Standards[17] (2012); - IFC Environmental, Health & Safety (EHS) Guidelines for wind energy[18](2007); - IFC EHS Guidelines for Electric Power Transmission and Distribution[19] (2007);
- The current and anticipated climate change risks (transition and / or physical as defined by the Task Force on Climate – related Financial Disclosures (TCFD)) of the Projects operations.

According to PS-3 of IFC guideline: Resource Efficiency and Pollution Prevention: This Performance Standard outlines a project approach to pollution prevention and abatement in line with international available technologies and practices. It promotes the private sector's ability to integrate such technologies and practices as far as their use is technically and financially feasible and cost-effective in the context of a project that relies on commercially available skills and resources. Specific objectives of this Performance Standard are:

- To avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities; and
- To promote the reduction of emissions that contribute to climate change

7.6.2 Risk Evaluation

The Recommendations of the Task Force on Climate-Related Financial Disclosures (TCFD Recommendations) divides climate-related risks into two overarching categories. These are:

- Risks which relate to the physical impacts of climate change (Physical Risks); and
- Risks which relate to the transition to a lower-carbon economy (Transition Risks).

Physical Risk

The increasing temperatures and high number of high heat days is predicted which could result in drought conditions and increased aridity. Increases in the number of high temperature days could damage project infrastructure and maintenance activities would likely be restricted on these days. Furthermore, high temperatures result in lower air density thereby potentially reduced energy output.

Infrastructure with high structures such as wind turbines and electricity transmission infrastructure are vulnerable to storm damage. This can reduce power capacity and/or cause power disruptions.

Electricity transmission infrastructure in hot, dry climates can exacerbate or cause wildfires.

Checklist for Preliminary Climate Risk Screening

General Project Identification			
Date	:	**April 2023**	
Country and Project Title	:	**India : 300 MW Kallam Wind Power Project**	
Risk Assessment Category	**Risk Value**	**Risk Score**	**Remarks**
Pre-Determined Impacts And Risk Factors			
1. Which physical environment best describes the project area	The physical environment which best describes the project location	1	Semi-arid climatic zone; Rainfall >500 mm
2. Categories sectoral risk of project	Add risk value from 0-3	2	Energy Sector
3. List individual hazards that may impact project	Add risk value of 1 for each natural hazard (up to a maximum of 4).	2	▯ The project site comes under seismic zone III which is depiction of moderately prone seismic activities. ▯ The site is highly prone to drought which will not affect the WTGs anyway. ▯ The project site has high risk of cyclone, moreover, WTGs are equipped with auto cut off speed and WTG foundation, thus, it is not expected that any damage would happen to WTG's.
4. Estimate the number of people in the project area "exposed" to risk after the project is completed.	For <100 score = 0, 100-1000 score = 1, 1000-10,000 score 2; >10,000 score = 3 Less than 100	0	The impact on population during construction would be dust and noise. During operation phases, shadow flickering impacts may arise from WTGs. Since the habitation are far away in maximum locations, minimal impacts are anticipated.

Stakeholder engagement and risk knowledge			
1. Do the project's proponents have the institutional capacity to successfully incorporate, manage, and deliver risk management measures to the project?	Good capacity, risk value = 0; poor capacity, risk value =1; very poor capacity, risk value = 2.	0	-
2. Will potentially hazard impacts on communities, gender, indigenous peoples, or the social dimensions of risk be considered in the concept paper?	Yes / No (if No or unsure, add risk value = 1)	0	-
3. Are there any demographic or socio-economic variables (i.e., population increase, settlement patterns, biophysical and environmental conditions) that may increase exposure to hazard impacts?	Yes / No (if yes or unsure, add 1 risk value)	0	-
4. Is it likely that executing agency stakeholders have some practical knowledge of risk reduction measures for the project?	Yes / No (if No or unsure, add risk value = 1)	0	-
5. Will the project reduce, leave unaltered, or increase the risk to project beneficiaries?	Reduce risk, score = 0; leave risk unaltered, score = 1; increase risk, score = 2.	0	-
6. Will the project reduce, leave unaltered, or increase the risk to the localized environment/ project dependent ecosystem?	Reduce risk, score = 0; leave risk unaltered, score = 1; increase risk, score = 2.	0	-

7. Do country/institutional policies or environmental laws significantly promote risk management measures?	Yes / No (if No or unsure, add risk value = 1)	0	-
8. Does the project require a risk expert to introduce risk reduction measures in project design, implementation, or operations and maintenance?	No= 0 Yes =1 or 2 based on assessment of the level of risk	0	-
Total risk value (range 0 to 25)	**High Risk: 17-25** **Moderate Risk: 8-16** **Low Risk: 0-7**	5	**The project is under low risk categorization;** **Low Risk (0–7):** This range indicates the project proposal has considered risk management measures to minimize hazard impacts and associated risks, and that the project may therefore have a potentially higher threshold against current and anticipated risks.

As established that the result of Climate change Risk for project site is "**low"**.

Transitional Risks

As wind power project generates less than 100,000 T CO_2 per year. The evaluation of transitional risks has not been assessed for this project given that electricity is generated from a renewable source and GHG emissions relating to the project are only due to machinery and facilities used during construction, its maintenance and repair activities carried out during operational stage.

7.6.3 Mitigations

Mitigation for WTGs:

Wind turbines are often designed to deal with a wide range of conditions, but where wind speeds are expected to increase, designs can be adapted to capture more energy and produce more electricity. Adaptation option includes the following:

- Construct turbines that can operate at, and physically withstand, higher wind speeds and higher wind gusts.
- Use taller towers to capture the stronger winds at higher altitudes.
- Ensure the presence of rapid emergency repair teams to repair damaged turbines quickly.

