Draft Environmental and Social Impact Assessment

Project Number: 49241-001
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IND: Mytrah Wind and Solar Power Development Project
- Nidhi Wind Power Project

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INTRODUCTION

Mytrah Energy (India) Limited ('Company' or 'MEIL') is developing a wind farm of 90.1 MW capacity at Habur and Mokal villages in Jaisalmer District of Rajasthan. ERM (also referred as "consulting firm") has been commissioned by MEIL to conduct an Environmental and Social Impact Assessment Study (ESIA) for the Project.

Project Description

The Key components of proposed wind farm includes 53 Wind Turbine Generators (WTGs), a pooling sub-station (PSS), internal and external transmission lines, access roads and additional project infrastructure as metering point, 4 vacuum circuit breaker (VCB) yards, material storage yard, scrap yard and, central monitoring station (CMS) building. The Project is presently in the pre-construction stage. The WTG is of GE -1.7/103 make with rated capacity of 1.7 MW. The Project is proposed to have a 132/33 kV pooling substation and metering facility.

The proposed Project site is located in area of 412.1Ha (land requirement for WTGs, substation, internal access roads etc.), government land (culturable waste land[1]) in the villages of Poonamnagar (Habur) and Mokal in the district and sub-division (tehsil) of Jaisalmer in Rajasthan. The project site is approximately 50 km north-west of Jaisalmer city, which is the administrative headquarters of the district.

The Project is proposed to have a 132/33 kV pooling substation and metering facility in between - the WTG locations NDH -20 and NDH – 21. The pooling sub-station is planned to be connected to the existing Rajasthan Rajya Vidyut Prasaran Nigam Ltd. (RVPNL) 400/220/132/33 GSS kV Substation at Ramgarh through external 132 kV transmission lines. The length of this line is going to be approximately 29 km and will be comprised of 70 towers. This transmission line route, will be passing through the villages of Punam nagar, Serawa, Sanu, Hema ki dhani, Hema, Biprasar, Biprasar netsi, Nawalsingh ki dhani, Minion ki dhani, Nala kharin and Ramgarh. .The transmission line will be running almost parallel to existing transmission lines of other projects. The transmission line does not pass through any forest area or close to perennial water bodies and human settlements. Internal transmission lines of 33 kV are proposed to connect each WTG to the pooling sub-station within the Project

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

site. The total length of the line will be 44 km having about 1200 poles and passing through villages Punam nagar and Mokala.

The nearest access point to the Project area lies approximately 4 km north of Habur village from which a 3 km long access road is being constructed to the Project area. Presently, there are no internal roads inside the Project area and the whole area has to be traversed using a network of dirt roads. Though the exact length of the internal access road is presently not known, it is understood that the land will be culturable waste land and will fall under 412.1 ha of land allotted for the project.

The proposed Project is being developed by MEIL under its self-development model[1]. Under this model, the Company is acting as the main engineering procurement and construction (EPC) contractor and will also be performing the operation and maintenance of the proposed Project. There will be about 12 contractors engaged for various construction related activities ranging from supply of WTGs, civil works, construction of WTG foundations, roads, transmission lines etc. About 25-300 labour will be engaged depending upon the stage of construction and about 10-15 employees from MEIL and its consultants will be on-site during the construction phase. Most labour will be engaged from the local area and interstate migrant labour[2] will be accommodated in a facility provided through contractors in the nearby area. During the operational phase, there will be 20 technical staff and about 30 security staff working.

Water requirement will be met through procurement via tankers sourcing water from Amar Sagar, Jaisalmer or partly from local village bore wells, the contract for which will be awarded to the local contractors from the villages, as is the norm for other projects in nearby villages, and is also a demand from the local community. Drinking water will be supplied through purchase of bottled water during both the construction and operations phases. Most of the raw materials for construction and other supplies will be procured from Jaisalmer city. Batching plant will be set up in the Habur Area near Mokal Village. Power requirement will be met through 14 DG sets of varying capacities (63 to 250 KVA) during the construction phase.

There will be provisions for fugitive emissions and dust control as maintaining vehicular speed to 10-15 km/hr, proper maintenance of vehicles; diesel generator (DG) sets with adequate stack heights, provisions of enclosure around batching plant etc. For reducing noise generation, DG sets with acoustic enclosure will be used etc. The waste generated will be mainly construction debris, domestic waste, packaging materials, used oil, oil contaminated rags for which provisions have been specified for management

[1] In the other model, MEIL undertakes project development through the turn key model. In this MEIL gives EPC and O&M contracts to other developments.

[2] Any person who is recruited by or through a contractor in one state under an agreement or other arrangement for employment in an establishment in another State, whether with or without the knowledge of the principal employer in relation to such establishment (the Inter State Migrant Workmen (regulation of Employment and Conditions of Service) Act 1979)

and disposal. Wastewater management will be done through septic tanks and soak pits for both phases. There will be appropriate firefighting system and equipment provided for fire safety and prevention.

As per the organization structure, the day to day HSE related activities on site will be overlooked by respective department Engineers who in turn will report to the Project Manager (Site head). The Site head will report to Corporate Project head and Corporate HSE head (planned) for various aspects during the construction phase as well as operational phase.

Land requirement and allotment process

As the developer of the project, MEIL is engaged in the land identification and procurement for the project, as well as the construction of the internal roads, the internal transmission line (132 KV), pooling substation and the civil foundation works activities. It is also understood that 412.1 ha of land have been allotted to the project and approximately 0.64 ha will be required for each of the WTGs. The remaining land requirement pertains to the requirement for the Pooling substation (2 Ha in Habur village), Labour Camp (1 Ha in Habur and Mokla village), project site office (0.01 ha in) and 4 batching plants (0.09 ha each, 3 in Habur and 1 in Mokla). The land for the WTGs is comprised of government land/ revenue land, categorised as culturable waste land. The land has been allotted to the project vide allotment letter No. P. (12) (3) (37) (Registration no. 117/2004) Revenue 2011/5148 dated 19/07/2012. This land allotment was further extended for another two years vide letter no. P 2 (479) Raj 3/11 dated 29/07/2015. The land for the other associated project components such as pooling substation, transmission line, internal access roads and labour camp is comprised of primarily government land.

The project area does not fall under Schedule V areas as defined by the Indian Constitution. No tribal land has been identified for the project so far. The land requirement for the project is comprised of government land which will not result in landlessness or economic vulnerability for the owner. Furthermore, the government land identified for the project is comprised of only 1.2% of the total area in the villages impacted, and is thereby expected to have negligible impact on the land availability and use in the area. The project does not require any forest land. No cultural heritage sites were identified in the project area or in a radius of 5 km (i.e. the Area of Influence, or AoI[1], set for all project receptors in the impact assessment).

Due to the low productivity of land in the area and scarcity of rainfall/irrigation, the local community undertakes opportunistic cultivation on the government land surrounding the villages in case of good rainfall

[1] The effects of the Project and Project activities on a particular resource or receptor will have spatial (distance) and temporal (time) dimensions, the scale of which is dependent on a number of factors. These factors are incorporated in the definition of the Project's Area of Influence (AoI). The AoI considered for the existing project with respect to the environmental and social resources have been defined in detail under section 6.2.1.

(which generally happens every 4-5 years). This cultivation is mostly of food grains in the monsoon season (Kharif), used for self-consumption of the cultivators and is heavily dependent upon the level of rainfall. As it is government land, with no recognized private rights the cultivators are recognized as encroachers and penalised for usage of the same by the government,, however are allowed to complete the crop cycle. While the community considers this as claim over the land, it is not recognized by the state law. Also, across monsoon cycles, the cultivators are known to shift locations, thereby not being associated with any particular piece of land.

Though, during the first site visit, no encroachments were observed on the land parcels identified; however, on visiting the site a month later (during peak monsoons in August), cultivation was observed on government land resultant from good rainfall in the region. However, this is understood to be opportunistic and entirely dependent upon the rainfall in the region. The land identified for the project is used by the community for grazing and commuting purposes. According to the discussions with the local community, as the AoI is characterised by large tracts of open government land with the project impacting only 1.19% of the total land in the AoI, the project will not have a significant impact on the grazing land/common land availability. Nevertheless it is understood that upon the initiation of construction activities, all cases of encroachments or claims on land were assessed and where appropriate a onetime negotiated amount was paid to the local community. This amount ranged between INR 30,000 to INR 16,00,000.

The land procurement for the project has been undertaken by the project team of MEIL, which comprises of three individuals, working at the project level. It is understood that no third party or land aggregators were engaged for the project.

Baseline

The Project area comprises largely of flat land with average elevation of 222 m above the Mean Sea Level (MSL) with one WTG location lying 253 m above the MSL on a sand hill. The study area considered for ESIA includes an area within 5 km radius from wind farm area of WTGs. The study area of 5 km has been selected based on the location of Project site and its footprint, nature and spatial distribution of potential social and environmental impacts (based on similar type of projects). No national park, Reserve forest, wildlife sanctuaries, biosphere reserves, notified historical or cultural sites are located within the study area. Physically, there is no demarcation or fencing for the Project Site boundary and hence it is contiguous with the rest of the area.

ERM undertook a site visit (11th July to 15th July, 2015) to understand the site setting, environmental and social sensitivities and to identify the relevant local stakeholders. This was followed by an additional site visit with ADB on 25th August 2015.

Landuse

The Project area lies in a predominantly sandy area characterised by sparse scrub covering 59.61% of the geographical area, followed by grass and open scrub 24.28%, stony waste 5.65%, dunes 5.18%, agriculture 2.29%, gravel waste 2.23% and rest under settlement, road and water bodies.

Topography

Topography of the AoI was observed to be flat land with one sand dune lying near the WTG location NDH – 26 (see ***Figure 2.1***for location). The elevation in 1 km radius from the Project boundary ranges from 216 m to 253 m above msl.

Soil

The top soil in the AoI consists of Aeolian sand with gravel particles and pebbles. Secondary information[1] suggests that soil in the area is stony, sandy, and mostly infertile.

Hydrogeology and drainage pattern

There are no perennial rivers in Jaisalmer District, which lies in the watershed area of Barmer basin. There are no natural lakes or ponds as the region has very low rainfall. A few ephemeral streams appear on land during rainfall, and water accumulates in certain low lying areas, but the water is shallow and drains into the sand very quickly. In the AoI, no perennial ponds were observed, though few seasonal ponds were observed which due to lack of rainfall were observed to be dry. The villagers in the AoI are primarily dependent on groundwater for meeting agricultural and domestic needs.

Climate and Meteorology

As per the data recorded at meteorological station, Jaisalmer, May and June are the hottest months with highest temperature of 41.6 degree Centigrade recorded in May month. The lowest temperature of 23.7 degree Centigrade was recorded in month of January. The total annual rainfall in the region is about 208 mm. The maximum rainfall was observed during month of August (75.8 mm) and minimum during the month of November (1.5 mm). Anticipated risk of climate change for Project Nidhi is covered in detail in Annexure C. Based on the details, it is anticipated that wind speed changes would not occur in immediate 10 years.

Natural Hazards

[1] Roy B. B et al. Soils of Rajasthan Desert and their Characteristics. Cetral Arid Zone Research Institute. http://www.dli.gov.in/data_copy/upload/INSA/INSA_2/20005a14_161.pdf

The Project area falls in Seismic Zone III which is defined as a moderate damage risk zone and vulnerable to earthquakes of intensity MSK VII (as defined by the BMTPC). The Project area falls in High Damage Risk Zone – B (Vb=47 m/s). The Project site and AoI do not fall under flood prone areas.

Ambient Noise

Noise Level was recorded at one (1) location at Kunp Singh ki Dhani which is the nearest habitation (800 m from NDH-8, south-southwest) to the Project Area. The Leq was recorded to be 53. 1 dB(A) during daytime and 44.5 dB(A) during night time which are within the Central Pollution Control Board (CPCB) standards for residential landuse. Slightly high noise levels during night i.e. 44.5 dB(A) which is close to the standard of 45 dB(A), are attributed to high wind speeds during the period and some vehicular movement.

Ecological baseline

Ecological baseline studies were undertaken during the month of July, 2015 (11th to 15th). Habitats observed in the study area are grasslands, agricultural land and gravel waste area. The study area is predominantly a grassland habitat. These grasslands are dominated by "Sewan" *Lasiurus sindicus* type grasses. The other associated grass species from the area are *Panicum antidotale*, *Cenchrus bifloris, Cenchrus ciliaris, Dactyloctenium sindicum, Aristida funiculate, Tragus racemosa, Cyperus bulbosus, Cymbopogon jwarancusa, Aristida mutabilis* and *Panicum turgidum*.

Beside grasses, isolated tree species are predominantly of *Prosopis cineraria*, *Acacia nilotica and Acacia catechu, Acacia senegal* and shrubs of *Salvadora oleoide and Capparis decidua* are also present in the study area. Smaller shrubs of *Salvadora oleoides, Euphorbia nerifolia, Calatropis procera*, "Bui" (*Aerva tomentora*), "Kair" (*Capparis decidua*), Phog (*Calligonum polygonoides*), *Tecomella undulata, Salvadora persica* and *Zizyphus nummularia* and "Kheep" (*Leptadenia pyrotechnica*) are commonly found in the area.

A total of eight (8) species of Reptiles belonging to 4 families were observed from the study area. Monitor Lizard (*Varanus bengalensis*) and Desert Monitor Lizard (*Varanus griseus*) has been listed as Sch.I and Spiny Tailed Lizard (*Saara hardwickii*) has been listed as Sch. II of Wildlife Protection Act and bear conservational significance. As the study area is devoid of surface waterbody, amphibian could not be spotted in the study area.

A total of 55 Avifaunal species were observed/reported from the study area during the ESIA study. Great Indian bustard (*Ardeotis nigriceps*), Long Billed Vulture (*Gyps indicus*) and Red Headed Vulture (*Sarcogyps calvus*) reported from the study area based on community consultations with local shepherds, are listed as critically endangered as per IUCN (*2015 ver.2*) Egyptian Vulture (*Neophron percnopterus*) observed is Endangered as per IUCN (*2015 ver.2*), MacQueen's bustard (*Chlamydotis macqueenii*) and Imperial Eagle (*Aquila heliaca*) reported are Vulnerable as per IUCN (*2015 ver.2*) and Pallid Harrier

(*Circus macrourus*) and Laggar Falcon (*Falco jugger*) are listed as Near Threatened as per IUCN (*2015 ver.2*) as Red data list categorization.

Great Indian bustard (*Ardeotis nigriceps*), MacQueen's bustard (*Chlamydotis macqueenii*), Shikra (*Accipiter badius*), White Eyed Buzzard (*Butastur teesa*), Black Shouldered Kite (*Elanus caeruleus*), Long Billed Vulture (*Gyps indicus*), Red Headed Vulture (*Sarcogyps calvus*), Short Toed Snake Eagle (*Circaetus gallicus*), Pallid Harrier (*Circus macrourus*), Montagu's Harrier (*Circus pygargus*), White Eyed Buzzard (*Butastur teesa*), Common Buzzard (*Buteo buteo*), Long legged Buzzard (*Buteo ruffinis*), Tawny Eagle (*Aquila vindhinna*), Egyptian Vulture (*Neophron percnopterus*), Imperial Eagle (*Aquila heliacal*), Merlin (*Falco columbarius*), Laggar Falcon (*Falco jugger*), Common Kestrel (*Falco tinnunculus*) and Indian peafowl (*Pavo cristatus*) are listed as Schedule I species of Wildlife Protection Act, 1972.

Ten (10) species are reported migratory species and thus bear protection from killing under Convention of Migratory Species (CMS) to which India is a signatory.

A total of 9 species of mammals of 9 genera belonging to 7 families were observed/ reported from the study area. `Indian Gazelle (*Gazella bennettii*) and Asiatic Wild Cat (*Felis sylvestris*) are listed as Sch. I species as per Wildlife Protection Act, 1972.

The wind farm site is in north direction at a distance of 16 km (approx.) from the Desert National Park. The Desert National Park (IN-RJ-03 - A1= Threatened species; A3=Biome species) is an Important Bird Area (IBAs) identified by Birdlife International. This Important Bird Area (IBA) is known to harbour 4 critically endangered species, 3 vulnerable species, and 1 near threatened species. The Desert National Park however, does not fall within the area of influence of the project. Additional study during the migratory season will be used to assess, whether the site falls within the migratory route or not.

Initial bird and bat survey to understand the impacts of bird and bat were undertaken during the current migratory season (from 6th to 15th Nov. 2015). The baseline data for birds and bats during the migratory season was collected. The activities included in the survey were waterbody survey within 5 km area of the wind farm boundary to assess the presence of migratory birds, Livestock carcass monitoring in order to assess the presence of scavenging vultures, Bird carcass survey in the adjoining Mokal wind farm of Suzlon to understand birds under risk of collision and electrocution.

IEE Section 6.5.6 provides the migratory route in the Central Asian migratory flyways. According to this, there are two species that may have flyways coinciding in the study area: the Demoiselle crane (*Anthropoides virgo*) and the Northern wheatear (*Oenanthe oenanthe*). Both species are however Least Concern (LC) in the IUCN red-list (version 2015.4) and not listed in Schedule I of the IWPA (1972). However, despite the reported overlap of the migratory route none of the either species were observed at the wind farm site during

ESIA Study (July 2015), initial bird and bat survey (Nov. 2015) and long term bird and bat study-First Phase (March 2016).
During the initial migratory survey some collisions were recorded for raptors (Steppe Eagle IUCN-EN v4, 2015) and migratory vultures (Eurasian Griffon IUCN-LC v4, 2015) in the adjoining Mokal wind farms (approximately 1 km from Nidhi Site) which are operational for the last four (04) years. The first phase of the long term bird and bat survey (February 2016) also recorded collision of the above species in the adjoining Mokal wind farm (on north west of Nidhi Site), adjoining Ostro wind farm operational since last 6 month (in southwest of Nidhi Site) and adjoining Tanot Power Wind Farm (South of Nidhi site) operational from 4 months.
Migratory species such as water-birds were not recorded near the Nidhi site due to the absence of perennial surface water bodies.
In addition to the above species the following threatened species in IUCN V 2015.4 2 species were recorded at the wind farm site during the initialsurvey; the Red-headed Vulture (*Sarcogyps calvus*) and White-rumped Vulture (*Gyps bengalensis*) Critically Endangered (CR); the Steppe Eagle (*Aquila nepalensis*) and Egyptian Vulture (*Neophron percnopterus* Endangered (EN). These species were also recorded during the first phase of the long term survey (February 2016).
Mortality of the Eurasian griffon indicates that other vulture species flying at similar height are at risk of potential collision. However all of these vulture species are widespread across Indian Sub-continent. It is unlikely that mortality at this site will be responsible for any decline of their population. The presence of these vulture species is primarily linked to the dead carcass at the site. The mitigation lies in the better carcass disposal which can be easily undertaken by the project. An electrocution of a steppe eagle was observed. The species is adversely affected by power lines and is highly vulnerable to the impacts of potential wind energy developments (Strix 2012, Meyburg and Boesman 2013). However steppe eagleis widely distributed in Rajasthan as well as all across India in winter and we cannot attribute any cause for population decline to this site.

Socio-economic baseline

For administrative purposes, Jaisalmer is divided in four sub-divisions or tehsils. The Project lies in the Jaisalmer tehsil and is surrounded by the villages of Poonamnagar (Habur), Mokal and Serawa, the nearest of these being Habur villages, lying approximately 5 km west. No other villages or settlements are located in the wind farm area.

As per the 2011 Census, the AoI, covering 3 villages in the 5 km radius, has a total of 693 households and a population of 4,104. The average household size in the AoI is 6 individuals per HH. Habur village is the closest from the project and has the maximum population of 2,569 individuals. The AoI has a negative sex ratio of 911. The entire population in the AoI falls in the rural category and the proportion of SC population is quite varied across the AoI villages, tehsil and the district. There is considerable presence of tribal population in the district, but the AoI houses negligible ST population,

compared to the tehsil and the district. The majority of SC population consists of Meghwals, Manganiars, Suthars and Dholis. According to the information made available during the consultations and the visual observations during the site visit, it is understood that the vulnerability in the AoI is based on the economic status of the households, and is not defined by the social group of the population. The vulnerable groups identified are women, women headed households and Below the Poverty Line people[1].

As reported during consultations, the culturable wasteland is used for agricultural purposes by the villagers in case of good rainfall in a particular year for which they pay fines/Penalties to the Government for the land use, any year it is used for cultivation, without any claim over ownership of land. In addition, the desert climate, sandy soil and erratic rainfall renders overall low agricultural productivity in comparison to the non-desert regions.

The villages in the AoI exhibit relatively higher literacy rates (for males and females both), compared to the Tehsil and the District level literacy rates. The AoI has 34% working population, out of which majority of the population is classified as "main workers", i.e., they are employed for more than six months in a year. The area has witnessed economic activity in the form of wind projects coming up over a period of almost 4 years. The livelihood profile of the villages in the AoI vary based on the proximity of wind power projects as the presence of wind projects has resulted in a shift from complete dependence on agriculture to partial dependence to farm and non-farm based activities. Some of the key economic opportunities resultant from the Wind Energy projects in the area comprise of locals securing jobs as security guards and people providing their vehicles for use in the project.

The primary crops in the region comprise of pearl millet, cluster bean (guar) and moth bean (moong) amongst Kharif crops and gram, mustard and isabgol being the Rabi crops. The dependence on monsoons for agriculture is high and is resultant from the lack of irrigation canals in the region, low water retention of the soil, hard quality and greater depth of ground water (500-600 feet). Apart from agriculture, livestock holdings play an important part in the livelihoods of the community, in terms of providing extra income in addition to meeting the nutritional intake of the household.

The AoI is characterised by poor sanitation facilities which increases the risk of diseases amongst people. The status of water availability also varies across the three villages. Habur has a well-established network of water resources, with bore wells, uncovered wells, hand pumps and water tanks serving the village population. Serawa and Mokal villages however face a scarcity of fresh water resources as there is no bore well in the villages and the people have to fetch water from bore-wells in nearby villages and ponds. It is reported that

[1] The poverty line is an economic benchmark and poverty threshold used by the Government of India to indicate economic disadvantage and to identify individuals and households in need of government assistance and aid. As of July 2014, the poverty line in rural areas is identified as Rs 32 a day and in urban areas as Rs 47 a day.

all the three villages in the AoI have access to the medical facilities at Sub Health Centres, and Habur has a PHC.

Impact Assessment

The following section provides a brief summary of impacts drawn from ***Section 7***. The project activities that would result in impacts are as follows:

- Site preparation as clearance of vegetation;
- Construction of temporary structures such as construction site office, store yard, labour accommodation, batching plant;
- Construction/ upgrade of access roads;
- Vehicular movement for transportation of WTG components and construction materials;
- Movement of construction equipment such as cranes, excavators, dumpers, trucks;
- Civil works for foundations excavation, construction related activity at each WTG location;
- Erection of WTGs and associated transformer yards;
- Construction of permanent site office;
- Operations and scheduled maintenance of the WTGs, transmission lines; and
- Removal of WTGs and elated infrastructure during decommissioning.

Change in Land use

As the Project Area is mainly sandy area and sparse scrub, the land resource use sensitivity is low. As a result, the impact significance is assessed to be minor. The residual impact is expected vary from negligible to minor post implementation of mitigation measures.

Impacts on land and soil environment

Soil erosion

During the construction phase, top soil will be susceptible to erosion to some extent due to site clearance activities. The scale of site clearance activities would be small at WTG footprints at different parcel of lands, whereas in areas of new internal road construction, excavated loose soil would be susceptible to erosion. As the project is located in dry sandy land and during the visit the surface water bodies were observed to be dry, which, reportedly is the case during most of the year due to scanty rainfall, indirect impacts of soil erosion on waterways are not expected; though it would contribute to the higher levels of particulate matter in ambient air quality. Significance of impact of soil erosion is considered negligible.

Soil compaction

The project will undertake the soil compaction activity to ensure soil stability during the establishment of storage areas for WTG components, access road, installation of batching plant, establishment of substation, CMS building etc. During construction activities, there would be compaction of soil in the project area during movement of vehicles/ construction machinery and work force movement. In addition, laying of electrical wires in the agricultural field during erection of internal and external transmission lines will also lead to the compaction of soil to certain extent. Routes will be designated for heavy vehicle movement. The significance of impact is considered negligible.

Impact on land due to improper waste disposal

General construction waste and municipal domestic wastes will be generated. A small proportion of the waste generated during construction phase will be hazardous and may include used oil, hydraulic fluids, waste fuel, grease and waste oil containing rags. If improperly managed, these wastes could create impacts on land. Workers will be strictly instructed about random disposal of any waste generated from the construction activity and construction contractor shall ensure that no unauthorized dumping of used oil and other hazardous wastes is undertaken. The impact significance is assessed as minor and residual impact will be negligible post implementation of mitigation measures.

During operation phase, the waste generated from project will include domestic solid waste at SCADA building, Central Monitoring Station (CMS) and substation and hazardous waste like waste oil and lubricants and oil containing jutes and rags will be generated during maintenance activities. The quantity of hazardous waste generated will be much lesser quantity than during the construction stage. With proper waste management the impact significance is assessed as negligible.

Soil contamination due to leaks and spills

Soil contamination during the construction phase may result from leaks and spills of oil, lubricants, or fuel from heavy equipment, improper handling of chemical/fuel storage and wastewater. Such spills could have a long-term impact on soil quality, but are expected to be localised in nature. Spill control measures such as the storage and handling of chemicals and fuel in concrete areas with secondary containment will be implemented to minimize impacts in the event of a spill. The impact significance is considered to be minor. The significance of impact will be reduced to negligible on implementation of mitigation measures.

During operation phase, the probability of the impact is only during WTG maintenance and therefore occasional. In case of accidental spillage, the impacts will be confined to the WTG land parcels and storage area. The impact significance is assessed as negligible.

Impact on Water Resources

The impacts of proposed project on water environment are assessed with respect to

- Decreased water availability form the water resources of the area due to consumption of water for carrying out project activities; and
- Decreased water quality due to wastewater release and spills/leaks from project activities.

The sensitivity of water resource in the area is considered as medium due to the fact that the project area is generally a dry area with very little rainfall, hardly any surface water bodies and experiences shortage of water. The impact on water availability was assessed as minor. The direct negative impact on water resources due to construction activities will be short term and limited mainly to construction phase of the project. Also the requirement will be in a phased manner and procured mostly from Jaisalmer city or partly from Kushari village. The significance of impact will be negligible to minor on implementation of mitigation measures.

Around 4 m3/day water is required during operation phase to meet domestic requirements of O&M staff and for use in the SCADA building and sub-station complex. The overall significance of impacts on water availability due to operational activities is assessed as negligible.

There are no surface water bodies in vicinity of the foot print area which could be directly impacted from project activities. Groundwater levels are very deep due to deep aquifers and chances of contamination from project activities is considered low. The impact is assessed to be negligible. During operation phase, there will be no wastewater generation from the power generation process. Only sewage would be generated from substation and CMS building and this will also be of negligible quantity. The estimated sewage generation from project site will be less than 2 m^3/day. The overall significance of impacts on water quality due to operational activities is assessed as negligible.

Air Quality

There are no receptors falling within 500 m of any of the WTGs as well as near access roads/dirt tracks to be used for the project and the overall impacts are assessed to be negligible.

Ambient noise levels

There are no settlements within the project foot print area, hence the increase in ambient noise levels are not likely to be experienced by any communities. Further, there are no receptors near the dirt tracks or paved roads lying in the Project area or on the access roads to the Project area for Jaisalmer town. There are herders and animals grazing during day time which may cause some discomfort. All the noise generating equipment such as DG sets, batching plant etc. will be located away from village settlement and impact significance is assessed as negligible.

Ecological Impacts

The wind farm area is devoid of any major or large vegetation patch. The construction area is revenue land, the associated ecological impacts of the construction phase are due to following construction activities;

i. clearance of vegetation for storage yards;
ii. laying of WTG foundation and WTG installation
iii. laying of transmission lines and transmission towers

The impacts of vegetation clearance will be both direct and indirect and limited to construction phase of the project. Overall impact significance of the vegetation clearance is assessed as minor.

The transmission line does not pass through any forest land and is located far from any waterbody. The ecological impact from the construction of transmission line and substation will be minor.