Mitigation for Transmission and Distribution:

Improving the resiliency of electricity infrastructure involves preparing T&D systems to continue operating despite damage. Adaptation efforts should also increase the system's ability to return

to normal operations rapidly if outages do occur. Specific measures include the following:

- Higher design standards for distribution poles and towers
- Change routes of overhead lines along roads away from trees, and use covered and/or insulated conductors and more underground cables, especially in wooded areas
- Where lighting strikes may increase, include lighting protection (earth wires, spark gaps) in the distribution network
- Design improved flood protection measures for equipment mounted at ground level in substations
- Protect masts, antennae, switch boxes, aerials, overhead wires, and cables from precipitation; wind; unstable ground conditions; and changes in humidity.

Other Mitigations:

To reduce GHG emissions during the construction phase, the following steps can be considered:

- For construction, wherever possible use recycled materials.

It is envisaged that insurance could cover these extreme events with engineering solutions also possible (such as modification to the cooling system) thereby reducing moderate to high impacts to low.

8 Environmental & 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 project proponent and imposed as conditions of contract of the sub-contractor employed for respective phases of the power project. The mitigation measures suggested during operation will be made part of the regular maintenance and monitoring schedule.

SRIPL-4 is committed to implement an effective Environmental and Social Management plan (hereinafter referred as ESMS) to continuously manage and communicate the potential social and environmental impacts and risks imposed on the project employees (direct and indirect) and the local communities residing in the immediate vicinity of the project area.

Table 8-1: Environment and Social Management Plan

SN	Attributes	Impact due to Project Activity	Impact Intensity without mitigation	Suggested Mitigation Measure	Impact Intensity with mitigation	Responsibility for Implementing Mitigation Measure	Mode of Verification	Monitoring Frequency/ Timeline	Supervision Responsibility
Pre-Construction Phase									
1	LAND	❒ Loss of land/properties and livelihood due to land procurement	LOW	❒ Avoid sourcing Schedule V area (ST land) for the project; ❒ Avoid procuring highly fertile land; ❒ Avoid procuring land near the cultural or archaeological heritage area; ❒ Follow all applicable state, national and international laws and regulations of land acquisition process for the proposed project; ❒ Monitor the entire land acquisition process so that neither physical nor economic displacement would occur in the project area; ❒ To ensure a transparent process for acquiring land, consultation should be done with all the stakeholders and local governing bodies; ❒ To provide fair rent amount to the families who are affected or whose land has been procured or whose livelihood has been affected, because of the land acquisition.	NO IMPACT	Land Team	Land document verification and site inspection	Until the completion of land procurement	SRIPL-4
Construction Phase									

SN	Attributes	Impact due to Project Activity	Impact Intensity without mitigation	Suggested Mitigation Measure	Impact Intensity with mitigation	Responsibility for Implementing Mitigation Measure	Mode of Verification	Monitoring Frequency/ Timeline	Supervision Responsibility
2	LANDSCAPE AND VISUAL	Impacts on Visual and landscape envisaged due to presence elements typical for a construction site such as equipment and machinery.	LOW	❒ Ensure restoration of site to the extent possible; ❒ Construction machinery, ❒ equipment, and vehicles not in use should be removed in a timely manner to the extent possible; ❒ Ensure restoration and ❒ management of waste disposal site.	NO IMPACT	EPC Team of SRIPL-	Site Inspection	Upon completion of	SRIPL-4 Team
						4		task	
3	AIR QUALITY	❒ Generation of fugitive dust due to movement of vehicles inside the project area during construction period. ❒ Emission from Diesel Generators, Batching Plant etc.	MODERATE	❒ Vehicles speed to be restricted to 20-30 km/hr. on unpaved road. This will reduce dust emission; ❒ Raw material should be covered with tarpaulin sheet during transportation and in storage area; ❒ Water sprinkling on the unpaved road/ haul road to minimize the dust generation wherever required; ❒ All the project vehicles shall have valid PUC certificate; ❒ Ensure regular maintenance of project vehicles during construction and operational phase;	LOW	EPC Team of SRIPL-4	Site Inspection	Monthly monitoring	SRIPL-4 Team
				❒ Emission standard of the DG sets operated in the project area should be maintained as per MoEFCC/ SPCB guidelines;					

SN	Attributes	Impact due to Project Activity	Impact Intensity without mitigation	Suggested Mitigation Measure	Impact Intensity with mitigation	Responsibility for Implementing Mitigation Measure	Mode of Verification	Monitoring Frequency/ Timeline	Supervision Responsibility
				❒ DG sets preferably placed away from settlement area;					
				❒ It will be ensured that exhaust emissions of construction equipment adhere to emission norms as set out by MoEFCC/ CPCB/ SPCB.					
4	NOISE LEVEL	❒ Impacts on noise level at the project site and its surrounding area envisaged due to vehicular movement to deliver construction materials and wind turbine. ❒ Noise from DG sets. Construction noise generated from using of machinery, and concrete mixing.	LOW	❒ Regular maintenance of construction machinery and equipment should be carried out to ensure noise emissions are maintained at designated levels; ❒ Integral noise shielding to be used where practicable and fixed noise sources to be acoustically treated, for example with silencers, acoustic louvers and enclosures; ❒ Keep stationary source of noise such as DG sets (during construction phase) at farthest point from the settlements; ❒ Restrict major noise generating activities during night time 10:00 pm to 6:00 am; ❒ Provide personal protective equipment to workers working near DG sets and other high noise	LOW	EPC Team of SRIPL- 4	Site Inspection	Monthly monitoring	SRIPL-4 Team