The WTG foundation laying and WTG component installation will require camping/ of work force on site, movement of vehicles for transportation of man and material, construction noise due to excavation etc. Noise generated by construction activities and vehicle movement may further disturb the wild life movement in the nearby areas. The impact significance of construction of WTG foundation and installation of WTG is assessed as minor.

Movement of vehicles in unpaved roads often leads to dust deposition on nearby vegetation areas and which may affect photosynthesis, respiration, transpiration and overall affect the productivity. In addition, the construction of new approach roads will lead to reduction in native species diversity of the area and may facilitate introduction of exotic and invasive species and subsequently their range expansion. Unregulated vehicle speed on such roads also leads to road kills of herpetofauna and moving wildlife such as Indian Gazelle which will impact their movement areas. Impact due to laying of approach road is assessed as moderate. With the implementation of the suggestive measures, the residual impacts will be minor.

During operation phase mortality of avifauna due to collision risk and electrocution is assessed as moderate. After implementation of mitigation measures, the significance of the impacts will be reduced to minor.

As the survey was undertaken in the non-migratory season impacts on the actual numbers of migratory birds visiting the area during migratory season (October-February) was not captured in the present study. Requirement of survey was established during migratory season (mainly October-February) to understand the migratory bird status of the study area. The adjoining operational wind farm at Mokal, where Mytrah has 20 nos. of operating WTGs was suggested to be surveyed in the month of October (Migratory Season-October to March) when the country starts receiving migratory birds from the central Asian countries. The operation wind farm site was selected for survey for any possible collision evidences of birds with wind turbines which could

be expected to the proposed wind farm site. The suggested monitoring should be cover the entire wind farm site for at least 10-15 days. This data is helpful to identify the species at risk of collision at proposed wind farm area. In case of the significant findings it was suggested that the study should be extended to cover the entire migratory season ; so that on the basis of the findings of the long term study, suitable mitigation measures can be suggested after identification of the magnitude of the risk.

To capture the impact of wind farms during the migratory season an initial bird and bat survey was conducted from 6th to 15th November 2015. The impacts identified based on bird carcass survey at the adjoining operational Mokal wind farm site for the bird and bat population are collision with wind turbines and electrocution with the internal and external transmission line. The evidences of bird collision with operational wind turbine and electrocution of birds with transmission lines were collected. Based on the initial bird and bat survey,the resource sensitivity is categorized to be high as the wind farm area is used by globally threatened species. The impacts to these species due to collision risk and electrocution is assessed as medium. Thereby, the impact significance of collision risk and electrocution of the bird species is assessed as major. Mitigation measures were suggested and robust implementation of these measures shall reduce the residual impact to moderate.

The transmission line from the Pooling Substation to Government Sub Station will be passing through villages Punam nagar, Serawa, Sanu, Hema ki Dhani, Hema, Biprasar, Biprasar Netsi, Nawal Singh ki Dhani, Minion ki Dhani, Nala Kharin and Ramgarh. No forest land was identified on the transmission route. The transmission line also passes along the pre-existing transmission route line. The IUCN listed threatened species identified at the adjoining operation Mokal wind power site have large home range (area for search of food) and the transmission route is well within the home range. The cumulative impacts of all the transmission lines is unlikely as these line have sufficient space between two conductors hence the chances of electrocution risk is minimal. The mitigation measures such as livestock carcass management suggested for the project site also holds good for the cumulative impacts due to transmission lines.

Community Health and Safety

The receptors for impacts on community health and safety include the local community within the AoI who may be present in the vicinity of the project activities, for grazing purposes or while commuting. The construction phase activities such as the erection of the WTGs, construction of the transmission line and substations and movement of material and personnel may result in impacts on the health and safety of the community. The impact significance is assessed as minor and residual impact varying from negligible to minor on implementation of mitigation measures.

Occupational Health and safety

The receptors of the impacts on occupational health and safety include the workers, both regular and contractual working on the project. The construction phase activities such as construction of WTGs, access roads, transmission lines and other project components and maintenance activities in the operations phase are likely to result in a risk on the health and safety of the workers on the project. The impact significance is assessed as minor and residual impact significance as negligible based on implementation of mitigation measures.

Impact on Economic opportunities

The primary receptors for impacts on economic opportunities are the local community within the AoI. The construction phase activities of the project including construction of access road, civil works, foundation activities, site clearance and security will involve semi-skilled and unskilled workers, who are likely to be recruited from the local community. The project is likely to also create a number of indirect economic opportunities in terms of hiring tractors, and setting up of tea shops.

During the operations phase, the employment opportunities will be reduced and restricted to the maintenance of access roads, hiring of cars and drivers, and a few security personnel and housekeeping staff at the site office. The significance of impact across both phases will be positive.

Labour Rights and Welfare

The projects will employ skilled, semi-skilled and un-skilled workers, across the project lifecycle, which will include contractual and regular employees and local and migrant workers. The contractual employees (local and migrants) will be employed through sub-contractors. The sub-contractor agreements require compliance to state and national rules and regulations which are in line with International Labour standards. The significance of impact is assessed as minor.

Impact on Indigenous Communities/ Vulnerable Groups

The AoI is characterised by a SC population of 22.2% and ST population of 0.2%. There is also no reported caste based distinction in terms of habitation patterns, with the various caste groups residing together in the villages. Reportedly, there is no difference across the social groups in terms of access to resources and economic opportunities. Vulnerability in the society is defined on the basis of the economic status of the households, and the difference in access to social, economic and political power between men and women. The vulnerable groups identified are women, women headed households and Below the Poverty Line People.

The land identified for the project is solely comprised of government land with only one plot of private land. Some of the land is used by the local community for grazing purposes, and does not have any specific SC/ST

group usage or attachment/association with the land identified for the project in terms of grazing, cultivation, water body and cultural/religious significance. The impact significance is assessed as minor and residual impact significance as negligible.

Analysis of Alternatives

Wind energy projects are non -polluting energy generation projects which are site specific and dependent on the availability of wind resource. The proposed wind power project site has the following location advantages:

- No ecological sensitive receptor such as national Parks, Wildlife Sanctuary, Reserve forest or protected forests within 10 km radius;
- No cultural property of archaeological importance within 3 km radius;
- No habitations falling within 500 m of any WTG

It will contribute towards the state of Rajasthan attaining self-sufficiency in power supply and generating a revenue stream through sale of excess electricity to power-deficient states in the Northern region.

Information Disclosure and consultation and participation

Keeping in mind the nature of the project and its setting, the stakeholders identified were categorized under community, institutional stakeholders, government bodies and other groups.

For the purpose of the Project, MEIL held open meetings with the local community to discuss the project and its implications for the community. The first meeting for the project was held in 2014, while the most recent meeting was held on 3rd July 2015, prior to the commencement of the construction activities for the substation and access road.

- As part of these meetings, information was provided about the project, its purpose, land requirements and the potential impacts on the community.
- On the basis of this information, the community provided a verbal agreement to the project and identified certain key areas for Corporate Social Responsibility (CSR) involvement by the company.
- A village Development Committee was established to channel funds for community development that will be provided by the company as part of its CSR activity. While MEIL has agreed to this, it is understood that presently no concrete CSR plan has been put in place, including the total budget, roles and responsibilities and timelines. The CSR activities will be conducted through the VDC in each village.
- As part of these meetings, the involvement of the community in the project was also discussed, in terms of manual labour, contracting opportunities for construction activities and vehicles to be hired by the project.

Key issues identified through the stakeholder consultations are:

- Preference of wind power projects than solar power projects (due to the nature of land requirement of the two sectors. Refer to ***Section 9.3.1***, for further details)
- Preference to local community in employment
- Community development activities

Grievance Redressal and engagement with the community

Presently, MEIL does not have a formal grievance redressal mechanism in place for external stakeholders. In order to manage these risks, MEIL needs an internal mechanism to allow the aggrieved party/s to lodge their complaints and get them amicably settled prior to approaching the formal legal mode of solutions.

However, according to the consultations undertaken with the local community and the project team, it was understood that the public meetings were used by the local community to voice any concerns. The local community representatives are also reported to have access to the contact information of the project team, who they approach on a need basis in case of any concern/grievance. However, this is an informal process and no records of such communication are maintained. A new internal unit and procedure will therefore be established which is provided in ***Section 10***.

The grievance redressal cell (GRC) will be driven internally by the Project team and shall have representation from the other teams to ensure fair and timely solution to the grievances. The GRC shall be led by a Grievance Officer, who can either be the site EHS officer or Community Relations Officer. The aggrieved party shall register their grievances with the GRC. The GRC shall be empowered to take a decision which is to be considered final and binding on the Project. However, the decision of the GRC is not binding on the aggrieved person and he or she may take the grievance to the administrative setup in case any grievance channel is available at that level or take a legal course, in case not satisfied with the outcome of GRC decision.

Environmental and Social Management Plan

The ESMP defines mitigation measures to minimize adverse impacts during different phases of project lifecycle, monitoring plan and responsibilities for its implementation.

MEIL management

MEIL has put an organisational structure in place with roles and responsibility for each of the verticals identified at the corporate as well as on site. MEIL will have a corporate EHS Head, who will be responsible for ensuring the implementation of the ESMP.

In addition to the Corporate EHS head, MEIL will have in place regional and project level Engineers looking after EHS. The roles and responsibilities

include the implementation of the ESMP, either by MEIL directly or through its partners or sub-contractors.

Inspection, monitoring and audit

Inspection and monitoring of the environmental and social impacts of the Project activities will increase the effectiveness of ESMP. Through the process of inspection and auditing, MEIL will ensure that the conditions stipulated in various permits are complied. The inspection and audits will be done by the project identified EHS staff and any other external agencies identified.

Reporting and documentation

MEIL will develop and implement a programme of regular reporting through the stages of the project lifecycle. The personnel delegated EHS roles shall be required to fully comply with the monitoring programme in terms of timely submissions of reports as per acceptable level of detail.

Conclusions and Recommendations

The proposed project is a renewable energy project comprising of 53WTG to generate 90.1 MW power through wind energy. Impacts due to wind energy projects are short term, generally limited to construction phase and operation phase have negligible adverse environmental and social impacts.

The Project and its key components such as access road, WTGs, Office building and transmission lines, are likely to have limited adverse environmental impacts on baseline parameters such as land use, water quality etc. The social impacts from the project are assessed to be generally beneficial in terms of overall local area development.

The key features of the project in terms of impact include the following:

- There are no sensitive receptors as villages, water bodies within 500 m of the wind farm;
- The entire wind farm mostly falls under barren and culturable wasteland and the WTGs are on government land;
- The construction of proposed project may bring local changes in the landuse pattern of the site but there would be no significant adverse visual impact to the area as other wind energy projects are already operating in the study area;
- The Project will require ~4 m3/day of fresh water during operation phase– planned to be sourced from tanker water;
- The project will have negligible impact on air emissions and ambient noise levels due to the distant location of receptors;
- The negligible quantity of sewage will be generated at site office, which will be disposed through septic tanks;
- The hazardous waste will be disposed of as per authorisation from RSPCB. The storage, handling, transportation and disposal will be strictly

as per the requirement of authorisation by RSPCB and Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008. The waste will be stored into closed containers under covered area with concrete flooring and sent for disposal to TSDF through authorized vendors;

- The proposed project will have no significant negative impacts on the nearby communities as there will be no involuntary physical displacement of people or impact on private land holdings.

To conclude, the implementation of ESMP will help MEIL in complying with national/ state regulatory framework as well as to meet IFC/ ADB reference framework requirements.

1 INTRODUCTION

Mytrah Energy (India) Limited (hereinafter referred to as *'Company' or 'MEIL'*) is developing a wind farm of 90.1 MW capacity at Habur and Mokal villages in Jaisalmer District of Rajasthan (hereinafter referred to as the Project). ERM (also referred as "consulting firm") has been commissioned by MEIL to conduct an Environmental and Social Impact Assessment Study (ESIA) for the Project.

The proposed wind farm development includes 53 Wind Turbine Generators (WTGs), a pooling sub-station (PSS), internal and external transmission lines and other associated facilities. The Project is presently in the pre-construction stage.

This report presents the results of the ESIA study.

1.1 PURPOSE OF THE REPORT

The consulting firm understands that MEIL intends to develop the wind farm project with financial assistance from the Asian Development Bank (ADB) and other lenders. In this context, the Project requires evaluating the environmental and social risks associated with the proposed project and to implement mitigation measures to avoid adverse impacts during the project lifecycle. In addition to ADB Guidelines the project has to comply with the applicable International Finance Corporation (IFC)/World Bank (WB) guidelines relating to the environment, social issues and occupational health and safety matters, while complying with local laws and regulations.

The report discusses the environmental and social baseline within which the proposed wind farm project will be commissioned and assesses the potential adverse and beneficial impacts that the project could have, along with suitable mitigation measures and an Environmental and Social Management Plan (ESMP) for the Project.

The applicable reference framework in accordance with which the consulting firm has performed and reported this study includes the following:

- Applicable Indian national, state and local regulatory requirements;
- ADB safeguards Policy Statement, 2009;
- ADB policy on Social Protection Strategy, 2001;
- ADB policy on Public Communications Policy, 2011;
- IFC Performance Standards (2012);
- IFC/World Bank General EHS Guidelines (2007);
- IFC/World Bank EHS Guidelines for Wind Energy Projects (2007); and
- IFC/World Bank EHS Guidelines for Electric Power Transmission and Distribution (2007)

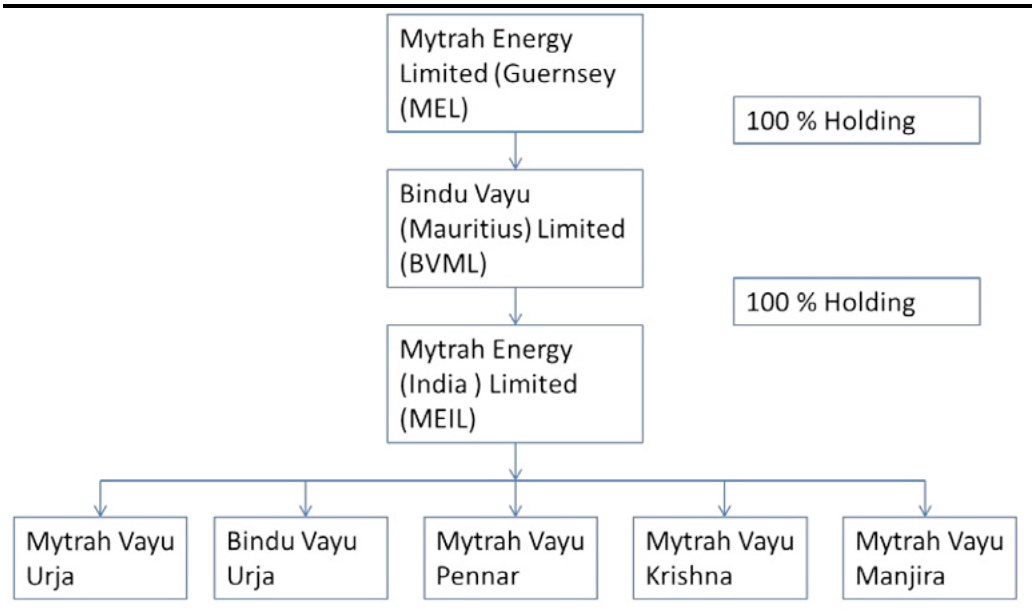
- Relevant ILO conventions covering core labour standards and basic terms and conditions of employment (limited to operational phase of the proposed Project).

**Note: Wind energy projects in India at present do not require an Environmental Clearance under the EIA Notification, 2006. The ESIA is thus being undertaken as an internal management tool for MEIL and for compliance to the ADB requirements. Thus, the consulting firm is not preparing the ESIA Report for any regulatory requirements; hence, any deliverable if used for the same purpose, the consulting firm needs to be communicated by the Client. In keeping the public disclosure rules of ADB, the ESIA will be disclosed on the banks' website.*

1.2 MYTRAH ENERGY (INDIA) LIMITED (MEIL)

Mytrah Energy (India) Limited (MEIL) is a wholly owned subsidiary of Mytrah Energy Limited (MEL) in India (Refer ***Figure 1.1***) and aims to own and operate 5000 MW of renewable power in India. MEL is a pioneer and one of the largest Independent Power Producers (IPP) in renewable energy, in India, with 543 MW power generation across 10 projects and 6 States. MEL has 172 wind masts installed across multiple states in India, providing a rich source of information from which to select its future projects. MEL currently has an active development pipeline of about 3500 MW.

Figure 1.1 MEIL Corporate structure



Source: 'smart utility' Mytrah Energy Limited Annual Report 2014

From a standing start in late 2010, MEIL has built a portfolio of over 500 MW of operating wind plants in India, with a further 100 MW in 2014. These assets are spread across ten wind farms in six states - Rajasthan, Gujarat, Maharashtra, Andhra Pradesh, Karnataka and Tamil Nadu. The company's portfolio was built using a combination of 'turn-key' developers and in-house project development, with wind turbines purchased from three leading vendors.

MEIL sells power mainly to state grids through 13 to 25 year Power Purchase Agreements. In addition, the 100.5 MW project in Tamil Nadu will sell power directly to customers on long-term agreements. Additionally, MEIL has the largest wind data bank in India, being the only independent power producer that has 120 wind masts across the country.

As per their Annual report 2014, MEIL has 543 MW operating facilities across 10 wind farms in India as presented in ***Table 1.1***.

Table 1.1 MEIL operating wind farms in India (as of December 2014)

S. No.	Project Location		Capacity (MW)	Number of WTGs	Development Mode	Operational since
1	Gujarat	Mahidad	25.2	12	Turnkey	October 2011
		Jamanvada	52.5	25	Turnkey	March 2013
2	Rajasthan	Mokal	42	20	Turnkey	September 2011
		Kaladonger	75.6	36	Turnkey	September 2012
		Bhesada	35.7	17 (out of 24)	Turnkey	October 2014 (Under Construction)
3	Maharashtra	Chakla	39	26	Turnkey	February 2012
		Sinner	12.6	6	Turnkey	September 2012
4	Andhra Pradesh and Telengana	Vajrakarur	63	30	Turnkey	December 2012
		Burgula	37.4	44	Self-Development	March 2014
5	Tamil Nadu	Vagarai	100.5	67	Turnkey	December 2014
6	Karnataka	Savalsang	95.2	112	Self-Development	December 2014
Total			578.7			

Source: 'smart utility' Mytrah Energy Limited Annual Report 2014

As per the MEIL Annual Report 2014, further 300 MW of wind power projects are under construction in Andhra Pradesh, Maharashtra, Rajasthan and Telengana.

The proposed Project in Jaisalmer - Project Nidhi – is being developed by MEIL on a 'self-development' basis wherein the Company is responsible for construction and operation of the wind farm. The Special Purpose Vehicle (SPV) created for the project is Nidhi Wind Farms Private Limited which is a 100% owned subsidiary of Bindu Urja Infrastructure Ltd. (BUIL). BUIL is a company owned by MEIL's Chairman and CEO Mr. Ravi Kailas.

1.3 OVERVIEW OF THE PROJECT

The Project comprises of 53 WTGs of 1.7 MW each combining to provide 90.1 MW power in total and is located in Jaisalmer district of Rajasthan.
Table 1.2provides a snapshot of the proposed project.

Table 1.2 Project Nidhi - a snapshot

Detail	Description
Location	Habur and Mokal Villages in Taluka and District Jaisalmer, Rajasthan; which is approximately 300 km from Jodhpur Civil Airport.
Terrain	Flat
Type of WTGs	53 WTGs of 1.7 MW each with 103 m rotor diameter and 80 m hub height. Model: GE – 1.7/103.
Land Requirement for WTG's	Approximately 412.1 Ha of Government Land for WTGs and other project components(pooling substation, internal and external transmission line, temporary labour camp, internal access roads, site office and batching plant) has been obtained on lease.
Substation	Ramgarh Grid substation (pre-existing)
Land Requirement for External Transmission line	MEIL has obtained permission under section 68 of Electricity Act, 2003 and it will pass through villages Punam nagar, serawa, Sanu, Hema ki dhani, Hema, Biprasar, Biprasar netsi, Nawalsingh ki dhani, Minion ki dhani, Nala kharin and Ramgarh. This is along a route of pre-existing transmission line. Power evacuation approval is required and has been obtained from Rajasthan Rajya Vidyut Prasaran Nigam Limited (RVPN). Total 100 towers will be erected in the transmission line, along 8.3 km. the land is comprised of government land (culturable waste land)
Land requirement for Internal Transmission line	the internal transmission lines will connect the WTGs to the pooling substation. The internal transmission line's length is understood to be 32.8 km, spread across the village Habur and Mokal. The land requirement for the internal transmission lines is comprised of government land(culturable waste land).
Internal Access roads	the internal access roads will be used for accessing the WTGS. The access roads will be constructed in the villages of Habur and Mokal, and will have a total length of 40 km. the width of the access road is understood to be 6 mts.
Project Commissioning	October 2016
Project Status at time of ESIA study	Planning and Pre-Construction Stage

1.4 ESIA SCOPE

The Scope of Work for the ESIA broadly entailed:

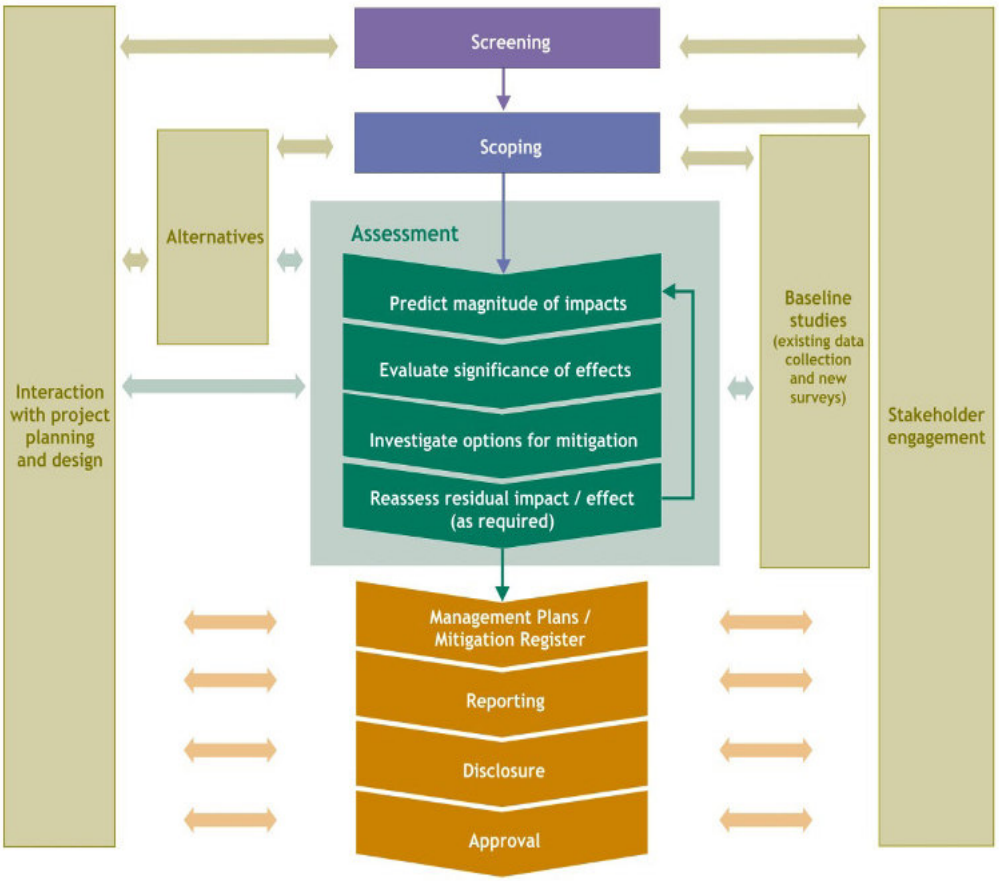
- Identification and review of the applicable local, state, national and international environmental and social legislation and regulatory framework.
- Collection of baseline information through limited primary field surveys and monitoring with respect to ambient noise quality, land use pattern and socio economic profile within the AoI of 5 km radius from the boundary of the project. Collection of secondary data on geology, geomorphology, social profile etc.
- Prediction and identification of environmental and social impacts of the project followed by evaluation of significance of the predicted impacts.
- Suggesting appropriate mitigation/enhancement measures for identified environmental and social impacts.

- Comparison and analysis of the alternatives considered for the project with respect to power generation technology.
- Formulation of Environmental and Social Management Plan (ESMP) in accordance with IFC's Performance Standard 1 addressing the various aspects considered in IFC's Performance Standards 2 through 8 with management tools and techniques including monitoring and reporting requirements for effective implementation.

1.5 *ESIA METHODOLOGY*

The general methodology followed by the consulting firm while undertaking an ESIA study has been illustrated in ***Figure 5.1***. This sub section provides an understanding of the overall methodology adopted for undertaking ESIA studies, while the specific methodology followed for this Project is discussed in ***Section 6***. ESIAs are undertaken following a systematic process that predicts and evaluates the impacts a project could have on aspects of the physical, biological, social/ socio-economic and cultural environment, and identifies measures that a project will take to avoid, minimise/reduce, mitigate, offset or compensate for adverse impacts; and to enhance positive impacts where practicable.

Figure 1.2 ***The ESIA Process***



The following sub sections provide a brief understanding of each stage identified.

1.5.1 Screening

The objective of a screening exercise is to provide a 'High Level' Project Description, including alternatives as well as identifying the applicable Impact Assessment requirements. The details of screening exercise are presented in ***Section 5*** of this ESIA report.

1.5.2 Scoping

For this ESIA study, scoping has been undertaken to identify the potential Area of Influence for the Project (and thus the appropriate Study Area), to identify potential interactions between the Project and resources/receptors in the Area of Influence and the impacts that could result from these interactions, and to prioritize these impacts in terms of their likely significance. This stage is intended to ensure that the impact assessment focuses on issues that are most important in decision-making and stakeholder interest.

It is to be noted here that during the period of ESIA study, Project was in the Planning and Pre-Construction phase, though, the scoping exercise includes all the phases of the project, i.e., planning and pre-construction, construction, operation and maintenance and decommissioning into consideration.

The details of scoping exercise are reported in ***Section 5.4*** of this ESIA report.

1.5.3 Project Description

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

1.5.4 Baseline Conditions

For the purpose of an impact assessment, the environmental and social baseline for the study area is established. The purpose of this baseline is to identify the key environmental, socio-economic, cultural and ecological conditions in the Study area, focusing on the resources/receptors that maybe impacted by the project. The baseline data is aimed at assisting the prediction and modelling of impacts and effects and to inform judgements about the sensitivity, vulnerability and/or importance of resources/receptors.

The detailed baseline methodology and characterisation for the project is provided in ***Section 6*** of this ESIA report.

1.5.5 Impact Identification/Prediction

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

The detailed IA is presented in ***Section 7*** of this ESIA report.

1.5.6 Analysis of Alternatives

A comparative analysis of alternatives for the project is provided in terms of site location analysis and feasibility, power generation technology available including no project scenario etc. in ***Section 8*** of this ESIA report**.**

1.5.7 Environmental and Social Management Plan (ESMP)

The results of ESIA study form the basis of the project ESMP. The ESMP incorporates measures and procedures for the short and long-term environmental and social management of the project during its various stages. The environmental and social management plan (ESMP) is developed for the project and is presented in ***Section 9*** of this ESIA report.

1.5.8 Stakeholder Analysis and Consultations

An effective ESIA process requires engagement with relevant stakeholders throughout the key stages. This assists in understanding stakeholder views on the Project and in identifying issues that should be taken into account in the prediction and evaluation of impacts.

Details of the Stakeholder Engagement methodology and activities undertaken for this project to date are presented in ***Section 9*** of this ESIA report.

1.6 LIMITATIONS

The limitations associated with the baseline establishment and impact assessment pertain to the availability of secondary information, limited coverage of stakeholder representatives in the consultations.