SN	Attributes	Impact due to Project Activity	Impact Intensity without mitigation	Suggested Mitigation Measure	Impact Intensity with mitigation	Responsibility for Implementing Mitigation Measure	Mode of Verification	Monitoring Frequency/ Timeline	Supervision Responsibility
				source; ❒ Local communities need to be informed about the vehicular movement before start of heavy vehicle carrying materials and machines to site. Sensitive locations should be identified and avoided as far as possible from the ❒ route and if unavoidable, drivers should be informed to restrict speed at those locations; ❒ Diesel generator sets, if used; will adhere to noise standards of MoEF&CC.					
5	GROUND WATER ABSTRACTION	❒ Water will be required for civil work and domestic usage during construction phase. As per CGWB assessment, project is located in critical zone w.r.t. ground water potential.	LOW	❒ As per CGWB, the project Tehsil and district fall under safe zone; ❒ During construction phase, water will be supplied by authorized vendor for which no permission required from CGWB. Package drinking water will be supplied to meet the site requirement; ❒ Reduce the frequency of washing to save water.	NO IMPACT	EPC Team of SRIPL-4	Site Inspection	Monthly monitoring	SRIPL-4 Team

SN	Attributes	Impact due to Project Activity	Impact Intensity without mitigation	Suggested Mitigation Measure	Impact Intensity with mitigation	Responsibility for Implementing Mitigation Measure	Mode of Verification	Monitoring Frequency/ Timeline	Supervision Responsibility
6	GROUND WATER QUALITY	❒ Possible contamination from site run-off. Accidental contamination of sewage water from toilets facilities at site.	LOW	❒ Adequate drainage facility will be provided for surface run-off from the project site; ❒ Leak-proof holding tanks for sanitary waste water should be constructed to protect the seepage of waste water; ❒ Waste water holding tanks / septic tank should be located at more than 500 m away from bore wells or any other underground water holding tanks; ❒ It should be ensured that the waste water does not find its way into surface waters or water wells.	NO IMPACT	EPC Team of SRIPL-4	Site Inspection	Monthly monitoring	SRIPL-4 Team
7	TOPOGRAPHY and DRAINAGE PATTERN	❒ Change in contour level due to site levelling. Alteration in natural drainage pattern. ❒ Accumulation of surface runoff from project area in the nearby water channels.	LOW	❒ Site levelling should be done with minimum alteration in contour level. Project site is located in mostly flat terrain with mild undulation required minimum alteration of contour level; ❒ Provide alternatives to collect surface runoff from the project site during monsoon period; ❒ Don't allow exit of runoff from the project site to the nearby natural water body; ❒ Design storm water drain considering the natural contour level;	NO IMPACT	EPC Team of SRIPL-4	Site Inspection	Monthly monitoring	SRIPL-4 Team

SN	Attributes	Impact due to Project Activity	Impact Intensity without mitigation	Suggested Mitigation Measure	Impact Intensity with mitigation	Responsibility for Implementing Mitigation Measure	Mode of Verification	Monitoring Frequency/ Timeline	Supervision Responsibility
				❒ Site preparation activities should be designed to avoid any significant elevation of the land or blocking or altering natural drainage channels in the project site; ❒ Site preparation and development should be planned only after a detailed drainage plan has been prepared for site; ❒ Care should be taken towards deciding the approach road, it should not be an obstruction to micro drainage channels near water body, local drainage should not be blocked; If channels/drains get blocked due to accumulation of soil / waste materials, it will be ensured that they are cleaned especially during monsoon season.					
8	SOIL QUALITY	❒ Erosion of top soil, sedimentation due to different project activities such as site levelling,	LOW	❒ Top soil preservation and re-use for plantation purpose; ❒ Excavated soil should be kept in bund walls to protect sediment run-off during rainy days especially near water body and areas with natural slope; ❒ Store topsoil and other soil separately in designated areas of	LOW	EPC Team of SRIPL-4	Site Inspection	Monthly monitoring	SRIPL-4 Team

SN	Attributes	Impact due to Project Activity	Impact Intensity without mitigation	Suggested Mitigation Measure	Impact Intensity with mitigation	Responsibility for Implementing Mitigation Measure	Mode of Verification	Monitoring Frequency/ Timeline	Supervision Responsibility
		excavation of tower foundations, erection of WTGs, road construction etc. ❒ Soil Contamination due to storage of diesel, spent oil generation of used oil from running of DG sets etc.		the construction compounds, in such a way that it is not mixed with subsoil or trafficked on by vehicles; ❒ To limit the disturbance of soil structure, humus/topsoil layers has been separated from the infertile deposits to use it correctly after completion of works; ❒ Re-vegetation should be done after completion of construction work in order to reduce the risk of soil erosion. Storage of oil and other hazardous material should be undertaken on paved impervious surface and secondary containment should be provided for fuel storage tanks; ❒ In case of any accidental oil spill, the soil will be cut and stored separately for disposal as hazardous waste; ❒ Filling and transfer of oil to and from the container should be on impervious surface.					
9	SOLID and HAZARDOUS WASTE	❒ Waste generated during construction phase primarily consist of scrapped materials,	LOW	❒ Designated land within the project area should be allotted for the disposal of hazardous waste; ❒ Distribute appropriate number of properly contained litter bins and containers properly marked as "Solid as well as Hazardous Waste";	LOW	EPC Team of SRIPL- 4	Site Inspection	Monthly monitoring	HSE department of SRIPL-4