The secondary data utilized for the purpose of the baseline is limited to the information available in the public domain or made available during the consultations with the Nidhi Project team. While during the site visit a conscious attempt was made to cover relevant key social groups and stakeholder categories, it is acknowledged that the opinions and concerns presented in this report may not encompass all viewpoints amongst the

stakeholders. The site visit for the impact assessment was undertaken during 11th -14th July. Further site visit of half a day was undertaken in the month of August accompanied with ADB team. It should be noted that the Patwari who was involved in the land survey process, has since then retired and has moved to another city and could not be contacted. The present Patwari and other local administration stakeholders such as Tehsildar and Revenue Officers were unavailable for consultation due to a communal conflict in Ramgarh village. The consultations with the Patwari and local administration stakeholders would have provided an in-depth understanding of the land availability, profile and issues surrounding land procurement in the area.

During the time of site visit in July, there was no cultivation around the project site. While at the time of ADB visit in August, though there was cultivation, the consulting firm's team could not hold consultations due to non-availability of cultivators in the span of the visit, which was nearly half a day.
This limited the understanding of the land procurement process to the documentation available and the consultations undertaken with the local community and the project team.

Transmission lines (details both external and internal), transect was undertaken in areas, in which the transmission line was supposed to follow the existing transmission line route by other companies. It was reported by the project team at the time of the site visit that remaining topography for the proposed line was likely to be similar.

Furthermore, though as part of initial scope the consulting firm intended to collect baseline for surface water too, however no perennial surface water bodies were observed in the AoI and seasonal ponds were observed to be almost dry, thus no surface water samples were collected as part of baseline study. Historical data about water bodies in the area is not available as the area is mostly dry for major part of the year and perennial water bodies are rarely there.

Expert Opinion provided herein are based on the facts currently available within the limits of the scope of work, information provided by the client or its representative, prevailing secondary data, it is specifically the consulting firm's intent that the conclusions and recommendations stated herein will be intended as guidance and not necessarily a firm course of action except where explicitly stated as such.

1.7 LAYOUT OF THE REPORT

The structure of this ESIA report is as given in ***Table 1.3***.

Table 1.3 Structure of the report

Section	Title	Description

Section	Title	Description
Section 1	Introduction	*(this section)* Introduction to the Project and ESIA methodology
Section 2	Project Description	Technical description of the Project & related infrastructure and activities
Section 3	Applicable Policy, Legal and Administrative Framework	Discussion of the applicable environmental and social regulatory framework and its relevance for the Project.
Section 4	Land Requirement and Allotment Process	Provides an understanding of the land requirement for the project and the procurement process
Section 5	Screening and Scoping	Description of the outcomes of the Screening exercise and description of the outcome of the Scoping exercise undertaken as part of the ESIA process.
Section 6	Environmental, Ecological and Social Baseline	An outline of the Environmental, Ecological and Social Baseline status in the area of the Project.
Section 7	Impact Assessment	This section includes details of identified environmental impacts and associated risks due to project activities, assessment of significance of impacts and presents mitigation measures for minimizing and /or offsetting adverse impacts identified.
Section 8	Analysis of Alternatives	Description of the reason for selection of adopted alternative.
Section 9	Information Disclosure Consultation and Participation	Overview of the stakeholder identification process and engagement activities undertaken during the ESIA.
Section 10	Grievance Redress and engagement with Community	Descriptions of the grievance redress framework and mechanisms for resolving complaints.
Section 11	Environmental and Social Management Plan	Outline of the Environmental and Social Management Plan (ESMP) taking into account identified impacts and planned mitigation measures and monitoring requirements.
Section 12	Conclusion and recommendations	Summary of impacts identified for the Project

2 PROJECT DESCRIPTION

2.1 INTRODUCTION

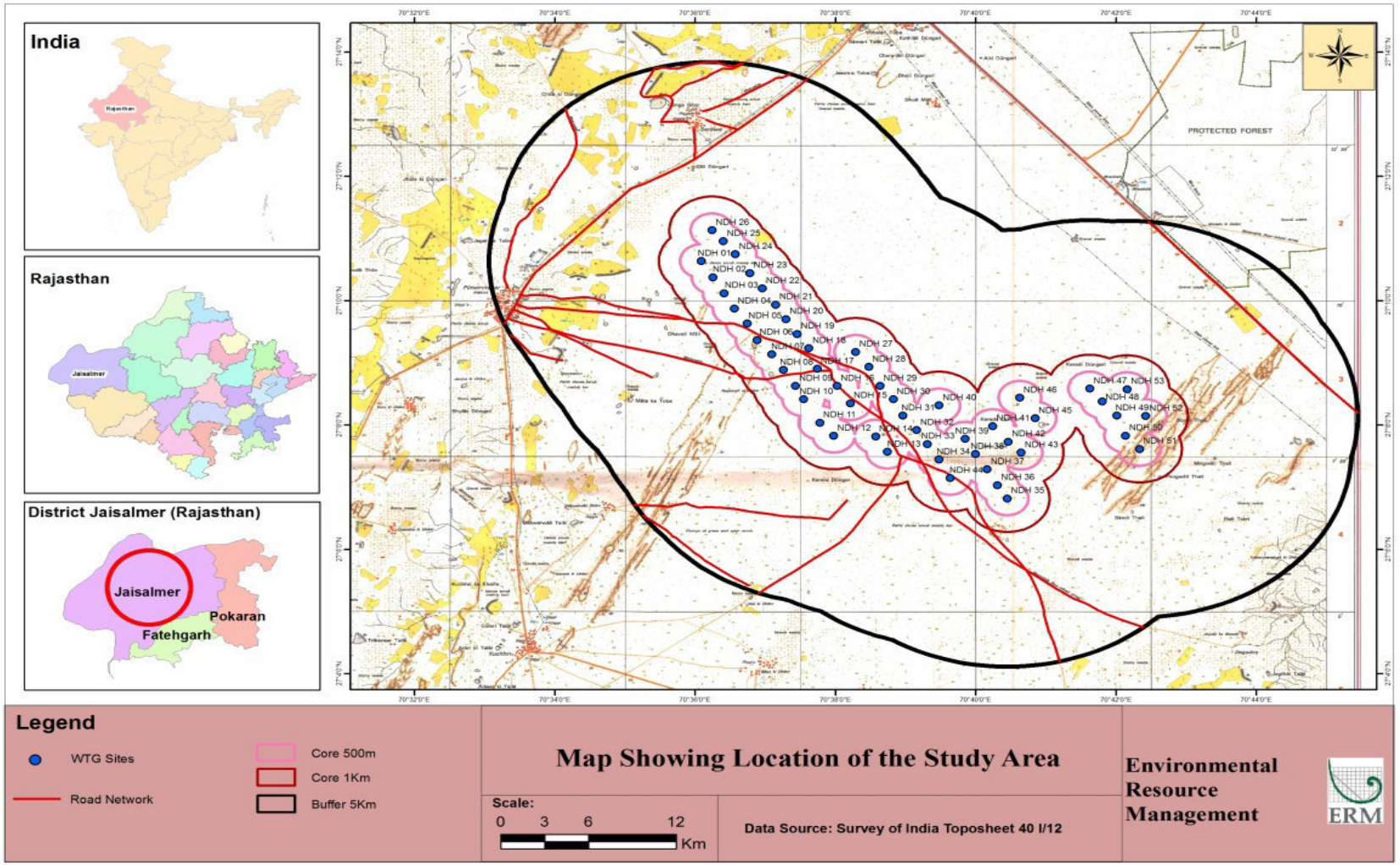
This section provides an overview of the project. It provides a description of the project in terms of location, associated infrastructure, equipment required and activities to be performed during the construction, operation and decommissioning stages of the project.

2.2 SITE SETTING

The proposed Project site is located in area of 412.1 Ha (land requirement for WTGs and substation) in the villages of Poonamnagar (Habur) and Mokal in the district and sub-division (tehsil) of Jaisalmer in Rajasthan. Jaisalmer is the most western and largest district of Rajasthan State. The project site is approximately 50 km north-west of Jaisalmer city, which is the administrative headquarters of the district. The project site is accessible by paved road till its periphery from Jaisalmer city, though there are only dirt roads inside the project area at present. Jaisalmer city is connected to the Indian rail network by the Jaisalmer railway station however the nearest airport to the city lies approximately 300 km south-east, in the city of Jodhpur in the adjoining district of the same name. The nearest international airport to Jaisalmer is the Jaipur airport, approximately 570 km east. ***Figure 2.1*** presents location of the project Area.

The project lies in the Jaisalmer Wind Farm area where Suzlon Energy Limited has erected around 1 GW of wind power plants which has various owners, including MEIL. Among these two existing wind farms lie in the immediate vicinity of the Project: towards the north-east of the Project lie the 380.5 MW wind farm whose owners include M/s Vedanta Limited and M/s Gupta Coal Ltd.; and to the south-west of the project lies the 50.4 MW wind farm belonging to M/s Ostro Jaisalmer Private Limited.

Figure 2.1 Location of the Project Area



Source: ERM India

2.3 *FACILITIES*

The project is planned to have an annual capacity of 90.1 MW which would be fed to the State Power Grid of RJVN. The key components of the proposed wind farm include the following:

- Wind turbines;
- Pooling substation;
- Transmission lines - Internal and External
- Access roads;
- Additional project infrastructure

The land requirement for the facilities is as follows:

Table 2.1 Land requirement for Project Components

Project Facility	Village Name	Land Parcel Size	Land Category	Status of Procurement
WTGs	Habur & Mokla	80*80 sq mts/WTG (33.92 Ha in total)	Revenue land	completed
Pooling Substation	habur	100*200 sq mts (2 ha)		completed
Internal Transmission Line (33 KV)	Habur & Mokla	32.8 kms		completed
External Transmission Line (132 KV)	Habur	8.3 kms		completed
Labour Camp (Construction Phase)	Habur & Mokla	100*100 sq mts (1 ha)		completed
Internal Access Roads	Habur & Mokla	6mts*40 kms		completed
Site Office	Habur	15* 11 sq mts (0.02 ha)		completed
Batching Plant	3- habur, 1-Mokla	30*30 sq mts (0.09 ha)		completed
Laydown area	Material directly unloaded at WTG location			

2.3.1 *Wind Mills*

The project is proposed to have 53 wind turbine generators (WTGs) of the GE – 1.7/103 make, with a rated capacity of 1.7 MW each. The specifications of WTGs are provided in ***Table 2.2 .***

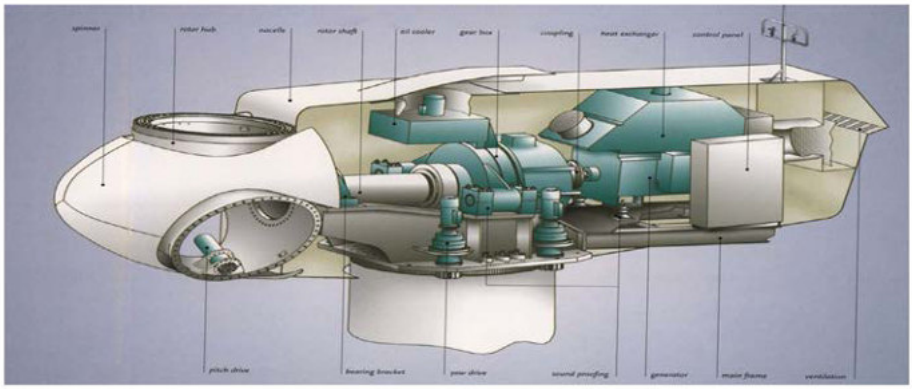
Table 2.2 Specifications of Proposed WTGs

S.No.	Parameters	GE – 1.7/103
1	No. of WTGs	53
2	Class	IEC TC IIIs
3	Rated Power	1.7 MW
4	Hub height	80 m
5	Rotor diameter	103 m
6	Swept Area	8,332 m^2

S.No.	Parameters	GE – 1.7/103
7	Estimated service life	25 years

Source: Technical Documentation Wind Turbine Generator Systems 1.7-103 - 50 Hz and 60 Hz by GE

Figure 2.2 GE Energy 1.7 - 103 nacelle layout



Source: Technical Documentation Wind Turbine Generator Systems 1.7-103 - 50 Hz and 60 Hz by GE

2.3.2 Pooling Sub-Stations

The Project is proposed to have a 132/33 kV pooling substation and metering facility in between - the WTG locations NDH -20 and NDH – 21. As per the Rajasthan Electricity Regulatory Commission (RERC) suo moto petition titled "Tariff for Wind Power Plants" dated 16July, 2009 the developer is obligated to construct the pooling station within/near the wind farm. While the metering will be done at generating bus, the power has to be evacuated to the nearest substation of the Rajasthan Vidhyut Prasaran Nigam Limited (RVPNL). RVPNL has an existing 400/ 220/ 132/ 33 GSS kV Substation at Ramgarh in Jaisalmer, around 25 km north-west of the Project site.

2.3.3 Transmission Lines – Internal and External

The current information available on the transmission line during the ESIA study is as follows:

- Internal transmission lines of 33 kV are proposed to connect from each WTG to the pooling sub-station within the Project site. The total length of the line will be 32.8 km having about 1200 poles and passing through villages Punam nagar and Mokala.
- The pooling sub-station is the planned to be connected to the existing RVPNL 400/220/132/33 GSS kV Substation at Ramgarh through external 132 kV transmission lines. The length of this line is going to be approximately 8.3 km. It is reported that the transmission line will be comprised of 70 towers.

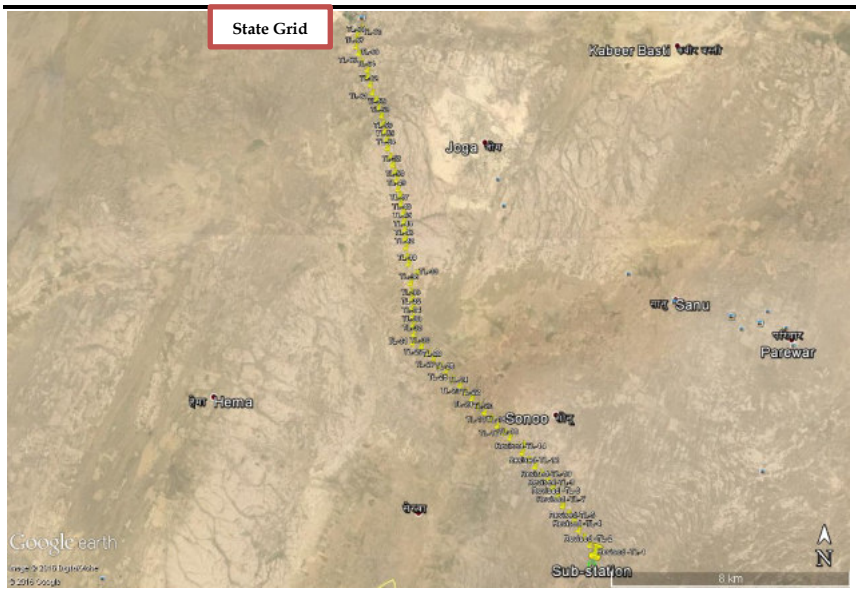
Spatila details of the poles and towers of the transmission line is given in ***Table 2.3*** and WTGs and External transmission line route is shown in ***Figure 2.3.***

Table 2.3 Spatial details of Poles/Towers of Transmission line

Tower/Pole type	Connections	Number of poles/towers	Villages covered
MCOH	Connects Pooling substation to Grid Substation in Ramgarh	72 Towers/ 21.97 km	Punamnagar (Habur), Sanu, Hema ki Dhani, Hema, Biprasar, Biprasar Netsi, Nawal Singh ki Dhani, Minyon ki Dhani, Nala Kharin, Ramgarh
DPDC	Link between MCOH and SPSC poles	53 Poles	Habur and Mokal
SPSC	Connects WTG switch yards to DPDC	740 Poles	Habur and Mokal

Source: MEIL

Figure 2.3 WTGs and external transmission line (in red) route



Source: Google Earth, accessed on August 2015

Since the project lies in an area which has existing wind farm development, there are two (02) nos. existing transmission lines passing through the proposed project transmission line corridor. Another high voltage under construction transmission line, reportedly belonging to RVPNL was also visible in the same corridor. All the three transmission lines are connected to the RVPNL substation at Ramgarh. As per visual observations to the extent possible done by ERM during the Site visit during 11 – 15 July, 2015 the proposed transmission towers will pass through barren land, waste land, and patches of cultivated land and is free from all encumbrances. As per the data shared, the proposed transmission line route[1]is expected to pass through

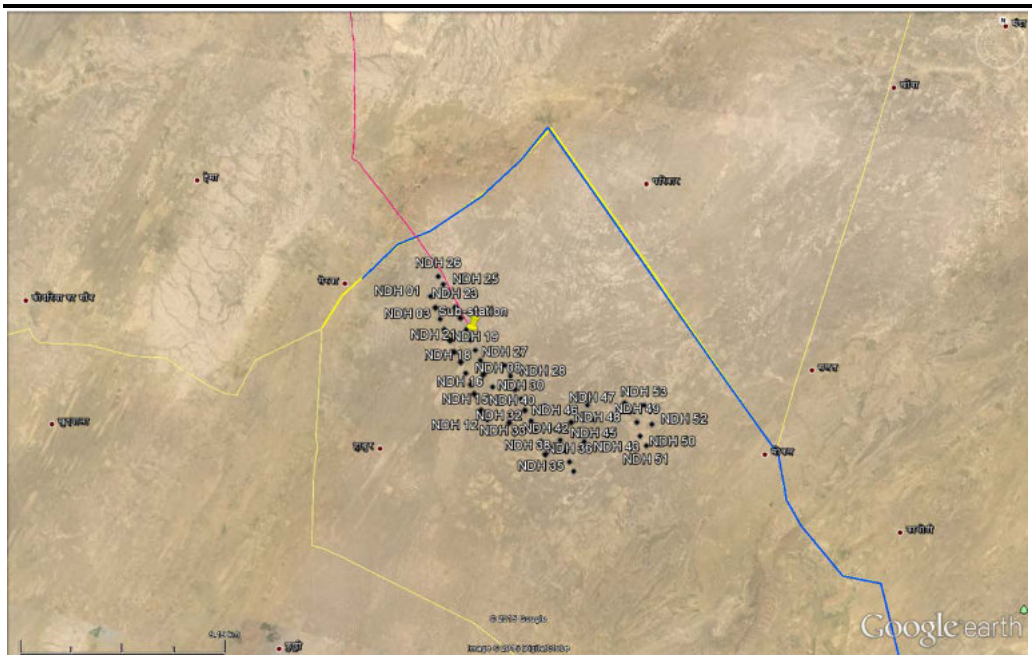
[1] At the time of the site visit, a tentative transmission line route was shared with the consulting firm and exact coordinates were not known.

villages of Punam nagar, Serawa, Sanu, Hema ki dhani, Hema, Biprasar, Biprasar netsi, Nawalsingh ki dhani, Minion ki dhani, Nala kharin and Ramgarh running almost parallel through existing transmission line of other projects. The transmission line will be running almost parallel through existing transmission line of other projects. The transmission line does not pass through any forest area or close to perennial water bodies and human settlements.

2.3.4 Access Roads

The Project site lays en-route the Jaisalmer- Ramgarh road, which is a paved single carriageway. From this major road, the site can be accessed by taking a turning onto the connecting road of Serawa and Habur villages, which is also a paved single carriage way. This carriage way, along with the Jaisalmer – Ramgarh road, encircles the Project site on three sides and connects the three villages lying in the study area – Mokal, Habur and Serawa (***Refer Figure 2.4***).

Figure 2.4 The Project area, nearby villages and surrounding access roads (in blue and yellow)



Google Earth, accessed on August 2015

The nearest access point to the Project area lies approximately 4 km north of Habur village from which a 3 km long access road is being constructed to the Project area. Presently, there are no internal roads inside the project area and the whole area has to be traversed using a network of dirt roads.

Figure 2.5 ***The approach road being constructed to the Project site from the Serawa - Habur road***

Source: ERM Site visit, July 2015

Consequently a large part of the project area does not have motor able access. It is reported that as part of the Project, internal access roads of 6 meter width for each WTG will be constructed; the total length of the access roads is approx. 40 km across Habur and Mokla..

2.3.5 Additional Project Infrastructure

Associated ancillary facilities and utilities provided for the project include:

- Unit Transformers with each WTG;
- Metering point for measuring production from each WTG;
- Vacuum Circuit Breaker (VCB) yards – 4 nos.
- Material storage yards and stores;
- Scrap yard;
- Central Monitoring Station building and facilities.

Refer to ***Table 2.1*** for information on the land requirement for the various project components.

2.3.6 Wind Turbine Profiling

All 53 WTG locations were assessed for sensitivities within 1 km radius. A detailed WTG profiling is provided in ***Table 2.4***. The pictorial presentation of landuse around WTGs is provided in ***Annex A***.

Table 2.4 Wind turbine profiling

S. No.	WTG ID	WTG Co-ordinates (in UTM)		WTG Site Elevation (m)	WTG Footprint Area		Nearest house/ structure					Nearest Village		Nearest Waterbody		Nearest Cultural/ Religious Site (temple/ mosque/ graveyard etc.)		Approach/ Access Road Condition			Distance from the nearest Paved Road	Land use around WTG Location based on visual observation			
		Easting (m)	Northing (m)		Topography (undulating land/flat land/on plateau or hill ridge)	Land use (Based on Land Records*)	Identification (Name/ ID in Map)	Distance (km) and Direction	Type of structure (Pucca/ Semi pucca/ Kutcha)	Use of Structure (residential/ agriculture/ storage)	Any window in direction of WTG, if yes, type of window	Name	Distance (km) and Direction from WTG	Identification ID	Distance (km) and Direction from WTG	Name/ Identification ID in Map	Distance (km) and Direction from WTG	Is there motorable access to site?	Condition of Road and Type	Name of the nearest approach road and Distance from the nearest Approach Point		North	East	West	South
1	NDH 1	658657	3007091	226	Flat	Culturable Waste Land	NA	NA	NA	NA	NA	Habur	NA	None	NA	None	NA	No	NA	NA	Habur road approximately 2 km	Grazing	Grazing	Grazing	Grazing
2	NDH 2	658925	3006612	229	Flat	Culturable Waste Land	Structure	~ 0.6	Kutcha	Broken	NA	Habur	NA	None	NA	None	NA	No	NA	NA	Habur road approximately 2 km	Power line ~ 17 m	Grazing land	Power line ~ 17 m	Grazing land
3	NDH 3	659182	3006113	219	Flat	Culturable Waste Land	NA	NA	NA	NA	NA	Habur	NA	None	NA	None	NA	No	NA	NA	Habur road approximately 2 km	Grazing	Grazing	Grazing	Grazing
4	NDH 4	659435	3005684	224	Flat	Culturable Waste Land	NA	NA	NA	NA	NA	Habur	NA	None	NA	None	NA	No	NA	NA	Habur road approximately 2 km	Grazing	Grazing	Grazing	Grazing
5	NDH 5	659751	3005241	223	Undulating in the south and west, Flat in the east and north	Culturable Waste Land	NA	NA	NA	NA	NA	Habur	NA	None	NA	None	NA	No	NA	NA	Habur road approximately 2 km	Grazing	Grazing	Grazing	Grazing
6	NDH 6	660039	3004792	221	Undulating	Culturable Waste Land	NA	NA	NA	NA	NA	Habur	NA	None	NA	None	NA	No	NA	NA	Habur road approximately 2 km	Sand dune	Sand dune	Sand dune	Sand dune
7	NDH 7	660338	3004343	225	Slightly undulating	Culturable Waste Land	NA	NA	NA	NA	NA	Habur	NA	None	NA	None	NA	No	NA	NA	Habur road approximately 2 km	Grazing	Grazing	Grazing	Grazing
8	NDH 8	660620	3003881	219	Flat	Culturable Waste Land	NA	NA	NA	NA	NA	Habur	NA	None	NA	None	NA	No	NA	NA	Habur road approximately 2 km	Grazing	Grazing	Grazing	Grazing
9	NDH 9	660908	3003404	223	Slightly undulating	Culturable Waste Land	NA	NA	NA	NA	NA	Habur	NA	None	NA	None	NA	No	NA	NA	Habur road approximately 2 km	Power line ~ 20 - 30 m	Grazing	Grazing	power line crosses from 20-30 m in front
10	NDH 10	661109	3003002	223	Flat	Culturable Waste Land	NA	NA	NA	NA	NA	Habur	NA	None	NA	None	NA	No	NA	NA	Habur road approximately 2 km	Power line crosses from ~ 300 m	Grazing	Grazing	Grazing
11	NDH 11	661494	3002327	227	Flat	Culturable Waste Land	NA	NA	NA	NA	NA	Habur	NA	NA	NA	NA	NA	Yes	Dirt road	NA	Punam nagar (Habur) to Kuchhri road	Barren	Barren	Barren	Barren

S. No.	WTG ID	WTG Co-ordinates (in UTM)		WTG Site Elevation (m)	WTG Footprint Area		Nearest house/ structure					Nearest Village		Nearest Waterbody		Nearest Cultural/ Religious Site (temple/ mosque/ graveyard etc.)		Approach/ Access Road Condition			Distance from the nearest Paved Road	Land use around WTG Location based on visual observation			
		Easting (m)	Northing (m)		Topography (undulating land/flat land/on plateau or hill ridge)	Land use (Based on Land Records*)	Identification (Name/ ID in Map)	Distance (km) and Direction	Type of structure (Pucca/ Semi pucca/ Kutcha)	Use of Structure (residential/ agriculture/ storage)	Any window in direction of WTG, if yes, type of window	Name	Distance (km) and Direction from WTG	Identification ID	Distance (km) and Direction from WTG	Name/ Identification ID in Map	Distance (km) and Direction from WTG	Is there motorable access to site?	Condition of Road and Type	Name of the nearest approach road and Distance from the nearest Approach Point		North	East	West	South
12	NDH 12	661834	3001937	228	Flat	Culturable Waste Land	NA	NA	NA	NA	NA	Habur	NA	NA	NA	NA	NA	Yes	Dirt road	NA	Punam nagar (Habur) to Kuchhri road	Barren	Barren	Barren	Barren
13	NDH 13	663102	3001480	218	Undulating	Culturable Waste Land	NA	NA	NA	NA	NA	Habur	NA	NA	NA	NA	NA	Yes	Dirt road	NA	Punam nagar (Habur) to Kuchhri road	Barren	Barren	Barren	Barren
14	NDH 14	662819	3001918	215	Undulating	Culturable Waste Land	NA	NA	NA	NA	NA	Habur	NA	NA	NA	NA	NA	Yes	Dirt road	NA	Punam nagar (Habur) to Kuchhri road	Grazing	Grazing	Grazing	Grazing
15	NDH 15	662209	3002904	226	Flat	Culturable Waste Land	NA	NA	NA	NA	NA	Habur	NA	NA	NA	NA	NA	Yes	Dirt road	NA	Punam nagar (Habur) to Kuchhri road	Grazing	Grazing land	Power line ~ 23 m	Power line ~ 23 m
16	NDH 16	661890	3003418	223	Flat	Culturable Waste Land	NA	NA	NA	NA	NA	Habur	NA	NA	NA	NA	NA	Yes	Dirt road	NA	Punam nagar (Habur) to Kuchhri road	Grazing	Grazing	Grazing	Grazing
17	NDH 17	661411	3003912	218	Flat	Culturable Waste Land	NA	NA	NA	NA	NA	Habur	NA	NA	NA	NA	NA	Yes	Dirt road	NA	Punam nagar (Habur) to Kuchhri road	Grazing	Grazing	Grazing	Grazing
18	NDH 18	661210	3004522	219	Flat	Culturable Waste Land	NA	NA	NA	NA	NA	Habur	NA	NA	NA	NA	NA	Yes	Dirt road	NA	Punam nagar (Habur) to Kuchhri road	Grazing	Grazing	Grazing	Agriculture area ~ 100 m
19	NDH 19	660925	3004949	219	Flat	Culturable Waste Land	NA	NA	NA	NA	NA	Habur	NA	NA	NA	NA	NA	Yes	Dirt road	NA	Punam nagar (Habur) to Kuchhri road	Grazing	Grazing	Grazing	Grazing
20	NDH 20	660665	3005389	211	Flat	Culturable Waste Land	NA	NA	NA	NA	NA	Habur	NA	NA	NA	NA	NA	Yes	Dirt road	NA	Punam nagar (Habur) to Kuchhri road	Grazing	Grazing	Grazing	Grazing
21	NDH 21	660414	3005808	224	Flat	Culturable Waste Land	NA	NA	NA	NA	NA	Habur	NA	NA	NA	NA	Yes	Dirt road	NA	NA	Punam nagar (Habur) road	Grazing	Grazing	Grazing	Grazing
22	NDH 22	660096	3006288	225	Flat	Culturable Waste Land	NA	NA	NA	NA	NA	Habur	NA	NA	NA	NA	Yes	Dirt road	NA	NA	Punam nagar (Habur) road	Grazing	Grazing	Grazing	Grazing
23	NDH 23	659796	3006743	224	Flat	Culturable Waste Land	NA	NA	NA	NA	NA	Habur	NA	NA	NA	NA	Yes	Dirt road	NA	NA	Punam nagar (Habur) road	Grazing	Grazing	Grazing	Grazing
24	NDH 24	659443	3007295	225	Flat	Culturable Waste Land	NA	NA	NA	NA	NA	Habur	NA	NA	NA	NA	Yes	Dirt road	NA	NA	Punam nagar (Habur) road	Grazing	Grazing	Grazing	Grazing
25	NDH 25	659152	3007686	221	Flat	Culturable Waste Land	NA	NA	NA	NA	NA	Habur	NA	NA	NA	NA	Yes	Dirt road	NA	NA	Punam nagar (Habur) road	Grazing	Grazing	Grazing	Grazing
26	NDH 26	658883	3008007	253	Flat	Culturable Waste Land	NA	0.25	Kutcha	Vacated	NA	Habur	NA	NA	NA	NA	NA	NA	NA	NA	Punam nagar (Habur) road	Grazing	Grazing	Grazing	Grazing
27	NDH 27	662317	3004423 5	218	Flat	Culturable Waste Land	NA	NA	NA	NA	NA	Habur	NA	None	NA	None	NA	No	NA	NA	Habur road approximately 2 km	Grazing	Grazing	Grazing	Grazing