SN	Attributes	Impact due to Project Activity	Impact Intensity without mitigation	Suggested Mitigation Measure	Impact Intensity with mitigation	Responsibility for Implementing Mitigation Measure	Mode of Verification	Monitoring Frequency/ Timeline	Supervision Responsibility
		rejected components, packing ❒ materials, human waste and crude oil, lubricant etc.		❒ Solid waste should be collected and disposed of from the project site regularly to avoid any decomposition of solid waste. This will help to restrict the generation of foul smell from the designated site; ❒ Domestic and construction waste like recyclables viz. paper, plastic, glass, scrap metal waste etc. will be properly segregated and stored in designated waste bins/containers and periodically sold to local recyclers; Awareness among the project workers/contractors should be increased regarding management of solid waste; ❒ Separate hazardous waste storage yard should be constructed; ❒ Hazardous waste should be kept with secondary containment and levelling; ❒ Hazardous wastes should be disposed through authorized vendor only within 90 days of storage; ❒ Spill kit should be available for any emergency use in case of spillage.					

SN	Attributes	Impact due to Project Activity	Impact Intensity without mitigation	Suggested Mitigation Measure	Impact Intensity with mitigation	Responsibility for Implementing Mitigation Measure	Mode of Verification	Monitoring Frequency/ Timeline	Supervision Responsibility
10	OCCUPATIONAL HEALTH AND SAFETY	❒ Material handling and storage; ❒ Possible injuries associated with working at height, during WTG installation, laying of transmission line; ❒ Other occupational hazards associated with operation of WTGs.	MODERATE	❒ All material will be arranged in a systematic manner with proper labelling and without protrusion or extension onto the access corridor; ❒ Loading and unloading operation of equipment should be done under the supervision of a trained professional; ❒ All work at height to be undertaken during daytime with sufficient sunlight; ❒ Proper PPEs should be provided to workers handling welding, electricity and related components; ❒ Fire extinguishing equipment should be provided in adequate number on site to handle any possible fire outbreaks; ❒ An accident reporting and monitoring record should be maintained ❒ Display of emergency phone numbers with name of contact person of the project proponent /local fire services, etc. at site should be done. ❒ The labour engaged for working at height should be trained for temporary fall protection devices.	LOW	EPC Team of SRIPL- 4	Site Inspection	Daily monitoring	SRIPL-4 Team
11	COMMUNITY HEALTH AND	❒ Blasting	LOW	❒ Use of proper amount of explosive taking into consideration the geo-	NO IMPACT	EPC Team of SRIPL- 4	Site Inspection	Monthly	SRIPL-4 Team

SN	Attributes	Impact due to Project Activity	Impact Intensity without mitigation	Suggested Mitigation Measure	Impact Intensity with mitigation	Responsibility for Implementing Mitigation Measure	Mode of Verification	Monitoring Frequency/ Timeline	Supervision Responsibility
	SAFETY	operations ❒ during access road construction		mechanical conditions of the site. No blasting required at site. ❒ If blasting is required then the procedure of blasting should be followed as per SRIPL-4's protocol for blasting; ❒ Provision of first-aid kits at all work-areas onsite; ❒ Passageways for pedestrians and vehicles within and outside buildings should be segregated and provide for easy, safe, and appropriate access; ❒ Safety signage and posters (also in local language) will be displayed at strategic locations within the site.				monitoring	
12	ECOLOGY & BIODIVERSITY	❒ Loss of biodiversity due to site clearance ❒ Disturbance of sensitive habitat ❒ Disturbanc e to local livestock population	LOW	❒ The site clearance for tower erection, access road and ancillary facilities should be restricted to the necessary footprint area around WTG; and try to avoid cutting of big trees to the extent possible. Ensure prior permission for cutting of trees (if required). ❒ The crane staging area, intervening areas, overhead clearance for suspended turbine components should be planned in such a way that minimum tree felling is required; ❒ Contractors should ensure that labour colonies are not set up in the regions where faunal species	INSIGNIFICANT TO LOW	EPC Team of SRIPL- 4	Site Inspection	Monthly monitoring	SRIPL-4 Team

SN	Attributes	Impact due to Project Activity	Impact Intensity without mitigation	Suggested Mitigation Measure	Impact Intensity with mitigation	Responsibility for Implementing Mitigation Measure	Mode of Verification	Monitoring Frequency/ Timeline	Supervision Responsibility
				are commonly found; ❒ In order to avoid deterioration of water quality and to prevent release of pollutants into the water body by the workers, project proponent should provide adequate sanitation facilities and garbage disposal bins in the labour camp; ❒ Sign boards on the roadside should be installed and strict regulations on speed limits should be imposed to control the road kills of animals during transportation of materials; Care should be taken to install the wind turbine in non-monsoon season and special precautions will be taken to minimize sediment run-off during the rainy days; ❒ Green area is proposed in the area. Plantations along the approach roads, site office is one of the preferred methods not only to increase the green cover of the area but also serve as a sink for air pollutants. ❒ Workshop on awareness and identification of GIB should be provided to the workers and site personnel.					
13	ENGAGEMENT OF LOCAL AND MIGRANT LABOUR	❒ Conflicts ❒ between labour and contractor	LOW	❒ Employment will be provided to local people wherever possible, especially as unskilled construction workers and security guards; ❒ SRIPL-4 will include clause or	POSITIVE IMPACT	EPC Team of SRIPL- 4	Site Inspection	Monthly monitoring	SRIPL-4 Team