S. No.	WTG ID	WTG Co-ordinates (in UTM)		WTG Site Elevation (m)	WTG Footprint Area		Nearest house/ structure					Nearest Village		Nearest Waterbody		Nearest Cultural/ Religious Site (temple/ mosque/ graveyard etc.)		Approach/ Access Road Condition			Distance from the nearest Paved Road	Land use around WTG Location based on visual observation			
		Easting (m)	Northing (m)		Topography (undulating land/flat land/on plateau or hill ridge)	Land use (Based on Land Records*)	Identification (Name/ ID in Map)	Distance (km) and Direction	Type of structure (Pucca/ Semi pucca/ Kutcha)	Use of Structure (residential/ agriculture/ storage)	Any window in direction of WTG, if yes, type of window	Name	Distance (km) and Direction from WTG	Identification ID	Distance (km) and Direction from WTG	Name/ Identification ID in Map	Distance (km) and Direction from WTG	Is there motorable access to site?	Condition of Road and Type	Name of the nearest approach road and Distance from the nearest Approach Point		North	East	West	South
28	NDH 28	662626	3003991	215	Undulating	Culturable Waste Land	NA	NA	NA	NA	NA	Habur	NA	None	NA	None	NA	No	NA	NA	Habur road approximately 2 km	Grazing	Grazing	Grazing	Grazing
29	NDH 29	662898	3003439	228	Flat	Culturable Waste Land	NA	NA	NA	NA	NA	Habur	NA	None	NA	None	NA	No	NA	NA	Habur road approximately 2 km	Grazing	Grazing	Grazing	Grazing
30	NDH 30	663220	3003041	229	Flat	Culturable Waste Land	NA	NA	NA	NA	NA	Habur	NA	None	NA	None	NA	No	NA	NA	Habur road approximately 2 km	Grazing	Grazing	Grazing	Grazing
31	NDH 31	663452	3002549	224	Flat	Culturable Waste Land	NA	NA	NA	NA	NA	Habur	NA	None	NA	None	NA	No	NA	NA	Habur road approximately 2 km	Attempt to encroach land and cultivate bajra	Attempt to encroach land and cultivate bajra	Attempt to encroach land and cultivate bajra	Attempt to encroach land and cultivate bajra
32	NDH 32	663780	3002127	220	Slightly undulating	Culturable Waste Land	NA	0.3 NW	Kutcha	Broken	NA	Habur	NA	None	NA	None	NA	No	NA	NA	Habur road approximately 2 km	Barren	Barren	Barren	Barren
33	NDH 33	664035	3001716	225	Undulaitng	Culturable Waste Land	NA	NA	NA	NA	NA	Habur	NA	NA	NA	NA	NA	NA	NA	NA	Punam nagar (Habur) road	Barren	Barren	Barren	Barren
34	NDH 34	664323	3001261	221	Undulaitng	Culturable Waste Land	NA	NA	NA	NA	NA	Habur	NA	NA	NA	NA	NA	NA	NA	NA	Punam nagar (Habur) road	Barren	Barren	Barren	Barren
35	NDH 35	665936	3000130	217	Flat	Culturable Waste Land	NA	NA	NA	NA	NA	Habur	NA	NA	NA	NA	NA	NA	NA	NA	Punam nagar (Habur) road	Grazing	Grazing	Grazing	Grazing
36	NDH 36	665702	3000521	216	Flat	Culturable Waste Land	NA	NA	NA	NA	NA	Habur	NA	NA	NA	NA	NA	NA	NA	NA	Punam nagar (Habur) road	Grazing	Grazing	Grazing	Grazing
37	NDH 37	665460	3000990	225	Flat	Culturable Waste Land	NA	NA	NA	NA	NA	Habur	NA	NA	NA	NA	NA	NA	NA	NA	Punam nagar (Habur) road	Grazing	Grazing	Grazing	Grazing
38	NDH 38	665177	3001431	224	Flat	Culturable Waste Land	NA	NA	NA	NA	NA	Habur	NA	NA	NA	NA	NA	NA	NA	NA	Punam nagar (Habur) road	Grazing	Grazing	Grazing	Grazing
39	NDH 39	664935	3001879	228	Undulaitng	Culturable Waste Land	NA	NA	NA	NA	NA	Habur	NA	NA	NA	NA	NA	NA	NA	NA	Punam nagar (Habur) road	Grazing	Grazing	Grazing	Grazing
40	NDH 40	664278	3002857	224	Flat	Culturable Waste Land	NA	NA	NA	NA	NA	Habur	NA	NA	NA	NA	NA	NA	NA	NA	Punam nagar (Habur) road	Grazing	Grazing	Grazing	Grazing
41	NDH 41	665571	3002271	230	Undulaitng	Culturable Waste Land	NA	NA	NA	NA	NA	Habur	NA	NA	NA	NA	NA	NA	NA	NA	Punam nagar (Habur) road	Grazing	Grazing	Grazing	Grazing

S. No.	WTG ID	WTG Co-ordinates (in UTM)		WTG Site Elevation (m)	WTG Footprint Area		Nearest house/ structure					Nearest Village		Nearest Waterbody		Nearest Cultural/ Religious Site (temple/ mosque/ graveyard etc.)		Approach/ Access Road Condition			Distance from the nearest Paved Road	Land use around WTG Location based on visual observation			
		Easting (m)	Northing (m)		Topography (undulating land/flat land/on plateau or hill ridge)	Land use (Based on Land Records*)	Identification (Name/ ID in Map)	Distance (km) and Direction	Type of structure (Pucca/ Semi pucca/ Kutcha)	Use of Structure (residential/ agriculture/ storage)	Any window in direction of WTG, if yes, type of window	Name	Distance (km) and Direction from WTG	Identification ID	Distance (km) and Direction from WTG	Name/ Identification ID in Map	Distance (km) and Direction from WTG	Is there motorable access to site?	Condition of Road and Type	Name of the nearest approach road and Distance from the nearest Approach Point		North	East	West	South
42	NDH 42	665943	3001817	220	Flat	Culturable Waste Land	NA	NA	NA	NA	NA	Habur	NA	NA	NA	NA	NA	NA	NA	NA	Punam nagar (Habur) road	Grazing	Grazing	Grazing	Grazing
43	NDH 43	666250	3001487	222	Undulating	Culturable Waste Land	NA	NA	2 Kutcha structures	Empty	NA	Habur	NA	NA	NA	NA	NA	NA	NA	NA	Punam nagar (Habur) road	Barren	Barren	Barren	Barren
44	NDH 44	664587	3000722	220	Flat	Culturable Waste Land	NA	NA	NA	NA	NA	Habur	NA	NA	NA	NA	NA	NA	NA	NA	Punam nagar (Habur) road	Grazing	Grazing	Grazing	Grazing
45	NDH 45	666567	3002511	216	Flat	Culturable Waste Land	NA	NA	NA	NA	NA	Habur	NA	NA	NA	NA	NA	NA	NA	NA	Mokal road	Grazing	Grazing	Grazing	Grazing
46	NDH 46	666199	3003125	217	Undulating	Culturable Waste Land	NA	NA	NA	NA	NA	Habur	NA	NA	NA	NA	NA	NA	NA	NA	Mokal road	Grazing	Grazing	Grazing	Grazing
47	NDH 47	667837	3003432	216	Flat	Culturable Waste Land	NA	0.3NE	Pucca	NA	3 windows	Habur	NA	NA	NA	NA	NA	NA	NA	NA	Mokal road	Agriculture	Agriculture	Agricultura	Agriculture
48	NDH 48	668137	3003045	219	Flat	Culturable Waste Land	NA	NA	NA	NA	NA	Habur	NA	NA	NA	NA	NA	NA	NA	NA	Mokal road	Grazing	Grazing	Grazing	Grazing
49	NDH 49	668491	3002628	220	Flat	Culturable Waste Land	NA	NA	NA	NA	NA	Habur	None	NA	None	NA	None	NA	No	NA	Mokal road	Agriculture	Agriculture	Agriculture	Agriculture
50	NDH 50	668707	3002034	217	Flat	Culturable Waste Land	NA	NA	NA	NA	NA	Habur	None	NA	None	NA	None	NA	No	NA	Mokal road	Agriculture	Agriculture	Agriculture	Agriculture
51	NDH 51	669035	3001637	211	Flat	Culturable Waste Land	NA	NA	NA	NA	NA	Habur	None	NA	None	NA	None	NA	No	NA	Mokal road	Agriculture	Agriculture	Agriculture	Agriculture
52	NDH 52	669169	3002627	219	Flat	Culturable Waste Land	NA	NA	NA	NA	NA	Habur	NA	None	NA	None	NA	No	NA	NA	Mokal road	Agriculture	Agriculture	Agriculture	Agriculture
53	NDH 53	668720	3003414	219	Undulating in the NW, Flat in SE	Culturable Waste Land	NA	NA	NA	NA	NA	Habur	NA	None	NA	None	NA	No	NA	NA	Mokal road	Grazing	Grazing	Grazing	Grazing

Source: Profiling during ERM Site visit 11-15th July 2015

2.4 PROJECT PHASES AND ACTIVITIES

The project life-cycle of a wind farm development can be divided into four phases as follows:

- Planning and preconstruction phase;
- Construction phase;
- Operation (including maintenance and repair) phase; and
- Decommissioning.

These phases are outlined in the sections below. The Project is currently in the construction phase, with the construction of the internal access roads and the pooling substation having been initiated.

2.4.1 *Planning and Preconstruction Phase*

The planning and pre-construction phase involves the conceptualization of the project and has following five components:

- Site selection and wind resource assessment;
- Land purchase process;
- Site surveys as topographic, geo-technical investigations, micro-siting studies, power evacuation arrangements, zero-point marking etc.;
- Approvals/clearances/ permits; and
- Design and finalization of contractors (discussions have started)
- Mobilisation of contractors

Currently, the zero-point marking geo-technical investigations at all 53 WTG locations has been done for the Project. The status of the approvals and permits has been discussed in ***Section 4.4***.

2.4.2 *Construction Phase*

The wind farm development the construction activities include:

- Construction of external connecting road and internal access roads;
- Site preparation activities such as clearance, excavation, filling, levelling etc.;
- Construction of site office, equipment and supplies storage areas, fuel storage areas and waste pits;
- Construction of turbine foundations at each WTG location;
- Transportation of equipment including towers, blades, turbines, supply materials and fuels;
- Completing internal electrical connections at each WTG location;
- Erection of internal overhead electrical lines;
- Establishment of pooling sub-station; and
- Commissioning of the WTGs

In addition to the above facilities, a labour camp will also be constructed on the site to house migrant labour. This camp will be constructed at Khasra No. 927/1441 in Habur Area, near boundary of Village Mokal and maintained by MEIL. The labour will commute by vehicles provided by contractors to the site.

As reported above, the only construction going on the Project site presently is the connecting road which will connect the Serawa – Poonamnagar (Habur) road to the WTG location NDH -26.

As a part of the construction strategy, it has been decided that all materials will be unloaded directly at WTG locations and intercarting has not been considered.

2.4.3 Operation and Maintenance Phase

The wind farm projects have limited activities for the operations and maintenance phase and involve:

- Obtaining regulatory permit and approvals like the Consent to Operate (CTO) from Rajasthan State Pollution Control Board (RSPCB);
- Regular remote monitoring of the WTG operations;
- Normal greasing and cleaning activities;
- Annual shut down for maintenance which will mostly include cleaning and greasing, change of parts etc.; and
- Internal road repairs as and when required.

The design life of the project is expected to be 25 years from the date of commissioning. Regular maintenance would be required to ensure that the turbines are kept in optimal working order. Most day to day facility operations would be done remotely through the use of computer networks using SCADA but some limited maintenance and repair activities would be undertaken on site.

2.4.4 Decommissioning Phase

The wind farm site, after having remained in operation for the lifecycle estimated at 25 years, will not lose its value as a wind power generation system. However, it is not yet decided if the project would approach for upgradation/expansion, once this project life is completed.

2.5 CONTRACTORS

The proposed Project is being developed by MEIL under the self-development basis. Under this model, the company is acting as the main EPC contractor and will also be performing the operation and maintenance of the proposed project either directly or by contracting. In addition to these the company is also performing the following activities in-house:

- Land procurement;

- Construction of Pooling sub-station;
- Construction of external 132 kV transmission line;
- Construction of the internal 33 kV transmission line;
- Civil work of laying foundations of all the WTGs;
- Construction and management of the labour camp; and
- Construction of all the access roads and earthen roads

Other activities being undertaken through other agencies/sub-contractors are presented in ***Table 2.5***.

Table 2.5 Sub-Contractors and their scope of work for Project Nidhi

Contractor Name and Address	Scope of Work
M/s GE	supply of WTGs, related logistics and commissioning
M/s Greenworld	civil works, excluding laying WTG foundations;
M/s. Bhati Construction	Construction of WTG Foundations
M/s Vision Engineering	Construction of 33 KV Line
M/s Navdurga Electroconstruction Pvt. Ltd.	Construction of 132/33 KV Pooling substation
M/s Bhawna Construction and Engineering Company	Construction of Roads
M/s Jaisalmer Engineers Pvt. Ltd.	Construction of WTG Foundation and roads
M/s Hatch Power Infra Private Limited	Construction of 33 KV Line.
M/s Mohangarh Engineers & Construction Company	Construction of WTG Foundation
M/s Karnimatha Construction Company	Contruction of 132KV Transmission line
M/s AmarBhaw Power Pvt Ltd	Construction of 33 KV line and Unit substations and VCB Yard
M/s Bhati Construction	Construction of WTG Foundations.
M/s Vision Engineering	Construction of 33 KV line

Source: MEIL

2.6 RESOURCE REQUIREMENTS

2.6.1 Manpower

Construction Phase

The labour requirement varies during the construction phase from the initial phase to the commissioning phase. As reported by MEIL, approximately 250-300 labourers will be employed depending on stage of construction. Most of the labours will be employed at the local level from the surrounding villages. The socio-economic baseline will provide an understanding of the educational profile and the livelihood profile of the population in the AoI. Apart from these there will be about 10-15 employees from MEIL and its consultants.

Operation Phase

Technical staff numbering 20 and 30 security staff will be working at the wind farm during the O&M phase; these persons will be mostly from local area or Jaisalmer.

2.6.2 *Labour Accommodation facility*

The labourers will be provided with accommodation through contractors. The location of the construction labour camp is proposed to be at Khasra No. 927/1441 in Habur area near Boundary of Mokal Village. The labour will commute by vehicles provided by contractors to the site. The labour camp will have security staff for safety and security.

2.6.3 *Water Requirement*

Construction Phase

During construction phase, water will be required for domestic purposes as well as for construction activities (Refer ***Table 2.6***).

Table 2.6 Water Requirement during construction phase

S.N.	Area	Approximate Quantity	Source
1	Construction activities	100 m^3 per WTG	Procured through Tankers who generally source from Amar Sagar, Jaisalmer or Khusari Village.
2	Domestic water requirement	3 m^3/day (considering regular and Peak labour requirement)	Procured through Tankers from borewell in Poonam nagar (Habur) village..
3	Potable water	< 1 m^3/day	Bottled water purchase

Operation Phase

Approximately 4 m^3/day of domestic water will be required during the O &M phase planned to be sourced from tanker water.

2.6.4 *Raw Material*

Construction Phase

The construction material required includes cement, aggregates, steel, paints, solvents etc. Besides these, other supplies required for the project are fuels and oils, drilling requirements, spare parts for construction machinery and food and supplies for construction workforce. Most of the supplies will be procured from Jaisalmer city.

Operations Phase

Supplies, both for operational requirements and for the site staff, will be transported from Jaisalmer. This will include all fuels and oils, spare parts required for maintenance and food and supplies for the site staff.

2.6.5 *Fuel requirement and Storage*

Construction Phase

The onsite fuel requirement during construction phase will be about approximately 100 litres /day of diesel, which shall be procured from outlets

located close to the project site. The fuel will be stored in diesel drums of 200 litres capacity at the storage yard.

Operations Phase

There will be above ground storage facility for storage of lubricating oil. The oils will be unloaded in designated areas and stored in drums.

2.6.6 Batching plant

A batching plant will be installed in the Habur Area near Mokal Village boundary for providing ready mix concrete for WTG foundation and other civil work.

2.6.7 Power Requirement

Construction Phase

As reported, power requirement of the project will be met through DG sets. 14 number of DG sets of varying capacities (upto 250 KVA) will be used at the site.

Operations Phase

The power requirement at site office and WTG monitoring building during operation phase will be supplied by RVPNL.

2.7 POLLUTION CONTROL MEASURES

2.7.1 Air Emissions

Construction Phase

Likely emissions into the ambient air from the project during the construction phase will include:

- Fugitive emissions from WTG site preparations works, such as excavation, clearing, filling etc. and use of construction machinery;
- Fugitive dust emissions from unpaved roads owing to transportation of manpower and equipment;
- Vehicular emission from increased traffic activity during the construction stages;
- Emissions form DG sets; and
- Dust emissions from batching plant

The control measures for these emissions are as follows:

- Fugitive dust emission from site preparation and the use of construction machinery will be mitigated through maintaining the vehicular speed to 10 – 15 km/hr;

- Soil will be used for back filling. Vehicular emission will be controlled through proper maintenance of vehicles and vehicles with proper PUC will be operated at project site;
- DG sets to be used will have adequate stack height as per CPCB norms;
- Fugitive dust emission arising out of various activities in the batching plants will be mitigated through better material handling and provision of enclosure around the facility

Operations and Maintenance Phase

During the operations phase there will be no air emissions form the WG areas. However, there will be gaseous and fugitive dust emissions owing to plying of maintenance vehicles. It will be ensured that well maintained vehicles with proper PUC are used for maintenance purposes. DG sets deployed as back-up power, will emit a limited amount of gaseous pollutants into the ambient air.

2.7.2 Noise Emissions

Construction Phase

During the construction phase noise will be generated primarily during the day time. Noise will be generated from moving vehicles as well as construction equipment, including the DG sets utilized for power. Since there are no localities in the vicinity of the proposed Project area, the only receptors of noise pollution are the construction workers.

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

Operations Phase

While in operation, wind turbines produce noise from mechanical and aerodynamic sources:

- Aerodynamic noise emanates from the movement of air around the turbine blades and tower. The types of aerodynamic noise may include low frequency, impulsive low frequency, tonal, and continuous broadband. In addition, the amount of noise may rise with increasing rotation speed of the turbine blades, therefore turbine designs which allow lower rotational speeds in higher winds will limit the amount of noise generated;
- Mechanical noise may be generated by machinery in the nacelle of the wind turbines.

The Project will have windmills of 53 WTGs of 1.7 MW each and their model will GE 1.7 – 103. The specifications for the WTGs for the proposed Project are listed in ***Table 2.7.***

Table 2.7 Specifications for noise from WTGs for the proposed Project

GE 1.7-103 Specifications	
Hub Height	80m
Rotor diameter	103 m
Tip Height	131.5m
Noise	107dBA, 105dBA with low noise trailing edge technology
Frequency	50Hz and 60Hz
Blades	50.2m
Technology	Model based controls, low noise trailing edge, vortex generators, weak grid support

Source: GE Technical Documentation Wind Turbine Generator Systems 1.7-103 - 50 Hz and 60 Hz

2.7.3 Waste Management

Construction Phase

The solid waste generated by the project will consist of labour camp waste, garbage waste, metal scrap, and excess construction materials. The main types of waste that will be generated and sources are shown in ***Table 2.8***.

Table 2.8 Waste Generated, their sources and method of disposal

S. No.	Waste Type	Source and location	Estimated quantities	Method of Disposal
1	Domestic solid waste	Labour activities on site, canteen/rest area	~90 kg/day	Waste will be segregated onsite and will be disposed of at site as approved by local authority.
2	Construction Debris (excavated earth)	Construction of WTG, Access road, substation, Storage yard etc.	0.2-0.3 tonne/day (average) 0.5 – 1.0 tonne/day peak mainly during WTG foundation work only	All excavated materials to be used for backfilling and levelling and other debris shall be used for road construction.
3	Packaging waste containing wood, cardboard and other recyclables	Packing material for WTGs and Accessories and storage yard	~10 kg per WTG	Return back to the suppliers or used as storage boxes/racks at site.
4	Sludge from Wastewater Septic Tanks	Site Office, toilets	~10 kg/month	Collected and disposed of through contractors
5	Used oil/ waste oil	DG set, construction machinery on site	10-15 litres/month	Collected and disposed of through approved recyclers in accordance to *Hazardous Waste Rules, 2008.*
6	Oil contaminated rags	Cleaning activities at WTG sites and substation	-15-20 kg/month	Collected and disposed of through approved vendors in accordance to *Hazardous Waste Rules, 2008.*

Operations Phase

- During operation phase, the waste generated from project will include domestic solid waste at SCADA and substation and hazardous waste like waste oil, lubricants and oil contaminated rags will be generated during maintenance activities;
- The hazardous wastes will be stored onsite at separate designated covered area provided with impervious flooring. The storage containers/ bins/ drum will be clearly marked and identified for their hazards;

- The hazardous wastes will be disposed of in accordance to Hazardous Waste (Management, Handling and Transboundary Movement) Rules, 2008, as amended, through RSPCB/ CPCB approved vendors;
- Non-recyclable material will be collected, segregated onsite and handed over to local Municipal Corporation for disposal;
- Sewage will be disposed of through septic tanks and soak pits.

2.7.4 Wastewater Management

Construction Phase

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

Operations Phase

The operation phase will have negligible wastewater generation. Septic tank and soak pits will be provided at SCADA building and CMS monitoring station for disposal of sewage.

2.7.5 Fire Safety and Security

Construction

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

Operations

Structural fire protection

Wind Turbines comprise predominantly of non-flammable materials. Most components of the WTGs are predominantly metal. The only inflammable components are rotor blades and the panelling of the machine house, which are made from glass-fibre reinforced plastic, electric cables and electrical components, Gear box, transformer and hydraulic oils, hoses and other plastic components. It is practically impossible for fire to spread from the transformer station to the wind turbine or vice versa.

Fire prevention

The service personnel will take all appropriate measures to prevent fires. Lightening protection system will be based on lightening protection zone concept and in accordance to IEC 61400- 24, 62305-1, 3, 4 and DIN EN 50164-1,2. A lightning strike as a cause of fire is practically excluded.

Fire extinguishers

One portable powder fire extinguisher will be maintained at each WTG. These extinguishers are meant for immediate fighting of fire in early stages.

2.8 PROJECT SCHEDULE

The proposed timelines for construction and commissioning for Project Nidhi are presented in ***Table 2.9***.

Table 2.9 Project Nidhi Schedule

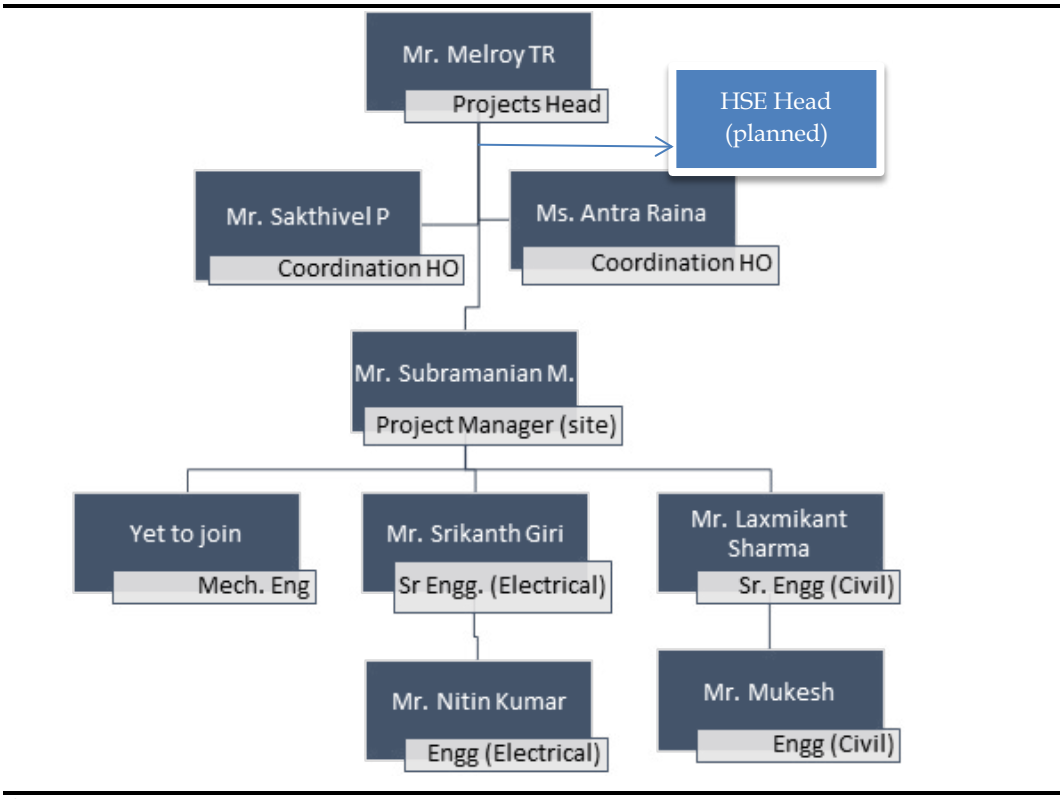
ACTIVITY	Proposed Schedule										
	June'15	July'15	Aug'15	Sep'15	Oct'15	Nov'15	Dec'15	Jan'16	Feb'16	Mar'16	Apr'16
Preparatory Activities											
LAND RELEASE FOR CONSTRUCTION											
Construction of Storage Yard											
Approach Road / Internal Road											
Dispatch of Anchor Cages		10	20	23							
Receipt of Anchor Cages at Site		10	20	23							
Deployment of Civil Engineer- GE											
Excavation			10	10	11	11	11				
PCC			8	10	10	10	10	5			
Steel Reinforcement			6	10	10	10	10	7			
Foundation Casting			4	10	10	10	10	9			
WTG Dispatch					12	16	16	9			
WTG Receipt						16	16	19	2		
WTG Installation						8	12	15	12	6	
WTG Handing over for Commissioning						5	12	15	12	9	
DP yard						8	12	12	15	6	
132/33KV Substation											
132KV EHV Transmission Line											
Bay Extension - Ramgarh GSS											
33 KV Internal Line & External Line											
Approvals											
Pre Commissioning						5	10	15	15	8	
Commissioning						2	12	15	12	12	

Source: MEIL Project Team

2.9 PROJECT ORGANISATIONAL STRUCTURE

The structure as is presented in ***Figure 2.6*** below:

Figure 2.6 Project Organisational Structure



Source: MEIL

Based on the organization structure, the day to day HSE related activities on site will be overlooked respective department Engineers who in turn will report to the Project Manager (Site head). The Site head will report to Corporate Project head and Corporate HSE head (planned) for various aspects during the construction phase as well as operational phase.