SN	Attributes	Impact due to Project Activity	Impact Intensity without mitigation	Suggested Mitigation Measure	Impact Intensity with mitigation	Responsibility for Implementing Mitigation Measure	Mode of Verification	Monitoring Frequency/ Timeline	Supervision Responsibility
				provisions related with non-engagement of forced and child labour, gender equity, non-discrimination on employment and opportunity and freedom to express their view in contractor's agreement and HR policy; SRIPL-4 through its contractors shall ensure that labour is being adequately paid by contractors. Also ensure that wages are being paid as per the requirement of minimum wages act; ❒ SRIPL-4 shall include clause to ensure access of necessary basic amenities and facilities such as drinking water, kitchen, toilet and crèches (for female workers children); ❒ SRIPL-4 shall conduct internal audits as when required to monitor the performance of contractor; ❒ SRIPL-4 through the contractor inform the labour about emergency preparedness plan and communication system to be followed during emergency situation; ❒ SRIPL-4 through contractor should ensure that labour receive training on health and safety issues involved in the project.					
14	LABOUR ACCOMMODATION	❒ Conflicts ❒ between labour	MODERATE	❒ Maximum number of local labours will be engaged for un-skill work.	LOW	EPC Team of SRIPL- 4	Site Inspection	Monthly monitoring	SRIPL-4 Team

SN	Attributes	Impact due to Project Activity	Impact Intensity without mitigation	Suggested Mitigation Measure	Impact Intensity with mitigation	Responsibility for Implementing Mitigation Measure	Mode of Verification	Monitoring Frequency/ Timeline	Supervision Responsibility
		and local community		❒ For migrant worker, SRIPL-4 will arrange rented house in nearby villages with all the basic facilities as suggested by IFC. ❒ Ensure regular monitoring of rented facilities to ensure compliance to health & hygienic requirements at rented accommodation of the labours.					
15	LAND PROCUREMENT	❒ Loss of land and livelihood; ❒ Obstruction to access.	MODERATE	❒ All private land required for the project will be purchased on a willing buyer-seller basis by providing higher than the current market rate. Construction work will be started only after demarcation and completion of purchase procedure; ❒ It should be ensured that maximum employment will be given to the locals w.r.t their capacity and skills; ❒ Implement the recommended complaint resolution procedure (Grievance Redress Mechanism) to assure that any complaints regarding project related components are promptly and adequately investigated and resolved; ❒ Provide some alternate way/road so that project should not obstruct the villagers' access; ❒ The layout for access roads and transmission line should consider minimum land	POSITIVE IMPACT	EPC Team of SRIPL-4	Site Inspection	Monthly monitoring	SRIPL-4 Team

SN	Attributes	Impact due to Project Activity	Impact Intensity without mitigation	Suggested Mitigation Measure	Impact Intensity with mitigation	Responsibility for Implementing Mitigation Measure	Mode of Verification	Monitoring Frequency/ Timeline	Supervision Responsibility
				requirement and should avoid procurement of agricultural land; ❒ Any waste generated during the construction phase should not be accumulated near the religious or common community structure as this might affect the sentiment of the locals while triggering environmental hazard.					
16	COMMUNITY ENGAGEMENT	❒ Community Empowerment	MODERATE	❒ Given the short duration of the Project construction phase, efforts will be made to engage with the community through the Panchayati Raj Institution representatives and key identified leaders of the community to carry out all the pre-planned project activities to enhance participation and empowerment of the community in intervention villages.	POSITIVE IMPACT	EPC Team of SRIPL- 4	Inspection and routine monitoring	Annual Monitoring	SRIPL-4 Team
Operation Phase									
17	LANDSCAPE AND VISUAL	❒ Alteration in landscape due to installation of wind turbines	LOW	❒ Maintaining uniform size, design and painted in light colour (white) to reduce the visual impact when seen from farther distances; ❒ Maintaining a minimum distance ('Height of the turbine + ½ x rotor diameter + 5 m') from nearby settlement area, highways, school building etc. to minimize visual impacts and impacts due to shadow flicker and blade glint and prevent risks due to fall down of the turbines;	NO IMPACT	EPC Team of SRIPL-4	Site Inspection	Upon completion of task	SRIPL-4 Team

SN	Attributes	Impact due to Project Activity	Impact Intensity without mitigation	Suggested Mitigation Measure	Impact Intensity with mitigation	Responsibility for Implementing Mitigation Measure	Mode of Verification	Monitoring Frequency/ Timeline	Supervision Responsibility
				There will be no change in existing land use, as presently there are other wind power projects and one solar power project in the project surrounding area within 5 km vicinity.					
18	AVIATION	❒ Potential collision or alteration of flight paths in low flying areas; Wind energy facility close to aviation radar will pose signal distortion, which may cause loss of signal, masking real targets and/or erroneous signals on the radar ❒ screen, creating flight safety issues.	LOW	❒ Consultation with relevant aviation authorities before installation, in accordance with air traffic safety regulations; ❒ Avoid siting wind energy facilities close to airports and within known low-flying areas or flight paths; ❒ Consultation should be undertaken with the relevant aviation authorities to determine prevention and control measures; ❒ Consider wind energy facility design options, including geometric layout, location of turbines, and changes to air traffic routes.	NO IMPACT	EPC Team of SRIPL-4	Site Inspection	Upon completion of task	SRIPL-4 Team