3 LAND REQUIREMENT AND ALLOTMENT PROCESS

This section provides an understanding of the land requirement for the project and the process of land procurement, keeping in mind the applicable reference framework, especially ADB policy requirements. This review allows for the development of an understanding of the process followed, the form of engagement undertaken and the present status of the land allotment process.

The project is presently in its construction phase, with the construction activities for the access road and the pooling substation already initiated. As the developer of the project, MEIL is engaged in the land identification and procurement for the project, as well as the construction of the internal roads, the internal transmission line (33 KV), pooling substation and the civil foundation works activities. GE India Industrial Pvt Ltd. is engaged for supplying equipment, logistics, construction of the WTGs and operation and maintenance activities. The process of land identification and procurement is discussed in the following sub sections.

3.1 REVIEW OF LAND PROCUREMENT PROCESS

This review was undertaken on the basis of the consultations undertaken with the project team on site and the local community. Furthermore, the revenue department officials were unavailable for consultation at the time of the site visit.

3.1.1 Land Requirement for the Project

The land requirement for the project is comprised of the land for the WTGs, transmission line, labour camp, pooling substation, access roads and site office. It is understood that 412.1 ha of government land has been allotted to the project, through lease agreements. It is understood that approximately 2.5 acres or 1 ha will be required for the WTGs, of which only 0.64 Ha will be used for the turbines. The exact land requirement for other project components is provided in ***Table 2.1.*** The details of the land procurement are provided in the subsequent sections.

Table 3.1 ***Total Land Requirement for the Project***

Project Facility	Village Name	Land Category	Status of Procurement
WTGs	Mokal and Habur	Government land	Procured
Pooling Substation	Mokal and Habur	Government land	Procured
Internal Transmission Line (33 KV)	Punam nagar and Mokala	Government land	Procured
External Transmission Line (132 KV)	Punam nagar, serawa, Sanu, Hema ki dhani, Hema, Biprasar, Biprasar netsi, Nawalsingh ki dhani, Minion	Government land	Procured

Project Facility	Village Name	Land Category	Status of Procurement
	ki dhani, Nala kharin and Ramgarh.		
Labour Camp (Construction Phase)	Habur Area, near Mokal Village	Government land	Procured
Internal Access Roads	-Habur and Mokal	Government land	Procured
Site Office	Habur	Government land	Procured
Batching Plant	3 in Habur and 1 in Mokal	Government land	Procured
Laydown area	NA	NA	NA

The land has been allotted to the project by the District Collector, vide allotment letter No. P. (12) (3) (37) (Registration no. 117/2004) Revenue 2011/5148 dated 19/07/2012. The lease agreement required the project to be set up within a time period of 2 years from the execution of the lease, failing which the land would revert back to the government and the lease would be considered lapse. As the project construction was not completed in the stipulated time, this land allotment was further extended for another two years vide letter no. P 2 (479) Raj 3/11 dated 29/07/2015. The lease is valid for a period of 30 years, conditional on the project becoming operational by 2017. The following table provides an understanding of the land allotted in the villages Habur and Mokal.

Table 3.2 Village wise Land Allotment

Village Name	Khasra No.	Land Allotted (ha)
Habur	650	4.862
	651	4.862
	654	4.052
	655	4.052
	658	4.052
	659	4.052
	661	4.862
	662	4.862
	665	4.862
	666	4.862
	668	4.862
	669	4.052
	685	4.052
	686	4.862
	728	4.862
	731	4.862
	732	4.862
	733	4.862
	758	4.862
	759	4.862
	760	4.862
	761	4.862
	762	4.862
	764	4.862
	770	4.862
	771	4.862
	772	4.862
	773	4.862
	774	4.862

Village Name	Khasra No.	Land Allotted (ha)
	775	4.862
	776	4.862
	777	4.862
	780	4.862
	781	4.862
	783	4.862
	784	4.862
	785	4.862
	787	4.862
	788	4.862
	794	4.862
	795	4.862
	796	4.862
	798	4.862
	809	4.862
	810	4.862
	811	4.862
	875	4.708
	876	4.052
	878	4.862
	882	4.862
	884	4.862
	885	4.862
	890	4.862
	891	4.862
	892	4.862
	893	4.862
	894	4.862
	895	4.862
	896	4.862
	898	4.708
	900	4.862
	904	4.862
	905	4.862
	906	4.862
	907	4.862
	909	4.862
	911	4.862
	918	4.862
	919	4.862
	920	4.862
	921	4.862
	922	4.862
	923	4.862
	Total Habur	**349.773**
Mokal	74	4.857
	75	4.857
	76	4.857
	77	4.857
	93	4.857
	94	4.857
	95	4.857
	96	4.857
	97	4.857
	98	4.857
	99	4.857
	101	4.857

Village Name	Khasra No.	Land Allotted (ha)
	125	4.857
	Mokal Total	**62.327**

Source: Land lease deed

Wind Turbines Generators

The land requirement for the WTGs and other project components is 412.1 Ha (2573.1 Bigha or 1018.32 acres), in the villages Mokal and Habur. According to the information made available by MEIL, the land for the WTGs is comprised of government land, categorised as culturable waste land.

It is reported that the actual land requirement for the project will be approx. 1 Ha per WTG (53 Ha in total) of which only 0.64 Ha will be used during the operations phase.. Generally as observed with the existing WTGs in the area, once the construction phase is over, land is rehabilitated and can be used by the locals for grazing or acess.

Transmission Lines

According to the present information available, the land required for the RoWs of the internal and external transmission lines is comprised completely of Government land. According to the consultations with the MEIL project team, it is understood that the land identified for the transmission line RoW is comprised completely of barren land, with no forest land, Schedule V land, community land or cultural heritage sites being impacted. No encroachments were observed during the site visit, however, it is reported that opportunistic cultivation does occur during Monsoons (July-September), which is contingent to good rainfall. However, during the laying down of transmission lines, the period of Monsoon was avoided and hence no such cultivation was impacted.

Due to the fact, that on Government Land only 27 m width is required for Right of Use, for laying down the Transmission Line, the process of laying down of Transmission Line does not impact the community land, grazing land, or land owner owning economically unviable land parcels or has faced economic vulnerability.

Associated Project components

The land for the associated project components such as pooling substation, internal access roads and labour camp is comprised of government land, The details of the land procurement for the associated project components are provided in ***Table 2.1***.

3.1.2 Project Related Land Procurement and Specific Issues

Based on the information made available, the key observations pertaining to land procurement are mentioned below.

Schedule V Area

The project area does not fall under Schedule V areas[1] as defined by the Indian Constitution.

Tribal (Schedule Tribe) Land

According to the information available, the land identified for the project is comprised of government land. No tribal land has been identified for the project so far.

Landlessness

As mentioned above, the land requirement for the project is comprised completely of government land and thus will not result in any impact on private land owners.

Encroachment

According to the discussions undertaken with the Project team and the local community, it is understood that due to the low productivity of land in the area and scarcity of rainfall/irrigation, the local community undertakes opportunistic cultivation on the government land surrounding the villages in case of good rainfall (which happens approx. every 4-5 years). This cultivation is mostly of food grains in the monsoon season (Kharif), used for self-consumption of the cultivators and is heavily dependent upon the level of rainfall. As it is government land, with no recognized private rights the cultivators are recognized as encroachers and penalised for usage of the same by the government, however are allowed to complete the crop cycle. While the community considers this as claim over the land, it is not recognized by the state law. This encroachment is undertaken by the general and there is no dominance of any social group in undertaking this encroachment. While there may be tribal or vulnerable groups (refer to Section 6.6.6 for futher details) they are reported to be acting as members of the larger community. Also, across monsoon cycles, the cultivators are known to shift locations, thereby not being associated with any particular piece of land.

Though, during the first site visit, no encroachments were observed on the land parcels identified; however, on visiting the site a month later (during peak monsoons in August), cultivation was observed on government land resultant from good rainfall in the region. However, this is understood to be opportunistic and entirely dependent upon the rainfall in the region.

[1] The Schedule V areas comprise of the areas identified in the Paragraph 6 of the Fifth Schedule of the Indian Constitution. These areas comprise of those tribal inhabited areas which are located in other parts of the country than North-East India, including areas in Andhra Pradesh, Bihar, Chhattisgarh, Gujarat, Himachal Pradesh, Madhya Pradesh, Jharkhand, Maharashtra, Orissa and Rajasthan.

Nevertheless it is understood that upon the initiation of construction activities, all cases of encroachments or claims on land were assessed and where appropriate a onetime negotiated amount was paid to the local community. This amount ranged between INR 30,000 to INR 16,00,000.

Common Property Resources

The land identified for the project is used by the community for grazing and commuting purposes. According to the discussions with the local community, as the AoI is characterised by large tracts of open government land with the project impacting only 1.19% of the total land in the AoI, the project will not have a significant impact on the grazing land/common land availability. Also the project is not restricting or limiting access of communities to other grazing areas in the AoI.

Cultural Heritage

No cultural heritage sites were identified in the project area or in a radius of 5 km (Area of Influence).

NoC from Panchayat

The state does not require wind power projects to take a NoC (No Objection Certificate) from the Gram Panchayat of the impacted villages prior to initiation of construction activities, in case of procurement of government land. This process was done away with, few years back by the Rajasthan Government.

Rajasthan Wind Power Policy

The land for the project has been made available as part of the 2012 Policy for Promoting Generation of Electricity from Wind of the Rajasthan Government Energy Department. The land allotment for wind power projects under this policy is undertaken on the basis of the provisions of the Rajasthan Land Revenue (Allotment of Land for Setting up of Power plan based on Renewable Energy Sources) Rules 2007.

As part of this policy, the maximum land that can be allotted for wind power projects is 5 Ha/MW. The land is allotted to the project proponents at 10% of the DLC rate (agricultural land).

3.2 LAND PROCUREMENT PROCESS

3.2.1 Identification/Procurement of Land

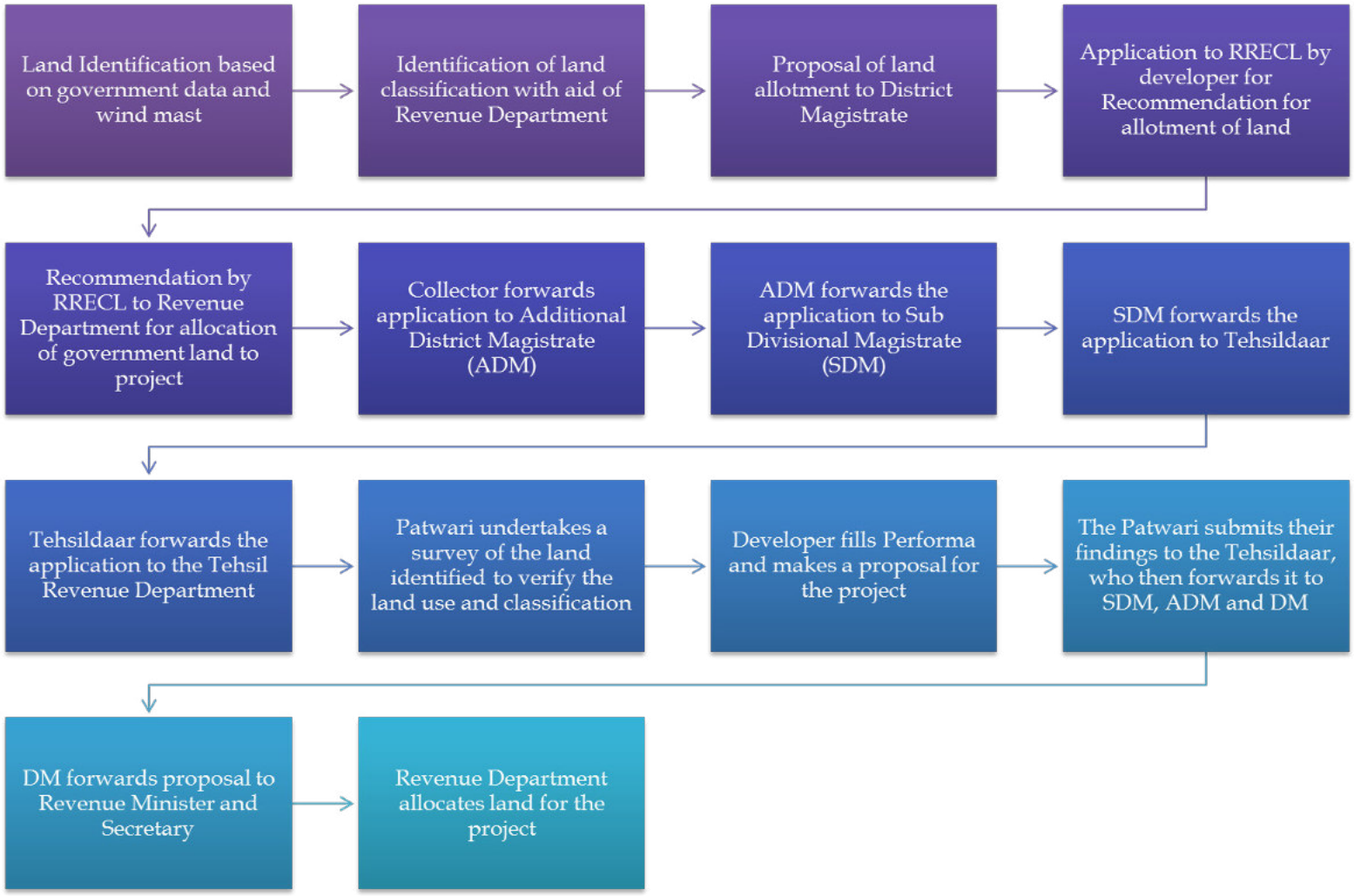
As has been mentioned above, the land for the project is primarily comprised of government/ revenue land. The allocation of the land for the project has been done in keeping with the provisions of the Rajasthan Wind Policy, 2012

and the Rajasthan Land Revenue (Allotment of Land for setting up of Power plant based on Renewable Energy Sources) Rules, 2007. The process of the procurement of the government land is as provided in ***Figure 3.1***below.

The land procurement for the project has been undertaken by the project team of MEIL, which comprises of three individuals, working at the project level. It is understood that no third party or land aggregators were engaged for the project.

The land team of MEIL also mentioned that any claims over the revenue land by the local community will be addressed on merit and further investigation and subsequent negotiation with the claimant.

Figure 3.1 Process for Land Identification and Allotment in Case of Government Land



4.1 INTRODUCTION

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

- Applicable environmental and social regulations and policies in India and the State of Rajasthan;
- Institutional Framework for the implementation of the regulations; and
- International Standards and Conventions including:
  - Applicable Indian national, state and local regulatory requirements;
  - ADB safeguards Policy Statement, 2009;
  - ADB policy on Social Protection Strategy, 2001;
  - ADB policy on Public Communications Policy, 2011;
  - IFC Performance Standards (2012);
  - IFC/World Bank General EHS Guidelines (2007);
  - IFC/World Bank EHS Guidelines for Wind Energy Projects (2007); and
  - IFC/World Bank EHS Guidelines for Electric Power Transmission and Distribution (2007)
  - Relevant ILO conventions covering core labour standards and basic terms and conditions of employment (limited to operational phase of the proposed Project).

4.2 INSTITUTION FRAMEWORK- ENFORCEMENT AGENCIES

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

Table 4.1 Enforcement Agencies relevant to the Project

Agency	Functions	Relevance & Applicability to the project
Rajasthan State Pollution Control Board	The RSPCB is a statutory authority entrusted to implement environmental laws and rules within the jurisdiction of the State of Rajasthan, India. The Board ensures proper implementation of the statutes, judicial and legislative pronouncements related to environmental protection within the State.	The project will need to obtain Consent to Establish and Consent to Operate under the Water (Prevention and Control of Water Pollution) Act, and Air (Prevention and Control of Pollution) Act, 1981. The project would generate used oil from generator sets and thus requires to obtain authorization under Hazardous Waste Management, Handling and Transboundary Movement) Rules, 2008.
National Institute of Wind Energy (formerly Centre for Wind Energy	• Research & Development • Wind Resource Assessment Unit: • Standards and Certification Unit: • R&D Testing unit	Not a regulatory requirement however if a report is required from NIWE, then MEIL will go for it or get the report from WRA firms for validation eg. 3 Tier, AWS True power, etc.

Agency	Functions	Relevance & Applicability to the project
Technology (C-WET))		
Indian Renewable Energy Development Agency Limited (IREDA)	The main objectives of IREDA is to promote, develop and extend financial support to specific projects and schemes for generating electricity and / or energy through new and renewable sources and conserving energy through energy efficiency.	Not mandatory, however required if loan is taken from IREDA
Rajasthan Renewable Energy Corporation Limited (RRECL)	The main objectives of the RRECL are • To generate electricity through renewable sources like wind and solar on decentralized manner; • To conserve energy in rural areas; • To import and adopt viable technology and machinery in the areas of Non-conventional energy sources and ensures post installation service; and • To impart training and to promote research and development in the field of Non-conventional energy sources	Project should be developed based on the RRECL guidelines for renewable energy
Rajasthan Rajya Vidyut Prasaran Nigam ltd	The main responsibilities of RRVPNL are Intra state transmission of electricity through Intra-State Transmission System; • Creation of new EHV lines and Grid Sub Stations of 765 kV/400 kV/220 kV/132 kV rating including their maintenance and augmentations; • Planning and co-ordination relating to intra-state transmission with all concerned agencies such as CTU, State Govt., generating companies, licensees, Regional Power Committees etc.; • Ensuring development of an efficient, coordinated and economical system of intra-state transmission of electricity from generating stations to Load Centres; • Non-discriminatory Open Access to its transmission system on payment of transmission charges; & • Complying with the directions of RLDC (Regional Load Dispatch Center) and SLDC, operating SLDC (State Load Dispatch Center) until any other authority is established by the State Government,	Project should be developed based on the RRVPNL Policy for promoting generation of Electricity from wind, 2012
State Labour Department	All issues pertaining to implementation of labour laws in any establishment, shop or factory.	Labours to be involved during the construction phase and few in the operation should be provided with wages and other facilities with state as well as local labour laws and acts.
District Administration (Collector's Office)	Private land purchase process by the land aggregator will be regularized by the state government under Rajasthan Land Revenue Act, 1956 (including rules for land conversion) through District collector and revenue department	Land purchase process for the various components of project such as WTG, substation, roads , batching plant etc. would be followed as per State Land revenue code and land registration act of Rajasthan.
National Green Tribunal	The tribunal will have jurisdiction over all civil cases relating to implementation of the	U/s 17, any person responsible for any untoward incidents (defined in Schedule

Agency	Functions	Relevance & Applicability to the project
	following regulations: ▪ The Water Act, 1974; ▪ The Water Cess Act, 1977; ▪ The Forest Conservation Act, 1980; ▪ The Air Act, 1981; ▪ The Environment Protection Act, 1986; ▪ The Public Liability Insurance Act, 1991; and ▪ The Biological Diversity Act, 2002 The Act provides for compensation on account of following ▪ Relief and compensation to the victims of pollution and other environmental damage arising under enactment of the above acts; ▪ Restitution of property damaged; and ▪ Restitution of the environment.	II of the Act) is liable to pay relief or compensation as determined by the tribunal, failing which a penalty (u/s 26 and 27) is imposable which may lead to imprisonment up to 3 years or fine upto Rs. 10 Crores or both and an additional fine of Rs 25,000 per day for any delay, which may further be increased to one lac per day.

4.3 *APPLICABLE REGULATORY/ POLICY FRAMEWORK*

Table 4.2 summarizes the key regulations that are relevant to the project across its lifecycle. This table should be used to update/develop a comprehensive legal register for the Project which can be regularly monitored for compliance as well as updated to reflect changes/non-applicability of regulations, policies and standards.

Table 4.2 Applicability of Key Legislations in India

Applicable Indian Legislation/Guidelines/International Conventions	Pre-construction	Construction	Operations	Decommissioning	Agency Responsible	Remarks
Land Purchase						
Rajasthan Land Revenue Act	√	√	X	X	District collector and revenue department	Kindly refer to ***Chapter 3 Section 3.4*** for details regarding land procurement.
The Electricity Act 2003	√	√	√	√	Central Electricity Authority	Generating company deemed to obtain a license under this Act and also to comply with all safety requirement as per rule 29 to 46 under chapter 6.
Indian Telegraph Act, 1885	√	√	√	√	Telegraph Authority	Under this act, for any structures observed in along the transmission line, the telegraph authority is to compensate for the actual loss / damage to the owner for the property.
Forest Clearance and Wildlife						
Forest Conservation Act 1980	√	√	√	√	MOEF and State Department of Forest, Govt. of Rajasthan	The Forest (Conservation) Act (FCA), 1980 as amended in 1988 and revised Rules made there under in 2003 (in suppression of FC Rules of 1981) provide for prevention of diversion of any forestland for non-forest purposes. In all such cases, prior Forest Clearance is required from Central and State Government depending upon type and extent of forestland required for non-forest purposes. Under the Act, an Advisory Committee advises GoI for grant of approval and other matters connected with the conservation of forests. The Project does not require a NOC as there is no designated forest area lies within the Project boundary.
Wildlife Protection Act, 1972, 2002 and Rules, 2003 and as amended	√	√	√	√	Wildlife Warden, State Forest Department;	If any protected/ endangered flora or fauna (as listed in Schedules of WP Act, 1972) are found in the project area, conservation measures require be proposing and implementing for their protection.
Environment Protection						
Environment Protection Act, 1986 and as amended	√	√	√	√	RSPCB MoEF CPCB	Permissible limits for ambient air quality, water quality, noise limits has been laid down by CPCB under EP Act, 1986 which requires to be complied with.

Applicable Indian Legislation/Guidelines/International Conventions	Pre-construction	Construction	Operations	Decommissioning	Agency Responsible	Remarks
The Noise (Regulation & Control) Rules, 2000 and as amended up to 2010	√	√	√	√	RSPCB	Per the Act, ambient noise levels are to be maintained as stipulated in the rules for different categories of areas such as residential, commercial, and industrial and silence zones. There are no residential, commercial, industrial or silence zones within 1 km of the proposed Project area.
Ambient Noise Standards	X	√	√	x	RSPCB, MoEF	
The Water (Prevention and Control of Pollution) Act, 1974, as amended	X	√	√	X	RSPCB	Project requires to obtain Consent to Establish before start of construction activities and Consent to Operate before commissioning of the project from RSPCB; (1)
The Air (Prevention and Control of Pollution) Act 1981, as amended	X	√	√	X	RSPCB	Project requires to obtain Consent to Establish before start of construction activities and Consent to Operate before commissioning of the project from RSPCB
Storage of Hazardous Chemicals						
Manufacture, Storage and Import of Hazardous Chemicals (MSIHC) Rules, 1989 and as amended	X	√	√	X	RSPCB	Rules will be applicable during construction and operation phases if chemicals stored at site satisfy the criteria laid down in the Rules.
Handling of Hazardous Wastes						
Hazardous Wastes (Management Handling and Trans boundary Movement) Rules, 2008 as amended up to 2010	X	X	√	√	RSPCB	Generation of waste oil and transformer oil at site attracts the provisions of Hazardous Waste Rules, 2008. The hazardous wastes have to dispose through approved recyclers only.
Labour and Working Conditions						
The Factories Act, 1948 and Rajasthan Factories Rules, 1951	X	X	√	X	Deputy Chief Inspector of Factories	MEIL and their contractors will need to comply to all requirement of factories rules and participate in periodic inspection during the Operations Phase
Building and Other Construction Workers Act, 1996; Inter-state Migrant Workers Act,	X	√	X	√	State Labour Department, Rajasthan	MEIL and their contractors will need to comply to the requirements of these regulations

(1) As per the Central Pollution Control Board's (CPCB) latest guidelines for Directions u/s 18(1) (b) of Water (P&CP) Act, 1974 and Air Act (P&CB), 1981 regarding Classification of Industries into Red, Green and Orange Category for Consent management, the Project falls under Green Category 79-"Solar power generation through solar photovoltaic cell, wind power and mini hydel power (<25 MW)" and would therefore require Consent to Establish (CTE) from RSPCB in accordance under the Air Act, Water Act and Hazardous Waste Rules.

Applicable Indian Legislation/Guidelines/International Conventions	Pre-construction	Construction	Operations	Decommissioning	Agency Responsible	Remarks
1979; Contract Labour Act, 1970						
The Child Labour (Prohibition and Regulation) Act, 1986; Bonded Labour (Abolition) Act 1976; Minimum Wages Act, 1948; Equal Remuneration Act 1976; Workmen's Compensation Act, 1923; Maternity Benefit Act, 1961.	X	√	√	√	Department of Inspector of Factories, Rajasthan	MEIL and their contractors will need to comply to the requirements of these regulations
Companies Act, 2013	X	X	√	X	MEIL	According to Schedule 135 sub-section 1, the companies meeting the threshold criteria specified should spend in every financial year, at least 2% of the average net profits of the company made during the three immediately preceding financial years, in pursuance of CSR Policy. The project will need to comply with the requirements as stated in the law.

4.4 PERMITTING AND COMPLIANCE STATUS FOR THE PROJECT

As per the EIA Notification (2006) and its amendments, the wind farm project does not require any environmental clearance from the Ministry of Environment and Forests (*MoEF*) or the Rajasthan State Environmental Impact Assessment Authority (*SEIAA*).

However, as per the Central Pollution Control Board's (*CPCB*) latest guidelines for Directions u/s 18(1) (b) of Water (P&CP) Act, 1974 and Air Act (P&CB) ,1981 and RSPCB letter : No.F.14(23) Policy/RPCB/Plg/10548-10587 dated 07 March 2013 regarding Classification of Industries into Red, Green and Orange Category for Consent management, the Project would require Consent to Establish (CTE) from RSPCB in accordance under the Air Act, Water Act and Hazardous Waste Rules. This has also been clarified by RSPCB office order dated 28th July 2014

Based on interactions held with the MEIL team and document review key permitting and compliance status for proposed project is provided in ***Table 4.3*** below.

Table 4.3 Permitting and Compliance Status

Permit	Status	Remarks
Environmental Clearance	Not Required	As per the Indian regulations, Wind power projects are not covered under the EIA notification, 2006 and subsequent amendments and are exempted from environmental clearance by the Ministry of Environment and Forest (MoEF) or state bodies.
Nodal Agency Consent from RREC	Required	Permission to establish at least 90 MW Wind Farm obtained
Forest Clearance from MoEF	Not Required	There are no Forest Areas within the Project Area
Power evacuation approval	Required	Power evacuation approval is obtained from Rajasthan Rajya Vidyut Prasaran Nigam Limited (RVPN).
Power Purchase Agreement (PPA)	Required	Power Purchase Agreement (PPA) with Rajasthan Discoms Power Procurement Center (RDPPC) is to be availed before the plant is commissioned.
Consent to Establish and Consent to Operate	Required	The project needs to obtain Consent to Establish which has to followed by Consent to Operate under Water (Prevention and Control of Pollution) Act, 1974 and Air ((Prevention and Control of Pollution) Act, 1981 from Rajasthan State Pollution Control Board (RSPCB) (1) . In light of the office order dated 28th July 2014 issued by Rajasthan State pollution control board, (No. F14(56-BP) policy/ RPCB/ plg/ 6753-81), MEIL is considering the applicability of the same for its project

(1) CTE and CTO are the permissions issued by Indian regultory authorities of Environment to manage the wastewater and air emissions from industries.