SN	Attributes	Impact due to Project Activity	Impact Intensity without mitigation	Suggested Mitigation Measure	Impact Intensity with mitigation	Responsibility for Implementing Mitigation Measure	Mode of Verification	Monitoring Frequency/ Timeline	Supervision Responsibility
19	NATURAL DISASTER	❒ Structural ❒ collapse due to earthquake, cyclonic storm etc.	LOW	❒ The project site is located under Zone III of seismic map, hence moderately prone to earthquake; ❒ Project proponent is recommended to coordinate with district Disaster Management Authority and implement the recommendations to manage the situations in event of any natural disaster; ❒ Earthquake resistant building material and WTGs are considered.	LOW	EPC Team of SRIPL-4	Site Inspection	Upon completion of task	SRIPL-4 Team
20	OPERATIONAL NOISE LEVEL	❒ Noise generation due to operation of wind turbines	LOW	❒ Wind turbines should be designed in accordance with the international acoustic design standards; ❒ Proper and regular maintenance of the WTG's; ❒ Implement the recommended complaint resolution procedure (Grievance Redress Mechanism) to assure that any complaints regarding operational noise are promptly and adequately investigated and resolved; ❒ Operating turbines in reduced noise mode; ❒ Curtailing turbine operations above the wind speed at which turbine noise becomes unacceptable in the project specific circumstances;	NO IMPACT	EPC Team of SRIPL-4	Site Inspection, community consultation	Monthly monitoring	SRIPL-4 Team

SN	Attributes	Impact due to Project Activity	Impact Intensity without mitigation	Suggested Mitigation Measure	Impact Intensity with mitigation	Responsibility for Implementing Mitigation Measure	Mode of Verification	Monitoring Frequency/ Timeline	Supervision Responsibility
21	SHADOW FLICKER	❒ Disturbance to nearby community due to shadow flickering caused by wind turbines.	MODERATE	❒ Ensure that the receptor has blinds or curtains to mask the shadow flicker effect; ❒ Undertake plantation to hide shadow flicker near receptors (households) identified with significant impact. ❒ Establish grievance redress mechanism for the local community to register their ❒ concern associated with impact of the shadow flicker to the site staff.	LOW	EPC Team of SRIPL-4	Site Inspection, community consultation	Monthly monitoring	SRIPL-4 Team
22	ECOLOGY & BIODIVERSITY	❒ Bird-Bat collision; ❒ Mortality due to electrocution; ❒ Modification of habitat.	MODERATE	❒ Adequate space between each turbine; ❒ The vane tips of the wind turbine should be painted with orange colour to avoid bird hits; ❒ Conduct birds and bats survey by an independent ornithologist in operation stage of wind power project during migratory season. During this study carcass monitoring will also be conducted; ❒ Bird guards will be installed on 33 kV Internal TL and 220 kV External TL; ❒ Flash lamps on the WTGs should be installed to reduce collision risk to bird at night; Identify the season in which the impact on birds and bats is significant; and in case of high mortality of birds or bats, further study will be conducted to understand whether impacted	LOW	EPC Team of SRIPL-4	Site Inspection	Monthly monitoring	SRIPL-4 Team

SN	Attributes	Impact due to Project Activity	Impact Intensity without mitigation	Suggested Mitigation Measure	Impact Intensity with mitigation	Responsibility for Implementing Mitigation Measure	Mode of Verification	Monitoring Frequency/ Timeline	Supervision Responsibility
				birds are having high conservation status. In case of high impact on any critically endangered bird species, feasible options to reduce the impact may be considered; ❒ The specific measures will be identified on the basis of outcomes from post-construction/operational monitoring. Client should keep track of the latest solution to mitigate impact of wind period turbines on birds and bats so as to choose the best option; ❒ It is also evaluated by SRIPL-4 that no proposed locations fall in any ecologically sensitive areas such as forest; bird sanctuaries etc and such locations are cancelled for further consideration, thereby avoiding potential ecological impact. ❒ Internal monitoring for bird and bat collision should carry out on weekly basis and a record should be maintained.					
23	COMMUNITY HEALTH AND SAFETY	❒ Disturbance to nearby community due to shadow flicker; blade throw hazard; blade glint; ❒ electromagnetic field interference	MODERATE	WTG locations are sighted in a way that they are away from the nearest public roads, EHV lines, railway tracks by 'falling distance', which 223 m (Hub Height + Blade length + 5m). Except KLM 002, KLM 004, KLM 008, KLM 009, KLM 010, KLM 017, KLM 030, KLM032, KLM 035, KLM 052, KLM054, KLM 055, KLM 056, KLM 071, KLM 080, KLM-105. Following measures are suggested-	NO IMPACT	EPC Team of SRIPL-4	Site Inspection, community consultation	Monthly monitoring	SRIPL-4 Team