Permit	Status	Remarks
Contractor permits	Required and clause added by MEIL in contract agreements to various contractors	The contractor will need to abide by the following laws and MEIL will have to ensure its being done being the principle employer: • Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996; • Inter-state Migrant Workmen (Regulation of Employment and Condition of Service) Act, 1979; • Contract Labour Act, 1970 • The Child Labour (Prohibition and Regulation) Act, 1986; • The Bonded Labour System (Abolition) Act 1976; • Minimum Wages Act, 1948; • Equal Remuneration Act 1976; • Workmen's Compensation Act, 1923; • Maternity Benefit Act, 1961.
Land procurement	Allotted	• Allotment of concerned land from Hon'ble Revenue Minister, GoR *(vide allotment letter No. P. (12) (3) (37) (Registration no. 117/2004) Revenue 2011/5148 dated 19/07/2012)* • This land allotment was further extended for another two years vide letter no. P 2 (479) Raj 3/11 dated 29/07/2015 (refer to ***Section 3*** for further details)
No Objection Certificate from the Gram Panchayat	Not Applicable	According to the recent amendments to the regulations for wind power projects, NOCs from the Gram Panchayat are not mandatory unless the project involves private land. The project has obtained verbal consent from the village Habur, where the project land is located..

4.5 APPLICABLE ENVIRONMENTAL STANDARDS

The Central Pollution Control Board (CPCB) has stipulated different environmental standards w.r.t. ambient air quality, noise quality, water and waste water for the country as a whole under EP Act, 1986. Also as per the applicable reference framework WB/IFC guideline values are applicable to the project. Details on the standards are provided as ***Annexure B*** of this Report.

4.6 INTERNATIONAL SAFEGUARD REQUIREMENTS

4.6.1 ADB Safeguard Policy Statement, 2009

In July 2009, ADB's Board of Directors approved the new Safeguard Policy Statement (SPS) governing the environmental and social safeguards of ADB's operations. The SPS builds upon ADB's previous safeguard policies on the Environment, Involuntary Resettlement, and Indigenous Peoples, and brings them into one consolidated policy framework with enhanced consistency and coherence, and more comprehensively addresses environmental and social impacts and risks. The SPS also provides a platform for participation by

affected people and other stakeholders in the project design and implementation.

The SPS applies to all ADB-financed and/or ADB-administered projects and their components, regardless of the source of financing, including investment projects funded by a loan; and/or a grant; and/or other means, such as equity and/or guarantees. ADB works with borrowers and clients to put into practice the requirements of SPS.

The SPS supersedes ADB's Involuntary Resettlement Policy (1995), Policy on Indigenous Peoples (1998), and Environment Policy (2002). In accordance with the SPS, these previous policies apply to all projects and tranches of multi-tranche financing facility projects that were reviewed by ADB's management before 20 January 2010.

The objectives of ADB's safeguards are to:

- avoid adverse impacts of projects on the environment and affected people, where possible;
- minimize, mitigate, and/or compensate for adverse project impacts on the environment and affected people when avoidance is not possible; and
- assist borrowers and clients to strengthen their safeguard systems and develop the capacity to manage environmental and social risks.

ADB's SPS sets out the policy objectives, scope and triggers, and principles for three key safeguard areas:

- Environmental safeguards;
- Involuntary Resettlement safeguards; and
- Indigenous Peoples safeguards.

To help borrowers and clients and their projects achieve the desired outcomes, ADB adopts a set of specific safeguard requirements that borrowers and clients are required to meet in addressing environmental and social impacts and risks. These safeguard requirements are as follows:

- Safeguard Requirements 1: Environment (Appendix 1 of SPS);
- Safeguard Requirements 2: Involuntary Resettlement (Appendix 2 of SPS);
- Safeguard Requirements 3: Indigenous Peoples (Appendix 3 of SPS); and
- Safeguard Requirements 4: Special Requirements for Different Finance Modalities (Appendix 4 of SPS).

In addition, ADB does not finance activities on the prohibited investment activities list (Appendix 5 of SPS).Furthermore, ADB does not finance projects that do not comply with its safeguard policy statement, nor does it finance projects that do not comply with the host country's social and environmental laws and regulations, including those laws implementing host country obligations under international law.

Consultation and Disclosure requirements of ADB

ADB's *Safeguard Policy and Public Communications Policy (2011)* sets out disclosure requirements for various ADB activities, including safeguard requirement. Safeguard Requirements 2: Involuntary Resettlement (Appendix 2 of SPS); and Safeguard Requirements 3: Indigenous Peoples (Appendix 3 of SPS) sets out the need for meaningful consultation and information disclosure during project preparation and operation to the affected peoples and other stakeholders. Key requirements include:

- **Information Disclosure:** The borrower/client will submit the following documents to ADB for disclosure on ADB's website as per the applicability with respect to the Project:
  - Draft EIA including draft EMP;
  - Final EIA/IEE;
  - Updated EIA/IEE and corrective active plan;
  - Environmental Monitoring Reports.
  - Resettlement Plan (RP)/Resettlement Framework (RF)
  - Indigenous Peoples Plan (IPP)/Indigenous Peoples Planning Framework (IPPF)
  - Monitoring reports

- **Information disclosure to affected people or stakeholders:** The borrower/client will provide relevant environmental information in a timely manner, in an accessible place and in a form and language(s) understandable to affected people and other stakeholders. For illiterate people, other suitable communication methods will be used.
- **Consultation and Participation:** The borrower/client will carry out meaningful consultation with affected people and other concerned stakeholders, including civil society, and facilitate their informed participation.
- **Timing and Frequency for consultation and participation:** Meaningful consultation begins early in the project preparation stage and is carried out on an ongoing basis throughout the project cycle.

4.6.2 ADB Gender and Development Policy 2003

The Gender and Development Policy (GAD Policy) of ADB is aimed at integrating gender issues in the Bank's macroeconomic sector and project work. The GAD strategy is based on consideration of social justice, gender equity and on substantial evidence that investments in women are vital to achieving economic efficiency and growth. The key elements of the GAD Policy include the following:

- **Gender Sensitivity**: to observe how ADB operations affect women and men and to take into account women's needs and perspective in planning its operations

- **Gender Analysis**: to assess systematically the impact of a project on men and women, and on the economic and social relationship between them
- **Gender Planning:** to formulate specific strategies that aim to bring about equal opportunities for men and women
- **Mainstreaming**: to consider gender issues in all aspects of ADB operations, accompanied by efforts to encourage women's participation in the decision making process in development activities
- **Agenda Setting**: to assist DMC governments in formulating strategies to reduce gender disparities and in developing plans and targets for women's and girls' education, health, legal rights, employment and income-earning opportunities.

4.6.3 ADB Social Protection Strategy 2001

The Social Protection Strategy of 2001, is a set of policies and programs designed to reduce poverty and vulnerability by promoting efficient labour markets, diminishing people's exposure to risks, and enhancing their capacity to protect themselves against hazards and interruption/loss of income. The five components identified for social protection include labour markets, social insurance, social assistance, micro and area-based approaches and/or child protection.

4.6.4 IFC Requirements

IFC applies the Performance Standards (1) to manage social and environmental risks and impacts and to enhance development opportunities in its private sector financing in its member countries eligible for financing. The Performance Standards may also be applied by other financial institutions choosing to support them in the proposed project. These performance standards and guidelines provide ways and means to identify impacts and affected stakeholders and lay down processes for management and mitigation of adverse impacts.

Together, the Client is required to meet the stipulations of all the eight Performance Standards throughout the life of an investment in the case such an investment is being sought either form IFC or any other institution which follows IFC standards.

(1) http://www.ifc.org/ifcext/sustainability.nsf/Content/PerformanceStandards

Table 4.4 IFC Performance Standards

IFC- PS no.	Description	Objectives
1	Assessment and Management of Environmental and Social Risks and Impacts	• To identify and evaluate environmental and social risks and impacts of the project; • To adopt a mitigation hierarchy to anticipate and avoid, or where avoidance is not possible, minimize and, where residual impacts remain, compensate/offset for risks and impacts to workers, Affected Communities, and the environment; • To promote improved environmental and social performance of clients through the effective use of management systems; • To ensure that grievances from Affected Communities and external communications from other stakeholders are responded to and managed appropriately; and • To promote and provide means for adequate engagement with Affected Communities throughout the project cycle on issues that could potentially affect them and to ensure that relevant environmental and social information is disclosed and disseminated.
2	Labour and Working Conditions	• To promote the fair treatment, non-discrimination, and equal opportunity of workers; • To establish, maintain, and improve the worker-management relationship; • To promote compliance with national employment and labor laws; • To protect workers, including vulnerable categories of workers such as children, migrant workers, workers engaged by third parties, and workers in the client's supply chain; • To promote safe and healthy working conditions, and the health of workers; and • To avoid the use of forced labor.
3	Resource Efficiency and Pollution Prevention	• To avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities; • To promote more sustainable use of resources, including energy and water; and • To reduce project-related GHG emissions
4	Community Health, Safety and Security	• To anticipate and avoid adverse impacts on the health and safety of the Affected Community during the project life from both routine and non-routine circumstances; and • To ensure that the safeguarding of personnel and property is carried out in accordance with relevant human rights principles and in a manner that avoids or minimizes risks to the Affected Communities.
5	Land Acquisition and Involuntary Resettlement	• To avoid, and when avoidance is not possible, minimize displacement by exploring alternative project designs; • To avoid forced eviction; • To anticipate and avoid, or where avoidance is not possible, minimize adverse social and economic impacts from land acquisition or restrictions on land use by (i) providing compensation for loss of assets at replacement cost4 and (ii) ensuring that resettlement activities are implemented with appropriate disclosure of information,

IFC- PS no.	Description	Objectives
		consultation, and the informed participation of those affected; • To improve, or restore, the livelihoods and standards of living of displaced persons; and • To improve living conditions among physically displaced persons through the provision of adequate housing with security of tenure5 at resettlement sites
6	Biodiversity Conservation and Sustainable Management of Living Natural Resources	• To protect and conserve biodiversity; • To maintain the benefits from ecosystem services; and • To promote the sustainable management of living natural resources through the adoption of practices that integrates conservation needs and development priorities.
7	Indigenous Peoples	• To ensure that the development process fosters full respect for the human rights, dignity, aspirations, culture, and natural resource-based livelihoods of Indigenous Peoples; • To anticipate and avoid adverse impacts of projects on communities of Indigenous Peoples, or when avoidance is not possible, to minimize and/or compensate for such impacts; • To promote sustainable development benefits and opportunities for Indigenous Peoples in a culturally appropriate manner; • To establish and maintain an ongoing relationship based on Informed Consultation and Participation (ICP) with the Indigenous Peoples affected by a project throughout the project's life-cycle; • To ensure the Free, Prior, and Informed Consent (FPIC) of the Affected Communities of Indigenous Peoples when the circumstances described in this Performance Standard are present; and • To respect and preserve the culture, knowledge, and practices of Indigenous Peoples.
8	Cultural Heritage	• To protect cultural heritage from the adverse impacts of project activities and support its preservation; and • To promote the equitable sharing of benefits from the use of cultural heritage.

Source: *Source: IFC Performance Standards on Environmental and Social Sustainability,*

In addition, during the construction, operation and eventual decommissioning of the site, the IFC EHS Guidelines for Wind Energy [(1)] and the General Environmental, Health, and Safety (EHS) General Guidelines [(2)] (April 30, 2007) will also be applicable for this project.

Where there is a discrepancy between the prevailing environmental standards on emission, discharge etc. and the corresponding standards published by the IFC/World Bank General EHS Guidelines, MEIL will incorporate the more stringent standard for the proposed Wind farm.

(1)
http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_WindEnergy/$FILE/Final+-+Wind+Energy.pdf
(2)
http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_GeneralEHS/$FILE/Final+-+General+EHS+Guidelines.pdf

5 SCREENING AND SCOPING

At the initial stage of the ESIA process, preliminary information was provided to aid in the determination of what legal and other requirements apply to the Project. This step was conducted utilising a high level description of the Project and its associated facilities. The screening process involved the following:

- Reviewing of applicable regulatory framework for the proposed Wind Power Project;
- Reviewing of available Project related activities and their impacts on various components of environment;
- Collection and compilation of available secondary baseline data from different sources; and
- Categorisation of Project as per ADB and IFC guidelines.

5.1 SCREENING METHODOLOGY

For the screening exercise, the consulting firm undertook discussions with the Project team and a review of the documents available. The following sub sections provide an understanding of the methodology followed.

5.1.1 *Kick-off Meeting*

The consulting firm team had a brief kick-off meeting with the MEIL team prior to site reconnaissance visit. A discussion was also held with regard to the expectations from this assessment in terms of scope of work, deliverables, timeline and the methodology to be followed for the same.

5.1.2 *Document Review*

Desk based review of the relevant documents of the project site and its surroundings were carried out to have a clear understanding of the Project and its impacts. Following documents were made available for review as part of ESIA:

- Co-ordinates of all the 53 nos. WTG sites and the external transmission line route;
- Various documents for the proposed Project;

A review of the secondary information available on the project area, the administrative block, the district and the state was undertaken so as to allow for the primary data to be substantiated and complimented.

5.2 PROJECT CATEGORISATION

5.2.1 ADB Safeguard Categories[1]

The projects are screened on the following criteria:

1. *Environment* -proposed project was screened according to type, location, scale, and sensitivity and the magnitude of their potential environmental impacts, including direct, indirect, induced, and cumulative impacts.

2. *Involuntary Resettlement* - The involuntary resettlement impacts of an ADB-supported project are considered significant if 200 or more persons will be physically displaced from home or lose 10% or more of their productive or income-generating assets.

   For those involving involuntary resettlement, a resettlement plan is prepared that is commensurate with the extent and degree of the impacts: the scope of physical and economic displacement and the vulnerability of the affected persons.

3. *Indigenous People* - The impacts of an ADB-supported project on indigenous peoples is determined by assessing the magnitude of impact in terms of
   - customary rights of use and access to land and natural resources;
   - socioeconomic status;
   - cultural and communal integrity;
   - health, education, livelihood, and social security status; and
   - the recognition of indigenous knowledge; and
   - the level of vulnerability of the affected Indigenous Peoples community.

As per these criteria projects are classified into any of the four categories: A, B, C and F1. The criteria and categories are further explained in ***Table 5.1*** below:

[1] ADB safeguard categories for environment, involuntary resettlement and indigenous peoples

(http://www.adb.org/site/safeguards/safeguard-categories)

Table 5.1 ADB Safeguard Categories

Category/ Criteria	Environment	Involuntary Resettlement	Indigenous People
A	A proposed project is likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented. These impacts may affect an area larger than the sites or facilities subject to physical works. An environmental impact assessment (EIA), including an environmental management plan (EMP), is required.	A proposed project is likely to have significant involuntary resettlement impacts. A resettlement plan, which includes assessment of social impacts, is required.	A proposed project is likely to have significant impacts on indigenous peoples. An indigenous peoples plan (IPP), including assessment of social impacts, is required.
B	The proposed project's potential adverse environmental impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed more readily than for category A projects. An initial environmental examination (IEE), including an EMP, is required.	A proposed project includes involuntary resettlement impacts that are not deemed significant. A resettlement plan, which includes assessment of social impacts, is required.	A proposed project is likely to have limited impacts on indigenous peoples. An IPP, including assessment of social impacts, is required.
C	A proposed project is likely to have minimal or no adverse environmental impacts. An EIA or IEE is not required, although environmental implications need to be reviewed.	A proposed project has no involuntary resettlement impacts. No further action is required.	A proposed project is not expected to have impacts on indigenous peoples. No further action is required.
F1	A proposed project involves the investment of ADB funds to or through a financial intermediary. The financial intermediary must apply and maintain an environmental and social management system, unless all of the financial intermediary's business activities have minimal or no environmental impacts or risks.	A proposed project involves the investment of ADB funds to or through a financial intermediary. The financial intermediary must apply and maintain an environmental and social management system, unless all of the financial intermediary's business activities are unlikely to generate involuntary impacts.	A proposed project involves the investment of ADB funds to or through a financial intermediary. The financial intermediary must apply and maintain an environmental and social management system, unless all of the financial intermediary's business activities unlikely to have impacts on indigenous peoples.

Based on site specific environmental and social impacts identified, the project is categorized as ***Category 'B'*** on both environment and social criteria, based on information described below:

- the proposed Project's potential adverse environmental impacts are mostly site-specific and limited largely to 500m of each WTG. There are no sensitive receptors as villages, water bodies within 500 m of the wind farm;
- The project will have negligible impact on air emissions and ambient noise levels due to the distant location of receptors;
- Impact on soil and water will be limited and largely reversible.
- The proposed project does not involve any involuntary resettlement as the project is being developed on government land which mostly comprises of barren and culturable waste land. There are no settlements on these lands and no impact on private land is anticipated.
- The proposed project will have no specific impact on indigenous people as the population of indigenous people in the project are is only 0.2%. The impact if any will be in terms of access to grazing land which is abundantly available in the other parts of the project area.
- While there are several species referred by IWPA (1972) within the project site, the following facts need to be considered.
    i. IEE Section 6.5.6 provides the migratory route in the Central Asian migratory flyways. According to this, there are two species that may have flyways coinciding in the study area: the Demoiselle crane (*Anthropoides virgo*) and the Northern wheatear (*Oenanthe oenanthe*). Both species are however Least Concern (LC) in the IUCN red-list (version 2015.4) and not listed in Schedule I of the IWPA (1972). Howver, despite the reported overlap of the migratory route none of the either species were observed at the wind farm site during ESIA Study (July 2015), initial bird and bat survey (Nov. 2015) and long term bird and bat study-First Phase (March 2016).
    ii. During the initial bird and bat migratory survey some collisions were recorded for raptors (Steppe Eagle IUCN-EN v4, 2015) and migratory vultures (Eurasian Griffon IUCN-LC v4, 2015) in the adjoining Mokal wind farms (approximately 1 km from Nidhi Site) which are operational for the last four (04) years. The first phase of the long term bird and bat survey (February 2016) also recorded collision of the above species in the adjoining Mokal wind farm (on north west of Nidhi Site), adjoining Ostro wind farm operational since last 6 month (in southwest of Nidhi Site) and adjoining Tanot Power Wind Farm (South of Nidhi site) operational from 4 months.
    iii. Migratory species such as water-birds were not recorded near the Nidhi site due to the absence of perennial surface water bodies.
    iv. In addition to the above species the following threatened species in IUCN V 2015.4 2 species were recorded at the wind farm site during the short-term survey; the Red-headed Vulture (*Sarcogyps calvus*) and

White-rumped Vulture (*Gyps bengalensis*) Critically Endangered (CR); the Steppe Eagle (*Aquila nepalensis*) and Egyptian Vulture (*Neophron percnopterus* Endangered (EN). These species were also recorded during the first phase of the long term survey (February 2016).

v. Mortality of the Eurasian griffon indicates that other vulture species flying at similar height are at risk of potential collision. However all of these vulture species are widespread across Indian Sub-continent. It is unlikely that mortality at this site will be responsible for any decline of their population. The presence of these vulture species is primarily linked to the dead carcass at the site. The mitigation lies in the better carcass disposal which can be easily undertaken by the project. The observed electrocution of a steppe eagle is of some concern. The species is adversely affected by power lines and is highly vulnerable to the impacts of potential wind energy developments (Strix 2012, Meyburg and Boesman 2013). However the species is widely distributed in Rajasthan and all across India in winter and we cannot attribute any cause for population decline to this site.

vi. The mitigation suggested such as management of live-stock carcass disposal and bird safe design elements in transmission pole use of bird- line markers, perch rejectors, etc. would reduce mortality substantially.

Conclusion

It is to be noted that while IUCN threatened species are observed in the area, all through the actual ground surveys conducted at ESIA Study (July 2015), initial bird and bat survey (Nov. 2015) and long term bird and bat study-First Phase (March 2016), it is concluded that critical habitats (1) as per ADB's SPS 2009 are not triggered. The wind farm area does not hold a regionally important population of any of the threatened species. Nor does the wind farm hold a significant percentage of the global population of any migratory species. Furthermore no species found in the wind farm site is endemic.

The project certainly does not qualify for Category A (A proposed project is classified as category A if it is likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented. These impacts may affect an area larger than the sites or facilities subject to physical works.) From our justification in categorizing the project as Category B and based on the

(1)Critical Habitat: A subset of both natural and modified habitat that deserves particular attention. Critical habitat includes areas with high biodiversity value, including habitat required for the survival of critically endangered or endangered species; areas having special significance for endemic or restricted-range species; sites that are critical for the survival of migratory species; areas supporting globally significant concentrations or numbers of individuals of congregatory species; areas with unique assemblages of species or that are associated with key evolutionary Processes or provide key ecosystem services; and areas having biodiversity of significant social, economic, or cultural importance to local communities. Critical habitats include those areas either legally protected or officially proposed for protection, such as areas that meet the criteria of the World Conservation Union classification, the Ramsar List of Wetlands of International Importance, and the United Nations Educational, Scientific and Cultural Organization's world natural heritage sites. 6 As defined by the Word Conservation Union's Red List of Threatened Species or as defined in any national legislation.

ecological assessment during the ESIA, the initial study in November 2015 and the first phase of the long-term study in February 2016, we maintain that

a. There is no evidence that any of the impacts are long term (as the birds start showing avoidance behaviour) and affect any area larger than the site or its facilities.
b. All impacts are not irreversible as there is no anticipated impact on population of species considered and mortality of these species can be reduced through evidence based mitigation action;
c. Impacts are not diverse but very specific and identifiable; and
d. Impacts are not unprecedented. Mortality of species has occurred in the area in the past, through electrocution by existing transmission lines evacuating conventional sources of energy and previously operational wind farms in the area.

The project study area does not fall under any legally protected area or natural habitat, and hence requirements suggested in ADB SPS 2009 regarding legally protected area and the requirements therein is not triggered.

5.2.2 Other

Equator Principles Financial Institutions (EFPIs) are required to categorise projects according to the magnitude of its potential impacts based on the environmental and social screening criteria of IFC as per the following understanding:

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

With reference to the IFC's environmental and social screening criteria, it is anticipated that the proposed Project will fall under '***Category B***' for the following reasons:

- **Potentially limited reversible:** Environmental and social impacts of the project are anticipated during the construction phase will encompass increase noise & vibration and air quality during the site preparation including setting of batching plants, labour camps, excavations for WTGs, Transmission Line Towers, vehicular transport, Impact on terrestrial ecology in and around WTG's; Internal and external transmission line towers, pooling substations; Impact on fauna and wildlife present project influence area close to various WTGs. Changes in water quality at seasonal drain present across the Project site during monsoon season and occupational health and safety; community health and safety during material and WTGs transportation; The Project footprint for most of the WTGs is limited to the immediate vicinity and any site-specific

environmental and social impacts can be readily addressed through appropriate mitigation measures proposed in ESMP.

- **Unprecedented:** The Project is a Greenfield project, however another four projects, of which one is a 100 MW project are being developed in the vicinity of the project Site, and thus the project is not an unprecedented activity.

- **Limited adverse impacts on the baseline**: Wind 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 operation phase. In terms of social impacts, the land required is comprised of government land and is obtained on lease from government. Land allotment process did not involve any physical displacement for WTG's. Impact will be limited to access to land used for grazing and positive impacts on livelihood opportunities.

5.3 SCOPING METHODOLOGY

For this ESIA study, scoping has been undertaken to identify the potential Area of Influence for the Project to identify potential interactions between the Project and resources/receptors in the Area of Influence and the impacts that could result from these interactions, and to prioritize these impacts in terms of their likely significance. This stage is intended to ensure that the impact assessment focuses on issues that are most important decision-making and stakeholder interest.

It is to be noted here that during the period of ESIA study, Project is in the Planning and Pre-Construction phase, therefore, the scoping exercise includes all the phases of the project, i.e., planning and pre-construction, construction, operation and maintenance and decommissioning into consideration.

The scoping exercise was undertaken on the basis of the information available on the project, the discussions with the Project team and the prior understanding of the consulting firm of wind power projects. Potential impacts have been identified through a systematic process whereby the features and activities (both planned and unplanned) associated with the operation and maintenance and decommissioning phases of the Project have been considered with respect to their potential to interact with resources/ receptors. However, social impacts are assessed retrospectively for the land purchase process during preconstruction phase. Potential impacts have each been classified in one of three categories:

- **No interaction**: where the Project is unlikely to interact with the resource/ receptor (e.g., wholly terrestrial projects may have no interaction with the marine environment);

- **Interaction likely, but not likely to be significant**: where there is likely to be an interaction, but the resultant impact is unlikely to change baseline conditions in an appreciable/detectable way; and
- **Significant interaction**: where there is likely to be an interaction, and the resultant impact has a reasonable potential to cause a significant effect on the resource/receptor.

As a tool for conducting scoping, the various Project features and activities that could reasonably act as a source of impact were identified, and these have been listed down the vertical axis of a Potential Interactions Matrix. The resources/receptors relevant to the Baseline environment have been listed across the horizontal axis of the matrix.

Each resulting cell on the Potential Interactions Matrix thus represents a potential interaction between a Project feature/activity and a resource/ receptor.

The proposed wind power Project will involve the key activities during its life cycle which will include planning and pre-construction, construction, operation and maintenance and decommissioning phases as detailed in ***Section 2.4***.

5.4 SCOPING RESULTS

The completed Potential Interactions Matrix for Project activities and likely impacted resources/ receptors is presented in ***Table 6.1***.Those cells that are coloured white are 'scoped out' for no further consideration in the ESIA Process.

Those interactions that are grey are also 'scoped out', but the ESIA report includes a discussion that presents the evidence base (e.g., past experience, documented data, etc.) used to justify the basis upon which this decision was made. Those interactions that are shaded black are retained for further consideration in the ESIA Process.

Interactions that are likely to lead to significant impacts are presented in ***Table 5.3*** and will be the focus of the impact assessment. Owing to site conditions there are certain possible interactions that will not take place. As a result these interactions have been "scoped out" and are presented in ***Table 5.4***.

5.4.1 Cumulative Impacts

A cumulative impact is one that arises from a result of an impact from the Project interacting with an impact from other similar activities to create an additional impact.

It was observed during site reconnaissance survey, that the AoI has other existing wind farm in the Project area. However the existing wind turbines of other projects were located at minimum distance of 1-2 km from the proposed

MEIL's wind farm, and view of same and experience of impact zone, cumulative impacts was scoped out.