SN	Attributes	Impact due to Project Activity	Impact Intensity without mitigation	Suggested Mitigation Measure	Impact Intensity with mitigation	Responsibility for Implementing Mitigation Measure	Mode of Verification	Monitoring Frequency/ Timeline	Supervision Responsibility
				❒ SRIPL 4 is in the process of verification and ground truthing of locations of all such WTGs. SRIPL 4 will ensure that all such WTGs are in line with prevailing guidelines of MNRE. ❒ Equip wind turbines with vibration sensors that can react to any imbalance in the rotor blades and shut down the turbine if necessary. ❒ Regularly maintain the wind turbine; ❒ Use warning signs to alert the public of risk; Reducing the occurrence of impacts due to blade glint by application of non-reflective paints; complaint resolution procedure (Grievance Redress Mechanism) to assure that any complaints regarding blade glint are promptly and adequately investigated and resolved.					
24	OCCUPATIONAL HEALTH AND SAFETY	❒ Electrocution; Firing due to short-circuit; Possible injuries associated with working at ❒ height; Diseases due to unhygienic	LOW	❒ Provide and ensure the wearing of personal protective equipment's viz., gloves, helmets, ear plug, safety belt etc. at the project site. ❒ Ensure effective work permit system for critical activities such as electrical work and working at height. ❒ Prepare emergency communication system and emergency preparedness plan.	NO IMPACT	EPC Team of SRIPL-4	Site Inspection	Monthly monitoring	SRIPL-4 Team

SN	Attributes	Impact due to Project Activity	Impact Intensity without mitigation	Suggested Mitigation Measure	Impact Intensity with mitigation	Responsibility for Implementing Mitigation Measure	Mode of Verification	Monitoring Frequency/ Timeline	Supervision Responsibility
		condition		❒ Ensure proper health & sanitation facilities for all the workers engaged in the functioning of the project.					
25	SOLID and HAZARDOUS WASTE	❒ Waste generated during construction phase primarily consist of scrapped materials, rejected components, packing materials, human waste and crude oil, lubricant etc.	LOW	❒ Designated area within the project site should be allotted for the storage of hazardous waste. ❒ Distribute appropriate number of properly contained litter bins and containers properly marked as "Solid & Hazardous Waste"; ❒ Solid waste should be collected and disposed of from the project site regularly to avoid any decomposition of solid waste. This will help to restrict the generation of foul smell from the designated site. ❒ Domestic waste like paper, plastic, glass, scrap metal waste etc. will be properly segregated and stored in designated waste bins/ containers and periodically sold to local recyclers. ❒ Awareness among the project workers/contractors should be increased regarding management of solid waste. ❒ Separate hazardous waste storage should be constructed for the storage of hazardous waste. ❒ Hazardous waste should be kept with secondary containment and levelling. ❒ Hazardous waste should be	NO IMPACT	EPC Team of SRIPL- 4	Site Inspection	Monthly monitoring	SRIPL-4 Team

SN	Attributes	Impact due to Project Activity	Impact Intensity without mitigation	Suggested Mitigation Measure	Impact Intensity with mitigation	Responsibility for Implementing Mitigation Measure	Mode of Verification	Monitoring Frequency/ Timeline	Supervision Responsibility
				disposed through authorized vendor only within 90 days of storage. ❒ Spill kit should be available for any emergency use in case of spillage					
26	CORPOARATE SOCIAL RESPONSIBILITY	❒ Community empowerment; Area Development	LOW	❒ Employment will be provided to local people wherever possible, especially as unskilled construction workers and security guards. ❒ Developmental needs and expectations (such as employment in the project or up-gradation of educational health care facilities, cultural property and infrastructure) of local communities will be identified through the Gram Panchayat, villagers and local administration. ❒ Opportunities for contributing to the economic and developmental needs of villagers through skill training will be explored particularly for unemployed youths to enhance employment generation leading to economic upliftment of the community in study villages.	POSITIVE IMPACT	EPC Team of SRIPL- 4	Site Inspection, community consultation	Monthly monitoring	SRIPL-4 Team
Decommissioning Phase									

SN	Attributes	Impact due to Project Activity	Impact Intensity without mitigation	Suggested Mitigation Measure	Impact Intensity with mitigation	Responsibility for Implementing Mitigation Measure	Mode of Verification	Monitoring Frequency/ Timeline	Supervision Responsibility
27	Ambient Air quality	❒ Dust	LOW	❒ Proper handling ❒ Using of PPEs	LOW	EPC Team of SRIPL- 4	Site Inspection, community consultation	--	SRIPL-4 Team
28	Noise quality	❒ Noise level	LOW	❒ Using of PPEs ❒ Plantation of green belt around the project boundary line that may contribute towards curbing noise generation.	LOW	EPC Team of SRIPL- 4	Site Inspection, community consultation	--	SRIPL-4 Team
29	Land	❒ Soil quality ❒ Land use	LOW	❒ Changes in contour level should be avoided to the extent possible. ❒ Maintain natural drainage system	LOW	EPC Team of SRIPL- 4	Site Inspection, community consultation	--	SRIPL-4 Team
30	Social	❒ Aesthetics	LOW	❒ Site to be restored in its original shape	LOW	EPC Team of SRIPL-4	Site Inspection, community consultation	--	SRIPL-4 Team

8.1 Environmental Monitoring Plan

The Environmental Monitoring Plan is formulated to ensure and demonstrate compliance with the regulatory and Institutional Agency's EHS requirements. Monitoring of environmental and social parameters and comparing them with benchmarks set by regulatory and institutional authorities will help SRIPL-4 assess in the environmental performance and identify gaps or non-conformance ensuring immediate actions.

Corporate Social Responsibility (CSR)

Construction Phase

With an intention to empower the local community particularly vulnerable category in project impacted area, Community Development initiatives on various social identified issues can be designed and incorporated under CSR policy of the project proponent.

The project proponent will develop their own CSR activity in line with Serentica's existing CSR vision, principles and values, for delineating its responsibility in contributing to social cause as a responsible corporate citizen. The proposed CSR activities will reflect identified areas of intervention, target audiences and purposes of undertaking various development interventions in accordance with Section 135 of the Companies Act 2013 and CSR guidelines of Serentica. As per CSR Policy, Project Proponent is committed to inclusive growth while facilitating active involvement of local stakeholders to promote fundamental value.