Table 5.2 Interaction Matrix for the proposed Project's life cycle

Environmental and Social Resources/ Receptors / Project Phase and Activity	Land use	Soil/Land Environment	Ambient Air Quality	Water Environment	Ambient Noise Quality	Ecology	Visual / Aesthetics	Occupational Health and Safety	Demography (Influx and Displacement	Local Economy and Employment	Natural /Common Property Resources	Land based Livelihoods	Community Health and Safety	Labor and Human Rights	Social Infrastructure and Services	Culture and heritage
Pre-construction Phase																
Land Purchase	■															
Construction Phase																
Clearance of vegetation from identified activity areas		■				▒										
Establishment of Labour camp, batching plant, storage areas for WTG parts and other equipment and construction materials	▒	■	▒	▒	▒	▒		■						■		
Upgrading/construction of access roads	▒	■	▒		▒	▒		■						■		
Mobilization of labour and equipment		▒	▒		▒	▒		■		▒				■		
Internal road construction (connecting WTGs) within Wind farm site	▒	■	▒		▒	▒		■						■		
WTG components and raw material transportation to site		▒	▒		▒	▒		■					■	■		
Site clearance, foundation excavation and construction at each of WTG sites	▒	■	▒	▒	▒	▒		■		▒				■		
Construction of Substation complex and SCADA complex	▒	■	▒	▒	▒	▒		■						■		
Erection of internal electrical lines inside wind farm site	▒	■	▒		▒	▒	▒	■						■		
WTGs erection and substation installations		■	▒		▒	▒	▒	■						■		
WTG commissioning					■			■								
Transmission Line Erection	■	■	■		■	▒		■				■	▒	■		
Operation Phase																

Environmental and Social Resources/ Receptors / Project Phase and Activity	Land use	Soil/Land Environment	Ambient Air Quality	Water Environment	Ambient Noise Quality	Ecology	Visual / Aesthetics	Occupational Health and Safety	Demography (Influx and Displacement	Local Economy and Employment	Natural /Common Property Resources	Land based Livelihoods	Community Health and Safety	Labor and Human Rights	Social Infrastructure and Services	Culture and heritage
Operations																
Scheduled maintenance activities (WTGs, sub-station, electrical lines, storage yard, SCADA building)																
Decommissioning Phase																
Replace WTG turbines with new ones																
Remove WTG parts and ancillary facilities																
Remove internal electrical lines																
Restoration of wind farm site land																

Note: *The activity-impact interaction matrix has considered one single project component, i.e. the wind farm site.*

= Represents "no" interactions is reasonably expected
= Represents interactions reasonably possible but none of the outcome will lead to significant impacts
= Represents interactions reasonably possible with one of the outcomes leading to potential significant impact

Table 5.3 Identified interactions that are likely to result in significant impacts

Interaction (between Project Activity and Resource/Receptor)	Justification for Expectation of Potentially Significant Impacts
Change in land use	• Construction of temporary structures such as construction site office, store yard, batching plant; • Construction/ upgradation of access roads; • Vehicular movement for transportation of WTG components and construction materials; • Movement of construction equipment like cranes, excavators, dumpers, trucks; and • Erection of WTGs and associated transformer yard and permanent site office.
Impacts on Land and Soil Environment	• Establishment of access roads; • Selective clearing of vegetation in areas designated for WTG erection and other surface infrastructure; • Stripping and stockpiling of soil layers; • Digging for WTG foundations and electrical poles; • Storage of materials as well as transport of construction material; and • General building/construction activities.
Impact on Water Resources	• The Project area is water scarce. • Decreased water availability form the water resources of the area due to consumption of water for carrying out project activities; and • Decreased water quality due to wastewater release and spills/leaks from project activities.
Impact on air quality	• During Construction phase from construction activities, vehicular movement, operations of batching plant, DG sets
Increased Ambient Noise Levels	• Generation of noise due to construction activities and operation of Wind Turbines. Site visits in the area indicated that there is a herding community which brings its animals which might be disturbed by high ambient noise in the environment
Ecological Impacts	• No forest land will be diverted for the project as was confirmed by the District Forest Officer; • Removal of vegetation causing impact on ecology of the area; • Habitat destruction during temporary laying of wires adjacent to the ROW of internal electrical lines; • Construction activities will lead to temporary disturbance to the wildlife present in the area; • The project site is situated at a distance of 27 km from Desert National Park. Hence the site does not fall within the area of influence of the project. Additional bird study in the migratory season will be used to asses, whether the site falls under migratory bird route or not. • The operation of wind farm may result in collisions of birds and bats with wind turbine rotor blades, potentially causing bird and bat mortality or injury.
Community health and Safety Impacts	• Transportation of WTG components, other construction materials and increased vehicular movement may lead to traffic hazards for community residing close to the access roads though it should be noted the population is located sparsely in this area; • Blade throw and natural disasters The Project area falls in these hazard zones: o Seismic Zone III which is defined as a moderate damage risk zone and vulnerable to earthquakes of intensity MSK VII (as defined by the BMTPC). o High damage risk zone - B(Vb= 47 m/s) for wind and cyclone

Interaction (between Project Activity and Resource/Receptor)	Justification for Expectation of Potentially Significant Impacts
	and; o Owing to equipment defects/malfunctions or natural disasters such as storms, cyclones, earthquakes and lightning failure in the rotor blade can occur which can result in the 'throwing' of a rotor blade which may affect public safety.
Impact on economic opportunities	• reduced dependence on agriculture and livestock rearing for income • local community choosing to work in the construction of access roads and other project components and as security guards for the WTGs
Occupational Health and Safety	• The construction phase activities such as construction of WTG foundations, access roads, transmission lines in construction phase and other project components and maintenance activities in the operations phase are likely to result in a risk on the health and safety of the workers on the project.
Labour Rights and Welfare	• The construction activities are expected to employ a considerable number of labour, local and migrant. In keeping with this, specific attention will have to be paid for ensuring that the project meets the requirements of the applicable rules and regulations, such as the Inter State Migrant Workmen (Regulation of Employment and Conditions of Service) Act 1979 and the Contract Labour (Regulation and Abolition) Act 1970 • The wind farm assets will be guarded by security personnel who would be armed. Such armed security workforce will have the potential for human rights violation.
Public safety and Human rights	• The construction activities are expected to employ a considerable number of labour, local and migrant. This will create possible violation of human and labor rights.
Impact on indigenous people	• According to the Census information, the local area is characterised by a minimal representation of Scheduled Tribe population (0.2% of total population) within the AoI. Furthermore, since the project is being set up on government land the impacts on indigenous people are expected to be negligible (in terms of access to land for grazing) and comparable to that of the local population.

Table 5.4 Scoped- out interactions during the proposed Project's life cycle

Impact Title	Reason for Scoping-out
Impact on ambient air quality operations phase	No emissions due to project operations in the operation phase.
Impacts on visual/aesthetic setting owing to WTG erection	There are existing wind farms in the Project area and WTGs are common feature. Local community does not relate WTGs with changes in visual landscape as interpreted from consultations.
Impacts on community (Shadow flicker)	The nearest *Dhani* (an agglomeration of 3-4 families) is more than 500m away from the Project boundary. Hence, there are no sensitive receptors to experience the impacts of shadow flicker. Based on the consulting firm's past experience with shadow flicker modelling studies in various parts of Rajasthan and other states of India, shadow flicker impact is limited maximum up to 500 m only. The impact magnitude reduces with respect to distance from the source. The impact of 30 hrs/year and 30 mins/day generally occurs for receptors which are located up to 300 m from the WTGs in North East, South East, North west and South west direction. Based on this it can be clearly justified that the

Impact Title	Reason for Scoping-out
	impacts beyond 500 m will be complying with the requirements of IFC guidelines for shadow flicker .
Impact on cultural resources and heritage structures	• There are no reported archaeological or heritage site in project footprint area. Based on the site assessment, no local shrines, graveyards, mosques, other places of community worship or cultural attachment could be identified or falling within the WTG footprint area. • The consultations with local people also did not reveal any cultural significance of any natural landscape that would be modified in construction activities of the project.

6 ENVIRONMENTAL AND SOCIAL BASELINE

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

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

This section establishes the baseline environmental, ecological and socio-economic status of the proposed wind farm site and surrounding area to provide a context within which the impacts of the proposed wind farm project are to be assessed.

6.1 LOCATION

The proposed Project is located in the district and tehsil of the name of Jaisalmer in the state of Rajasthan. Jaisalmer city, located at an aerial distance of 58 km south-east from the Project site, is the administrative capital of the district. District Jaisalmer is located within a rectangle lying between 26°.4' – 28°.23' North parallel and 69°.20'-72°.42' east meridians. It is the most western and largest district in the Rajasthan state and has a 471 km long international boundary with Pakistan along its north and west. Neighbouring districts on Jaisalmer district's north-east, east and south are Bikaner, Barmer and Jodhpur respectively.

Jaisalmer district, being a part of the Great Indian Thar Desert, is sandy, dry and scorched. The terrain around, within a radius of about 60 km is stony and rocky. The area is barren, undulating and generally slopes towards the Indus valley and the Runn of Kutch. There is no perennial river in the district and the underground water level is very low. The climate is characterised by extreme temperatures, with the maximum temperatures in summer reaching up to 49.2^{o}C and winter having minimum temperatures in the range of 1 ^{o}C. The average rainfall is only 16.4 cm as against the state average of 57.51 cm.

The Project contains 53 WTGs and lies in area of around 412.1 hectares of govt. revenue land, as reported. The area comprises largely of flat land with average elevation of 222 m above the Mean Sea Level (MSL) with one WTG location lying 253 m above the MSL on a sand hill. No national park, Reserve forest,

wildlife sanctuaries, biosphere reserves, notified historical or cultural sites etc. are located within the study area.

Details about access to the Project location have been provided in the ***Section 2*** of this report.

6.2 AREA OF INFLUENCE

For the purpose of the baseline establishment and impact assessment, an Area of Influence (AoI) has been identified. This sub section provides an understanding of the AoI thus identified and the reasons for the same.

6.2.1 Study Area

The study area considered for ESIA includes an area within 5 km radius from farthest of WTGs. The study area of 5 km has been selected based on the location of Project site and its footprint, nature and spatial distribution of potential social and environmental impacts (based on similar type of projects).

Project footprint Area

The Project Footprint is the area that may reasonably be expected to be physically touched by Project activities, across all phases. The wind farm site covers about 412.1 hectares of land situated in Jaisalmer district of Rajasthan State. Physically, there is no demarcation or fencing for the Project Site boundary and hence it is contiguous with the rest of the area.

The Project Footprint for Project includes land used for the erection of WTGs, substation, storage of materials, site office, access roads, and internal and external transmission lines.

Project Area of Influence (AOI)

The effects of the Project and Project activities on a particular resource or receptor will have spatial (distance) and temporal (time) dimensions, the scale of which is dependent on a number of factors. These factors are incorporated in the definition of the Project's *Area of Influence (AoI)*.

The *AoI* considered for the existing Project with respect to the environmental and social resources was based on the following reach of impacts:

- **Environmental parameters:** Project site boundary, immediate vicinity, access road and surroundings, i.e. a study area of approximately 5 km (hereafter referred to as the AoI) distance from project line has been used to depict these parameters;
  - **Air Quality:** Dust emissions, fugitive dust –typically up to 100 m from operations and maintenance area;
  - **Noise:** Noise impact area (defined as the area over which an increase in environmental noise levels due to the Project can be detected) –

typically 1 km from operations (this includes a distance of 10 times the size of the rotor diameter of the WTG);
    - **Land environment:** The impacts on soil and land- typically up to 100 m from project foot print area;
    - **Ecological Environment (Terrestrial and Aquatic):** This includes: (a) the direct footprint of the project comprising the wind farm; (b) The areas immediately adjacent to the project footprint within which a zone of ecological disturbance is created through increased dust, human presence and project related activities (e.g., trampling, transportation activities).;;
- **Social and Cultural:** The project footprint is spread across 3 villages, which lie within the study area of 5 km. This is taken as the area of influence, as social impacts largely remained confined to these villages.

Core and Buffer Zone

This AoI is in turn, divided into a core and buffer zone. This division of the AoI into two zones is based on the understanding that the majority of the impacts from the project (during the mobilization, construction, operations and decommission phase) would be contained within a 1 km radius from the Project Footprint in terms of spread and intensity, with the buffer zone appearing to have limited interaction with the Project.

Location of the AoI with the proposed WTGs, Core and Buffer Zones is as shown in the ***Figure 2.1.***

6.3 ENVIRONMENTAL BASELINE METHODOLOGY

The following sub sections provide an understanding of the methodology followed for the establishment of the environmental baseline.

6.3.1 Site Visit

ERM undertook a site visit (11th July to 15th July, 2015) to understand the site setting, environmental and social sensitivities and to identify the relevant local stakeholders. The site visit included a walkover of the site and associated facilities with the MEIL team. Limited consultation with the local community, local community representatives, local NGOs and local government officials was conducted to understand the local environmental issues in the area and to receive feedback from stakeholder on these issues.

A reconnaissance survey using available recent satellite imagery of the study area around the Project was initially conducted to identify environmental and social sensitive receptors located within the AoI.

For transmission towers, a linear corridor of 50 m either side of the proposed transmission line was considered for the assessment.

As part of this site visit, primary data was collected from sensitive spots and other places inside the AoI and Concerned government departments and other relevant agencies were also contacted in order to obtain information. The following sub sections provide an understanding of the same.

Primary Baseline Data Collection

M/s Avon Food Lab Pvt. Limited, (recognized by Ministry of Environment, Forests and Climate Change, Government of India) was engaged for collection of baseline information on ambient noise quality during the month of July (12 July- 15 July, 2015).

The primary baseline data was collected for aspects detailed out in ***Table 6.1.***

Table 6.1 Primary Baseline Data Collection[1]

S.No.	Environmental Attribute	No. of Locations/ Area	Frequency	Remarks
1	**Ambient Noise Quality**	5	Once during the monitoring period	Noise levels were monitored on hourly basis for 2 hours at four (04) locations inside the Core Zone. Noise levels were monitored on hourly basis for 24 hours at one (01) location inside the Buffer Zone.

Secondary Baseline Data Collection

Secondary baseline data collection involved identifying and collecting existing published materials and documents. Information on various environment aspects (like geology, hydrology, drainage pattern, ecology etc.), meteorology and socio economic aspects were collected from different institutions, government offices and literatures etc. Secondary data was collected for the aspects as given in ***Table 6.2.***

Table 6.2 Secondary Baseline Data Collection

S. No.	Attribute	Source of Data Collection
1	Meteorological data	India Meteorological Department (IMD)
2	Geology, geomorphology, hydrogeology and hydrology	Geological Survey of India (GSI) and State Ground Water Board
3	Land use	Through Satellite Imageries
4	Natural Hazards	Building Materials and Technology Promotion Council of India (BMTPC) Meteorological Department

[1] There are no permanent water bodies inside the 1 km buffer zone of the Project. There are seasonal lakes which were found to be dry at the time of the site reconnaissance. Therefore, no water quality assessment was performed. Further, there are no communities living inside the 1 km buffer zone, hence no air pollution modelling was performed.

Environmental and social baseline data was collected through primary surveys as well as through secondary sources by literature survey and discussions with the concerned departments/agencies. Details of data collected are summarized in subsequent sections.

6.4 ENVIRONMENTAL BASELINE FINDINGS

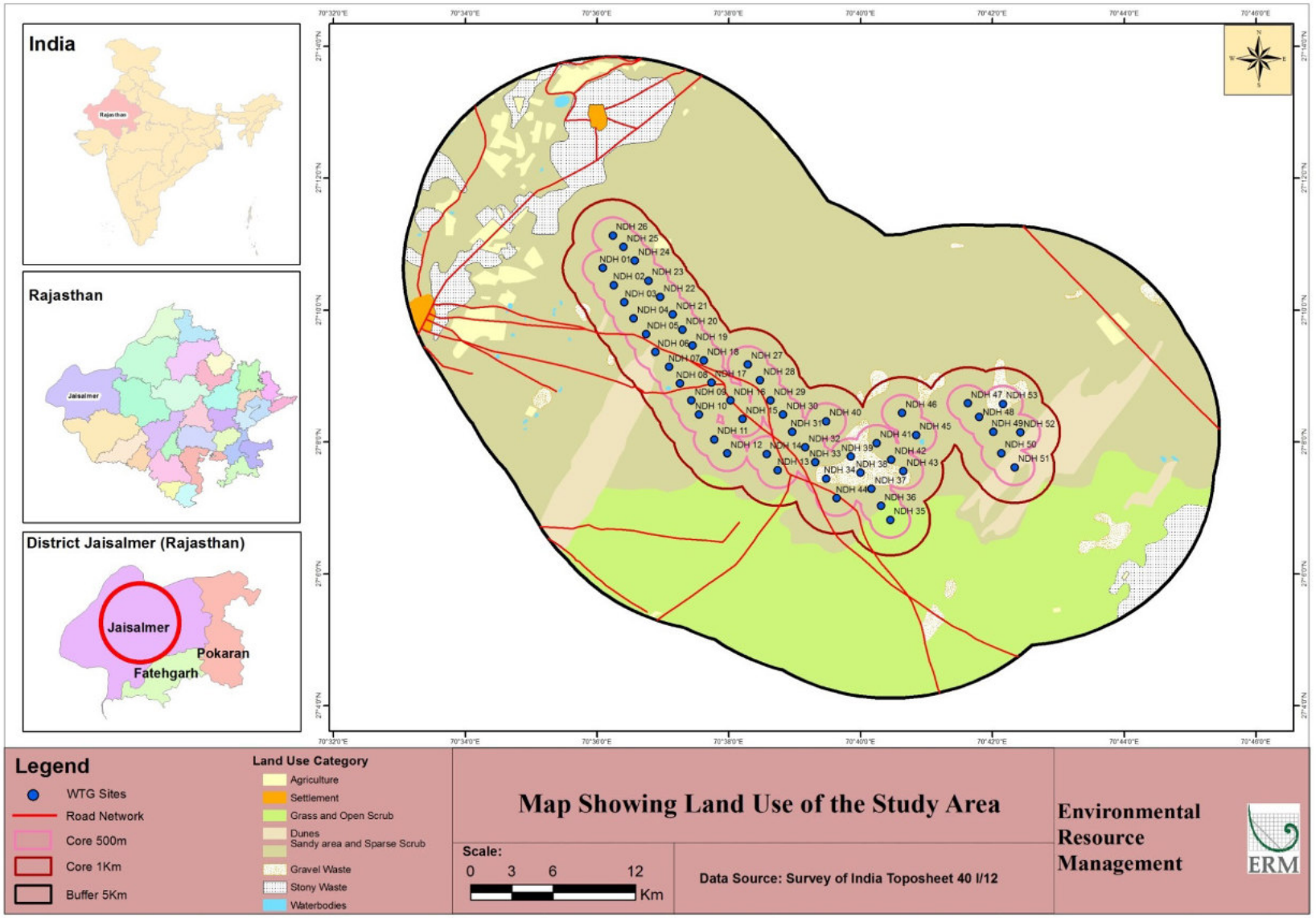
6.4.1 Land cover and use

The Project area lies in a predominantly sandy area with sparse scrub. There are 2 locations (NDH 26 and NDH 51) which lie in the sand dune areas while locations NDH 34, NDH 37, NDH 38 and NDH 39 lie in an area of stony waste. The land use details of the Project area are presented in of the AoI is illustrated by ***Figure 6.1***.

Table 6.3 Landuse break detail

Land Use Category	Area (Sq. km)	% of Geographical Area
Agriculture	5.61	2.29%
Grass and Open Shrub	59.49	24.28%
Dunes	12.70	5.18%
Sandy area and Sparse Shrub	146.06	59.61%
Gravel Waste	5.46	2.23%
Road Network	0.78	0.32%
Settlement	0.80	0.33%
Stony Waste	13.84	5.65%
Waterbodies	0.29	0.12%
Total	245.01	100.00%

Figure 6.1 Land use in the Project Area



Source: ERM India

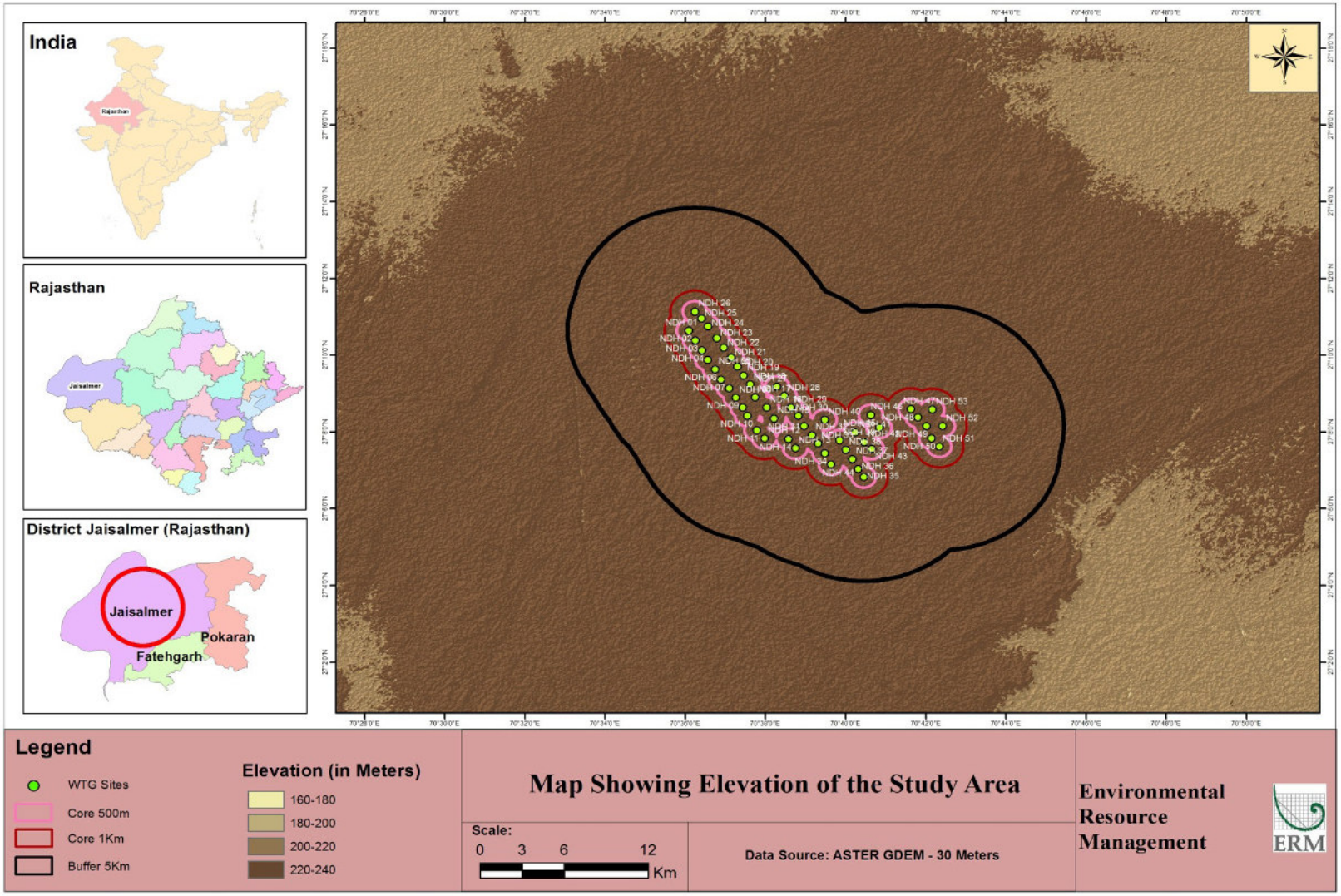
6.4.2 Topography

Topographically, the Jaisalmer District lies in the Thar Desert, which straddles the border of India and Pakistan. The western and northern parts of the district are bound by Pakistan and north-eastern part by the Bikaner District. Eastern and southern parts are bound Jodhpur and Barmer districts respectively. The district compromise of sand hills, of all shapes and sizes, some rising to a height of 150 ft. Long bushes cover the sand hills in the west and tufts of long grass in the east. Water is scarce and there are no perennial streams.

Topography of the AoI was observed to be flat land with one sand hill lying near the WTG location NDH – 26. The elevation in 1 km radius from the Project boundary ranges from 216 m to 253 m above msl.

Figure 6.2 presents the elevation profile of the area.

Figure 6.2 Elevation Map of the Study Area



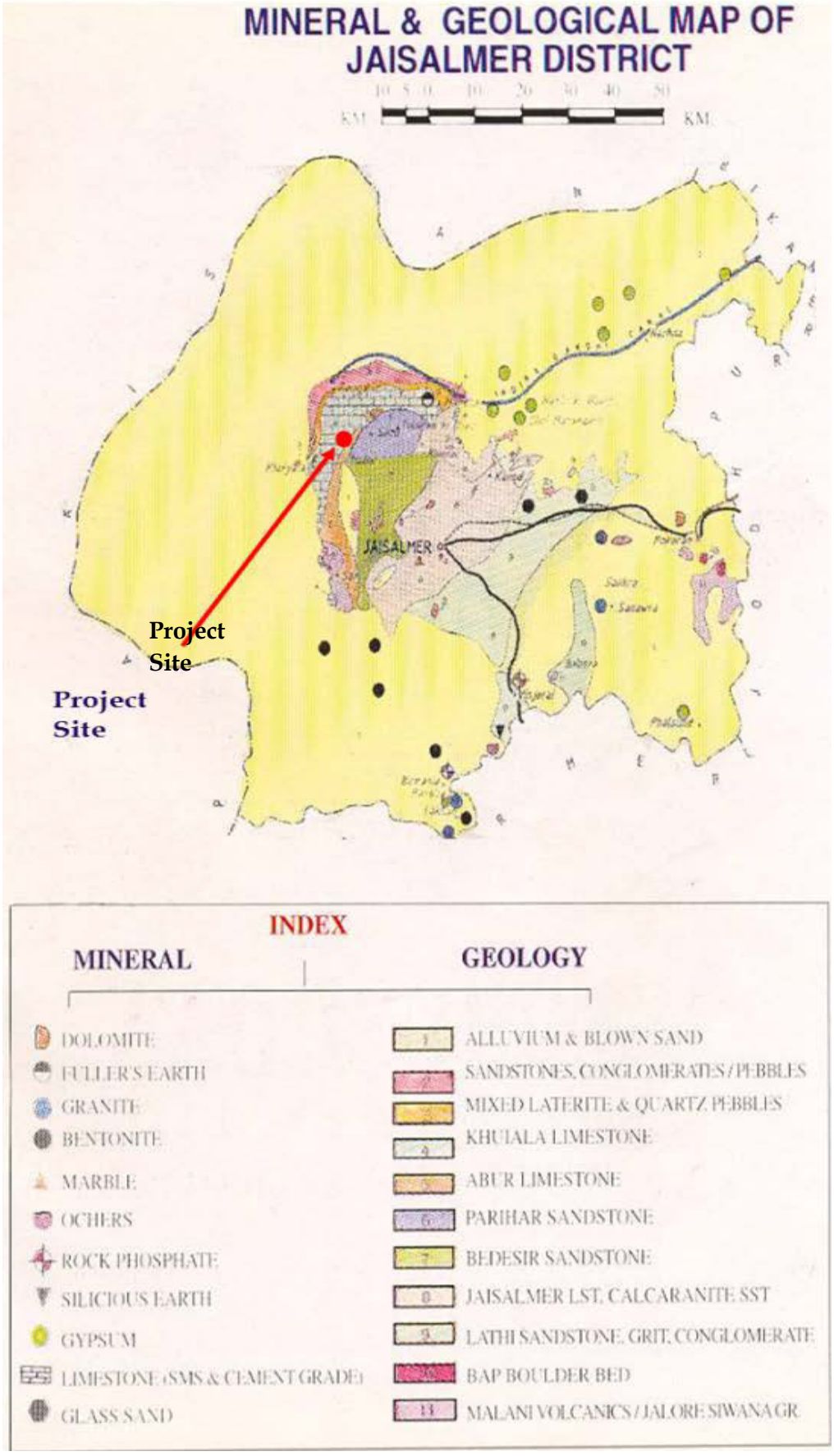
6.4.3 Geology

Geologically the AoI falls in Jaisalmer basin. In the north of Jaisalmer basin lies the sub- surface Delhi-Sargodha ridge and in the east lies western flank of Aravalli mountain. The south is surrounded by two prominent uplifted blocks - the Birmania- Barmer, Nagar, Parkar, Arch and the Saurasthra Peninsula. The study area is situated in Jaisalmer Taluka which lies in Jaisalmer basin.

The AoI has mainly Metamorphites, Granites, and Rhyolites rocks as basement rocks. These rocks are overlain by dolomitic limestone, shale and sandstone of the Marwar Supergroup, which are followed by the Jurassic rocks made up of the Lathi formation (sandstone, grit and veriegated shales with plant fossils), Jaisalmar formation (predominantly fossiliferous limestone), Baisakhi formation (Siltstone, Shale and Sandstone with intercalations of gypseous and bentonitic clays represent first marine transgression) and Bedesar formation (sandstone, limestone and shales). The Bedesar formation is further followed by Habur formation, Sanu formation, Khuiala formation, Bandha formation, glacial formation and secondary soil and pebbles[1].