Operation Phase

The CSR activity must continue during Operation Phase to comply with the need and requirement of the issues identified for development purposes while avoiding any community conflict during operation phase.

9 Categorization of Project as per IFC guideline

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

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

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

The project can be categorized as **Category B** as per IFC considering the fact that all suggested mitigation measures are implemented throughout the life cycle of the project.

10 Information Disclosure, Consultation and Participation

As per information disclosure requirement, client shall ensure that relevant information about environmental and social risks and impacts of the Project is made available in the Project area in a timely and accessible manner, and in a form and language(s) understandable to the project-affected people, other stakeholders, and the general public, so they can provide meaningful inputs into the implementation of the project. Environmental and social assessment reports, project specific ESMP, other approved forms of documentation such as monitoring reports, mitigation measure, grievance register etc shall be available in the project site office.

Based on the secondary research and study of local news/channel, and also confirm by the Revenue Officer/ Local NGO and Sarpanch (Village Head) that there is no negative information available either in print or electronic media about the project and project area. At the time of stakeholders' consultation as well as field visit, no agitation against the project has been noticed or reported as confirmed by the Sarpanch (Village Head) of the project area. From the stakeholder consultations conducted by the consultant, it can be concluded that the perception of land contributors/ owners is positive about the proposed Wind Project. Villagers found satisfied with land leasing procedure as it will help them to preserve their ownership rights on land. During consultation, villagers expressed their positive expectations with proposed project. They are expecting for employment opportunity, community development programs etc.

SRIPL-4 and its contractors would ensure that recommendations of the report mentioned in the Environmental Social Management Plan (ESMP) shall be implemented during the project's construction, operation, and decommissioning phase. All the resources required for the implementation of the different subcomponents of the plan would be provided by SRIPL-4 and its contractors.

11 Conclusion and Recommendation

The project is categorized as **Category B** as per IFC on the condition that the mitigation measures implemented throughout the life cycle of the project. The project should be constructed and operated as per the latest legal regulation**.**

An environment and social analysis have been carried out considering physical environment (climate and rainfall, topography, geology, etc.), biological environment (flora & fauna, natural/ critical habitat) and socio-economic environment (demography, community and employee health, land and labour etc.).

Brief Assessment of Project:

- **Location of project site w.r.t ecologically sensitive area:** Naigaon Peacock Sanctuary is an important habitat for birds in the area. Naigaon Peacock Sanctuary is protected for the conservation of the Indian Peafowl which is protected under Schedule I of WPA, 1972. The project area is around 29 km from Naigaon Peacock Sanctuary.
- **Presence of Important Faunal Species:** Presence of Important Faunal Species: With the field survey findings the project area is recorded with Asian Woollyneck (Ciconia episeopus), Painted stork (Mycteria leucocephala), Red-Necked Falcon (Falco chicquera) and Black-headed Ibis (Threskiornis melanocephalus) which are under near threatened category according to IUCN Red List. River Tern (Sterna aurantia) was also observed at one of the survey locations which is Vulnerable as per IUCN Red List. Besides these, Oriental Honey Buzzard (Pernis ptilorhynchus), Black-shouldered kite (Flanus axillaris), White-eyed Buzzard (Butastur teesa) were also observed in the study area which falls under Schedule-I species under Wildlife Protection Act, 1972.
- **Land Acquisition:** An estimated total land of approx. 752 acres will be required for the proposed wind project development.
- **Advantage of the proposed plant:** The 350 MW proposed plant is located in private land – mixed of agricultural and scrub land wherein land and other facilities will be developed by SRIPL-4.
- **Source of Pollution:** The wind project is based on clean technology and does not likely to cause any significant pollution. Further, the project will help to reduce GHG emissions.
- **Resettlement:** No resettlement and rehabilitation involved in the project.
- **Community Willingness:** Community is aware about the project and has not shown any unwillingness for the project as the project does not have any negative impact on the community. On a review of the detail community consultation undertaken, no uncertainty or doubt on the project activities has been observed among the locals. The community hence seem to be receptive about the upcoming proposed wind project.
- **Project Benefit:** The produced electricity will be evacuated to the state electricity grid and will help to cater the energy requirement.
- **CSR plan:** The CSR plan focused on community development will be implemented by the SRIPL-4.

There is no adverse impact on the nature of habitat, any natural existing land resources and effect in the regular life of people. Most impacts are expected to occur during the construction phase which are considered to be of a temporary in nature. The main project impacts are associated with clearing of shrub vegetation, waste management and excavation and movement of soils. From this perspective, the project is expected to have a small "environmental footprint". Adequate provisions have been made for the environmental mitigation and monitoring of predicted impacts. SRIPL 4 will ensure that all WTGs are in line with prevailing guidelines of MNRE & IFC.

The project will have number of positive impacts which are as follows:

- During the construction phase, there will be both direct (drivers, vehicle vendors, contractors,

watchmen) as well indirect employment generation (commercial establishments. small shops near the site).

- During operation phase, income generating avenues of the locals (small shops, local authorized water supplier, driver etc.) will also enhance.
- Natural drainage channels/ reservoirs in the study area should not be disturbed. To rule out future storm water problems, storm water channels are planned along the periphery of the project site.

In view of above, it can be concluded that the upcoming wind project site will not degrade the quality of the surrounding environment. At the same time, the socio-economic conditions of the surrounding area and power scenario will get better.

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