[1] *Source: Geological Survey of India Publication- dated 2011*

Figure 6.3 Mineralogy and Geology of Jaisalmer District



Source: Department of Mine sand Geology, Rajasthan

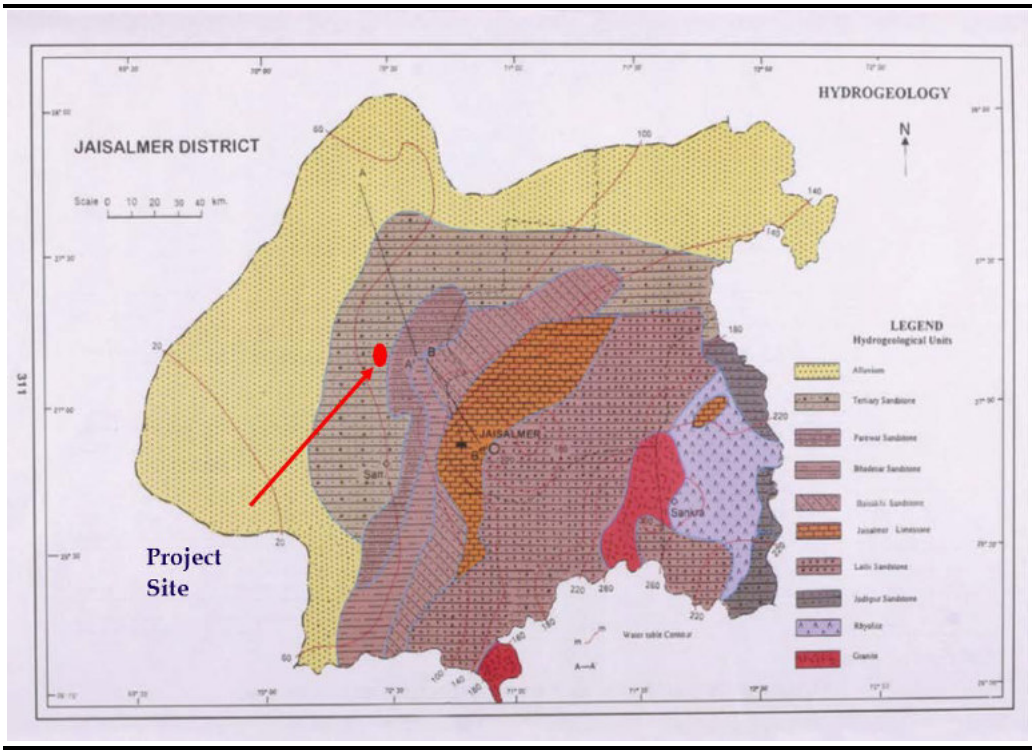
Soil

The top soil in the AoI consists of Aeolian sand with gravel particles and pebbles. An Initial Environmental Examination Study performed as a part of the Jaisalmer Urban Drainage Subproject in 2008[1] in the area for planning urban drainage suggests that soil in the area is stony, sandy, and relatively infertile.

6.4.4 *Hydro-geology*

The AoI lies in the hydro-geological unit of *Parewar sandstone (Mesozoic)* which is feldspathic ferruginous sandstone. The upper horizon is compact and fine to medium grained, while lower contains fine to coarse grained partly consolidated sediments. Thickness of the formation has been recorded to be more than 300 m. To a smaller extent the *Tertiary sandstone (Cenozoic)* unit is also present in the AoI. It is light brown in colour and has fine to medium grained consolidated sandstone interlaced with salcified limestone, fuller's earth and clay beds. The thickness of this litho unit in the north-western part of the district is also 300 m.

Figure 6.4 Hydro-geology of Jaisalmer district



Source: http://www.indiawaterportal.org/sites/indiawaterportal.org/files/jaisalmer_groundwater.pdf

[1] http://ruidp.rajasthan.gov.in/IEE%20PDF/IEE%20Jaisalmer%20Drainage.pdf

6.4.5 *Hydrology and Drainage pattern*

There are no perennial rivers in Jaisalmer District and it lies in the watershed area of Barmer basin. There are no natural lakes or ponds as the region has very low rainfall. A few ephemeral streams appear on land outside the town during rainfall, and water accumulates in certain low lying areas, but the water is shallow and drains into the sand very quickly. A few manmade reservoirs have been created by constructing simple bunds, such as Gadi Sagar Lake, which was built in the 14th century and was for some time the main source of water for the Jaisalmer town.

In the AoI, no perennial ponds were observed, though few seasonal ponds were observed which due to lack of rainfall were observed to be dry. The villagers in the AoI are primarily dependent on groundwater for meeting agricultural and domestic needs.

6.4.6 *Climate and Meteorology*

Regional Meteorology

The climate of the region is classified as arid climate (BWh) as per Köppen Climate classification.

The long term meteorology (period 1948- 2000) of the region based on data recorded at the nearest observatory station of India Meteorological Department (IMD) at Jaisalmer is presented in ***Table 6.4***.

Table 6.4 Climatology of Jaisalmer (1948 -2000): Ambient Air Temperature and Mean rainfall

Month	Mean Temperature (°C)		Rainfall in mm
	Maximum	Minimum	
January	23.7	7.6	1.5
February	27.1	10.5	3.0
March	32.6	16.4	2.7
April	38.2	21.9	21.0
May	41.6	25.6	8.9
June	40.8	27.0	15.1
July	37.7	26.5	60.1
August	36.0	25.4	75.8
September	36.4	24.2	17.6
October	36.1	20.2	2.4
November	31.0	13.4	1.5
December	25.5	8.5	2.4
Average	33.9	18.9	
Total			208 mm

Source: Monthly Mean Maximum & Minimum Temperature and Total Rainfall based upon 1901-2000 data, India Meteorological Department, Jaisalmer (http://www.imd.gov.in/doc/climateimp.pdf)

Temperature

As per the data recorded at meteorological station, Jaisalmer, the temperature begins to increase from January till May. May and June are the hottest months with highest temperature of 41.6^{0}C recorded in May month. The lowest temperature of 23.7^{0}C was recorded in month of January. The daily mean

minimum temperature varies from 7.6^{0}C in January to 27.0^{0}C in June, whereas the daily mean maximum temperature varies from 23.7^{0}C in January to 41.6^{0}C in May.

Rainfall

The total annual rainfall in the region is about 208 mm as per the data from the year 1948-2000. The monsoon sets in June and attains the high intensity in month of August. The monsoon withdraws towards the end of the September. The remaining months of the year also experience the sporadic rains. The maximum rainfall was observed during month of August (75.8 mm) and minimum during the month of November (1.5 mm).

6.4.7 Natural Hazards

The Building and Material Council of India (BMTPC) has published hazard maps of India[1]. As per these maps the study area falls under the respective hazard zones:

Seismic

The Project area falls in Seismic Zone III which is defined as a moderate damage risk zone and vulnerable to earthquakes of intensity MSK VII (as defined by the BMTPC). Most recent seismic activity that occurred in Jaisalmer district was when an earthquake of magnitude Mw=5.1 struck the area on 9 April 2009. According to data available on ASC (Amateur Seismic Centre) website, this moderate earthquake (M 5.0-5.9 termed as moderate) had its epicentre east of Mokal village, which lies approximately 5 km south-east of the Project Boundary, and was felt in a large part of the region along the India-Pakistan border. No other data on historical earthquakes were available for the region. It indicates that the foundation and structures of the project have to be designed to handle seismic interruptions.

Wind

The Project area falls in High Damage Risk Zone – B (V_b=47 m/s). Thus, the Project will accordingly have provisions of construction of structure to counter wind and cyclonic conditions.

Flood

The Project site and AoI do not fall under flood prone areas although news of flash floods in year 2010 was reported in the Jaisalmer districts.

[1] Natural Hazard maps can be found on the BMTPC website here:

http://www.bmtpc.org/topics.aspx?mid=56&Mid1=178

6.4.8 Noise Quality

Noise Level was recorded at one (1) location in the study area during the monitoring period. Noise levels were recorded in form of sound pressure levels with the help of a digital sound level meter.

Table 6.5 Details of Ambient Noise Monitoring Location

S.N	Location	Geographical Coordinates (UTM)	Distance and direction w.r.t Project Site (approx.)	Justification of the Sampling Location
1	Kunp Singh ki Dhani	660069 m E 3003306 m N	800 m from NDH -8, SE	Nearest habitation to the Project Area

Source: ERM's Site Assessment

Thus, this location captures the baseline conditions prevailing at nearest settlements to the project site. No sensitive receptors were observed within 500 m distance of the project footprint area.

Methodology

Noise monitoring was carried out for 24 hours (one time) during monitoring period. Noise levels were recorded at hourly intervals over a 24 hour period covering both daytime (0600 to 2200 hrs) and nighttime (2200 to 0600 hrs). At each location, day time Leq has been computed from the hourly sound pressure level values measured between 0600 to 2200 hours and night time Leq has been computed from the hourly sound pressure level values measured between 2200 to 0600 hours.

Observations

The recorded noise levels in the study area are summarized in ***Table 6.6***

Table 6.6 Ambient Noise Levels in the Study Area during Monitoring Period

S.No.	Locations	Noise level (dB(A))				Applicable CPCB Standard (dB(A))-Residential Landuse	
		Leq Day	Leq Night	Lmax	Lmin	Day time	Night time
1	Kunp Singh ki Dhani	53.1	44.5	56.1	40.0	55	45

Note: Day time is considered from 6 am to 10 pm and night time is considered from 10 pm to 6am.
CPCB limits for residential area during daytime and night time are 55dB (A) and 45 dB (A) respectively, commercial area during daytime and night time are 65dB (A) and 55 dB (A) respectively and industrial area during daytime and night time are 75dB (A) and 70 dB (A) respectively.
CPCB limits for residential area during daytime and night time are 55dB (A) and 45 dB (A) respectively, commercial area during daytime and night time are 65dB (A) and 55 dB (A) respectively and industrial area during daytime and night time are 75dB (A) and 70 dB (A) respectively.

The equivalent ambient noise level for day time (Leq day) and night time (Leq night) at the monitoring location were observed to be below the prescribed corresponding limits for a residential area. Slightly high noise levels are attributed to high wind speeds during the period and some vehicular movement. No other major source was observed in the region.

6.5 ECOLOGICAL BASELINE

6.5.1 Introduction

The ecological assessment of the wind farm area (core zone) and surrounding 5km radius (buffer zone) was undertaken during 11th July to 15th July, 2015 to understand the sensitivities. The entire wind farm area and study area was surveyed for enumeration of flora and fauna found in the study area, their sensitivity with respect to the project site and understand and establish the ecological baseline of the study area and to understand impacts of the project on the species and habitats in surrounding areas. The temperature variation during survey days varied from 40°C to 24°C. The weather was slightly overcast to clear. Extreme weather conditions such as sand storm and minor showers of rains were experienced on two of the four survey days.

The ecological surveys were conducted with following objectives:

Flora

- Identification of floral species (terrestrial), sensitive habitats, endangered species and forestland falling within the study area (including project site);
- Enumeration of tree species present at wind farm area ***(core zone)*** and surrounding 5 km radius area***(buffer zone)***;
- Classification of flora for any endangered or protected species or endemic floral species prevailing in the study area (including project site) based on field survey;
- Identification of areas protected under international conventions, national or local legislation for their ecological, landscape, cultural or other related value; and
- Identification of aquatic flora in the water bodies falling in the study area.

Fauna

- Identification of fauna (terrestrial and aerial aquatic), based on spotting, pug marks, droppings, nesting, etc.;
- Identification and classification of any species recognized as critically endangered or endangered (in accordance with the IUCN Red List, or according to the schedules of the Wildlife (Preservation) Act 1972 and amendments);
- Identification of areas which are important or sensitive for ecological reasons including their breeding, nesting, foraging, resting, over wintering areas including wildlife migratory corridors /avian migratory routes; and
- Identification and assessment of aquatic ecological resources within the study area.

6.5.2 *Approach and Methodology*

Floral Analysis

The major vegetation habitats identified in the wind farm area and 5 km buffer area are open scrub, grasslands and agricultural lands. Habitat specific vegetation survey was undertaken to enumerate the trees, shrubs and herbs in the study area.

Faunal Analysis

Herpetofaunal

Intensive search was made along the hedges of all the aquatic habitats open wells located in the study area were checked to identify and list the amphibians. Status of reptiles was assessed using Intensive Time Constrained Search Methods [(1) (2)] covering different micro habitats surveyed within the core and buffer zones of the study site.

Avifauna

Avifaunal species were enumerated by habitat surveys at the sample plots. Avian nomenclature was followed by Standard field guide [(3)].

Mammals

Habitat survey for mammals was conducted. Identification was followed by standard literature. [(4)(5)]

Secondary literature from published books and research publications were also consulted for the flora and fauna of the study area. Discussions were held with the officials of State Forest department. The enumerated list of faunal species is compared to the species listed in IUCN Red data list and species listed in schedule 1-6 of Wildlife Protection Act, 1972 to confirm their conservation status.

6.5.3 *The Study Area*

The approach to wind farm area can be made from through Jaisalmer-Lodurva-Kucheri Road and Jaisalmer-Mokala-Sanu- Habur road. The current activity at site included construction of approach road from Sanu- Habur road to under-construction sub-station area. The substation boundary wall pavement was dug for construction. The geo-technological study was undertaken recently.

(1) Welsh, H.H., jr. 1987. Monitoring herpetofauna in woodlands of north western California and south west Oregon: a comparative strategy. Pp. 203-213. In. Multiple – Use Management of Califirnia's hardwood resources. T.R. Plumb, N.H. Pillisbury (eds. Gen. Tech. Regional Environmental Planning. PSW – 100) US Department of Agriculture, Forest Service.

(2)Welsh, H.H. Jr. and Lind, A. 1991. The structure of the herpetofaunal assemblage in the Douglas-fir/hardwood forests of northwestern California and south western Oregon. Pp: 395-411. In: Wildlife and vegetation of unmanaged Douglas-fir forests. (Tech.Coords). L.F. Ruggiero, K.B. Aubry, A.B. Carey and M.H. Huff. Ge. Tech. Rep. PNW-GTR-285. Portland, OR: US. Department of Agriculture, Forest Service.

(3) Birds of India, Srilanka, Pakistan, Nepal, Bhutan, Bangladesh and Maldives. 2000. Krys Kazmeierczak and Ber Van `Perlo. Om Field Guides

(4) Prater. S. H. 2005. The Book of Indian Animals. Bombay Natural History Society and Oxford University press 12th Edn. pp. 316.

(5) Menon, V. 2003. A field guide to Indian Mammals. Dorling Kindersley (India) Ltd. New Delhi. 201 p.

The site is surrounded by under construction Ostro's wind farm area on its southwest side and operating Suzlon wind farm site on its north east. Two (02) transmission line, one under-construction and one already operational exist in the area. The only anthropogenic disturbance in the area is agriculture and livestock rearing which is the main source of livelihoods other than the livestock rearing. Rainwater is the main source for irrigation and drinking water in the region. The vegetation classification of the area is given in the ***Table 6.7.***

Table 6.7 Vegetation Classification of the Region

Area Type	Classification
Plant Diversity Centers of India[1]	3. Desert
Biogeographic Province of India[1]	3A. Desert-Thar
Phyto-geographical regions of India[2]	Semi Arid and Arid Region
Agro Ecological Sub Region (Indian Council of Agricultural Research) [3]	Western Plain, Kachch And Part Of Kathiawar Peninsula, Hot Arid Eco-Region (2.1)
Agro-Climatic Region (Planning Commission)[3]	Western Dry Region- (XIV)
Agro Climatic Zone (National Agricultural Research Project)[3]	Arid Western Zone (RJ-1)

Source: [1]Wildlife Institute of India, [2]H.J. Chaudhary & S.K. Murty 2000 Plant Diversity and Conservation in India-an overview Bishen Singh Mahendrapal Singh Pubs. [3]Agriculture Contingency Plan-Jaisalmer, Department of Agriculture and Cooperation, Ministry of Agriculture, Govt. of India

Following habitats are found within the north and south cluster and their 5 km buffer area are discussed in below sections;

6.5.4 Habitats in the study area with representative Vegetation

Following habitats were observed

Grasslands

The study area is predominantly a grassland habitat. . These grasslands are dominated by "Sewan" *Lasiurus sindicus* type grasses. The other associated grass species from the area are *Panicum antidotale, Cenchrus bifloris, Cenchrus ciliaris, Dactyloctenium sindicum, Aristida funiculate, Tragus racemosa, Cyperus bulbosus, Cymbopogon jwarancusa, Aristida mutabilis* and *Panicum turgidum*.

Beside grasses isolated tree species predominantly of *Prosopis cineraria*, with *Acacia nilotica* and *Acacia catechu*, *Acacia senegal* and shrubs of *Salvadora oleoides, Capparis decidua* are also present in the study area. etc. Smaller shrubs of *Salvadora oleoides, Euphorbia nerifolia, Calatropis procera,* "Bui" *(Aerva tomentora),* "Kair" *(Capparis decidua),* Phog *(Calligonum polygonoides), Tecomella undulata, Salvadora persica and Zizyphus nummularia* and "Kheep" *(Leptadenia pyrotechnica)* are commonly found in the area.

Agricultural Land

Most of the agricultural land were ploughed and were ready to receive rains in order to undertake agriculture activities.

Figure 6.5 Habitats within the Study Area


Open Land


Grassland


Stony/Gravel Waste Land


Agriculture Land

Source: Site and surrounding areas survey by ERM during 11th July to 15th July, 2015

Other Habitats

Other habitats such as gravel waste area and agricultural land does not bear any floral species. Agricultural lands have been freshly ploughed and does not bear any vegetation.

Economic values of Plant species from the area

The economic values of some plant species from the area are given in ***Table 6.8***

Table 6.8 Economic Values of some plant species from the area

No	Local Name	Botanical Name	Economic Uses
Common Tree Species			
1	Khejri	*Prosopis cineraria*	Fuel wood, Young shoots used as Fodder
2	Rohida	*Tecomella undulata*	Timber, Fuel wood & Medicinal uses
3	Bordi	*Ziziphus mauritiana*	Fruits edible, Timber & Medicinal uses
4	Neem	*Azadirachta indica*	Medicinal uses
5	Kumat	*Acacía senegal*	Forage, Fodder & source of Gum
6	Babool	*Acacia nilotica*	Forage, Fodder & Medicinal
7	Faras	*Tamarix aphylla*	Commonly used as windbreak
8	Gonda	*Cordia myxa*	Multiple uses
9	Ker	*Capparís decidua*	Landscaping and Slope stablization
10	Hingota	*Balanites ægyptiaca*	Fruits are edible, Medicinal uses
11	Jal(Khara)	*Salvadora persica*	Medicinal
12	Keekar	*Prosopis juliflora*	Fuel wood
13	Giri	*Choloroxylon swietenia*	Furniture Building
14	Kheenp	*Leptadenia reticulata*	Medicinal
15	Bar	*Ziziphus zizyphus*	Fruits edible
Common Bushes			
1	Gugal	*Conmiiphora wiglatii*	Medicinal
2	Thar Beri	*Ziziphus nummularia*	Forage & Fodder
3	Kheemp	*Leptadenia pyrotechnica*	Sand dune fixation
4	Phog	*Calligonum polygonoides*	Forage & Fodder, Flower edible
5	Banwali	*Acacia jacquemontii*	Medicinal
6	Vajradanti	*Barleria prionitis*	Medicinal
7	Alai	*Mimosa hamata*	Forage & Fodder, Soil Binder
8	Murali	*Lycium barbarum*	Medicina
9	Senia	*Crotalaria burhia*	Hut making, Medicinal & Forage
10	Lana	*Haloxylon salicornicum*	Medicinal
11	Bui	*Aerva persica*	Medicinal
12	Beyani	*Tephrosia purpurea*	Medicinal
13	Sonamukhi	*Cassia auriculiformis*	Medicinal
Common Grasses			
1	Sewan	*Lasiurus sindicus*	Forage & Fodder
2	Murat	*Panicum antidotale*	Forage & Fodder in tender stage
3	Bhurat	*Cenchrus bifloris*	Edible
4	Dhaman	*Cenchrus ciliaris*	Soil erosion control
6	Gandhiya	*Dactyloctenium sindicum*	Sand dune stabilization, shelterbelts and afforestation in dry zones
7	Lamp	*Aristida funiculata*	Forage & Fodder in tender stage
8	Hiran Chugi	*Tragus racemosa*	Forage & Fodder in tender stage
9	Moth	*Cyperus bulbosus*	Edible
10	Bura	*Cymbopogon jwarancusa*	Essential Oil
11	Lampra	*Aristida mutabilis*	Grazing
12	Murat	*Panicum turgidum*	Soil Stabilization and restoration

6.5.5 *Faunal Assessment*

Faunal species from the study area were recorded based on direct sightings, indirect evidences such as dung, droppings, scats, pugmarks, scratch signs, burrows, nests etc. and consultation with Forest Department officials and local community. During consultation with communities, pictorial representations of species were used in form of Field guides and other literatures of the faunal species of India. The species occurring within the study area are discussed in the following sections:

Herpetofauna

The Herpetofaunal (amphibian and reptilian) species found in the study area are discussed below and given in ***Figure 6.6.***

Figure 6.6 ***Herpetofaunal Species observed within the Study Area***

Brilliant Ground Agama

Spiny Tailed Lizard

Desert Monitor Lizard

Garden Lizard`

Indian fringe-toed lizard

Bengal Monitor Lizard

Source: Site and surrounding areas survey by ERM during 11th July to 15th July, 2015

Amphibians

As the study area is devoid of surface waterbody, amphibian could not be spotted in the study area.

Reptiles

A total of eight (8) species belonging 4 families were observed from the study area. Monitor Lizard (*Varanus bengalensis*) and Desert Monitor Lizard (*Varanus griseus*) has been listed as Sch.I and Spiny Tailed Lizard (*Saara hardwickii*) has

been listed as Sch. II of Wildlife Protection Act and bear conservational significance. The details of reptiles are given in ***Table 6.9.***

Table 6.9 Reptiles observed from the Study Area

Sn.	English / Popular Name	Scientific Name	Family	Occurrence	WPA Schedule / IUCN Status
1	Russell's Viper	*Daboia russelii*	Viperidae	Frequent	IV/ LC
2	Saw-scaled viper	*Echis carinata*	Viperidae	Frequent	IV/LC
3	Brilliant Ground Agama	*Trapelus agilis*	Agamidae	Common	-/-
4	Indian fringe-fingered lizard	*Acanthodactylus cantoris*	Lacertidae	Common	-/-
5	Spiny Tailed Lizard	*Saara hardwickii*	Agamidae	Common	II/-
6	Bengal Monitor Lizard	*Varanus bengalensis*	Varanidae	Common	I/LC
7	Desert Monitor Lizard	*Varanus griseus*	Varanidae	Rare	I/-
8	Oriental Garden Lizard	*Calotes versicolor*	Agamidae	Common	-/-

Notes: LC-Least Concern

Avifauna

A total of 55 species were observed/reported from the study area. Great Indian bustard (*Ardeotis nigriceps),* Long Billed Vulture (*Gyps indicus)* and Red Headed Vulture (*Sarcogyps calvus)* species reported from the study area based on community consultations/local shephards are Critically endangered as per IUCN 2015, ver.2 Egyptian Vulture (*Neophron percnopterus)* observed is Endangered as per IUCN 2015, ver.2 , MacQueen's bustard (*Chlamydotis macqueenii)* and Imperial Eagle (Aquila heliacal) reported are Vulnerable as per IUCN 2015, ver.2 and Pallid Harrier (*Circus macrourus)* and Laggar Falcon (*Falco jugger)* are listed as Near Threatened as per IUCN 2015, ver.2 as Red data list categorization.

Great Indian bustard (*Ardeotis nigriceps),* MacQueen's bustard (*Chlamydotis macqueenii),* Shikra (*Accipiter badius),* White Eyed Buzzard (*Butastur teesa*), Black Shouldered Kite (*Elanus caeruleus*), Long Billed Vulture (*Gyps indicus*), Red Headed Vulture (*Sarcogyps calvus*), Short Toed Snake Eagle (*Circaetus gallicus*), Pallid Harrier (*Circus macrourus*), Montagu's Harrier (*Circus pygargus*), White Eyed Buzzard (*Butastur teesa*), Common Buzzard (*Buteo buteo*), Long legged Buzzard (*Buteo ruffinis*), Tawny Eagle (*Aquila vindhinna*), Egyptian Vulture (Neophron percnopterus), Imperial Eagle (Aquila heliacal), Merlin (*Falco columbarius*), Laggar Falcon (*Falco jugger*), Common Kestrel (*Falco tinnunculus*) and Indian peafowl (*Pavo cristatus*) are listed as Schedule I species of Wildlife Protection Act, 1972.

Ten (10) species are reported migratory species and thus bears protection from killing under Convention of Migratory Species (CMS) to which India is a signatory.

The details of species are given in ***Table 6.10*** and photographic representation is provided in ***Figure 6.7.***

Figure 6.7 Avifaunal Species observed within the Study Area

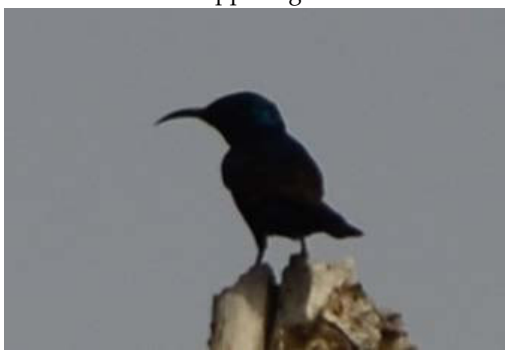
Short Toed Snake Eagle

Eurasian Roller

Oriental Turtle Dove

Egyptian Vulture

Steppe Eagle



Purple Sunbird

Black Crown Sparrow Lark

Source: Site and surrounding areas survey by ERM during 11th July to 15th July, 2015

Table 6.10 Avifaunal Species Observed/reported in the Study Area

Sn	Common Name	Scientific Name	Family	Migratory Status	Conservation Status		O/R
					IUCN	WPA, 72	
1	Rosy Pastor	*Pastor roseus*	Sturnidae	M	LC	IV	O
2	Grey Francolin	*Francolinus pondicerianus*	Phasianidae	R	LC	IV	O
3	Large Grey Babbler	*Turdoides malcolmi*	Leiothrichidae	R	LC	IV	O
4	Chestnut bellied Sandgrouse	*Pterocles exustus*	Pteroclididae	R	LC	IV	O
5	Southern Grey Shrike	*Lanius meridionalis*	Laniidae	R	LC	IV	O
6	Great Indian bustard	*Ardeotis nigriceps*	Otididae	R	CR	I	R
7	MacQueen's bustard	*Chlamydotis macqueenii*	Otidae	M	VU	I	R
8	Demoiselle Crane	*Anthropoides virgo*	Gruidae	M	LC	IV	R
9	Common Crane	*Grus grus*	Gruidae	M	LC	IV	R
10	Common Myna	*Acridotheres tristis*	Sturnidae	R	LC	IV	O
11	Long tailed Shrike	*Lanius schach*	Laniidae	R	LC	IV	O
12	Small Green Bee-eater	*Merops orientalis*	Meropidae	R	LC	IV	O
13	Blue-cheeked Bee-eater	*Merops persicus*	Meropidae	R	LC	IV	O
14	House Sparrow	*Passer domesticus*	Passeridae	R	LC	IV	O
15	House Crow	*Corvus splendens*	Corvidae	R	LC	IV	O
16	Large billed Crow	*Corvus macrorhynchos*	Corvidae	R	LC	Iv	O
17	Shikra	*Accipiter badius*	Accipitridae	R	LC	I	R
18	White Eyed Buzzard	*Butastur teesa*	Accipitridae	R	LC	I	O
19	Black Shouldered Kite	*Elanus caeruleus*	Accipitridae	R	LC	I	R
20	Long Billed Vulture	*Gyps indicus*	Accipitridae	R	CR	I	R
21	Red Headed Vulture	*Sarcogyps calvus*	Accipitridae	R	CR	I	R
22	Short Toed Snake Eagle	*Circaetus gallicus*	Accipitridae	R	LC	I	O
23	Pallid Harrier	*Circus macrourus*	Accipitridae	R	NT	I	R
24	Montagu's Harrier	*Circus pygargus*	Accipitridae	M	LC	I	R
25	White Eyed Buzzard	*Butastur teesa*	Accipitridae	R	LC	I	O
26	Common Buzzard	*Buteo buteo*	Accipitridae	M	LC	I	R
27	Long legged Buzzard	*Buteo ruffinis*	Accipitridae	M	LC	I	R
28	Tawny Eagle	*Aquila vindhinna*	Accipitridae	R	LC	I	R
29	Egyptian Vulture	*Neophron percnopterus*	Accipitridae	R	EN	I	O
30	Imperial Eagle	*Aquila heliaca*	Accipitridae	M	VU	I	R
31	Merlin	*Falco columbarius*	Falconidae	M	LC	I	R
32	Laggar Falcon	*Falco jugger*	Falconidae	R	NT	I	R
33	Common Kestrel	*Falco tinnunculus*	Falconidae	M	LC	I	R
34	Indian peafowl	*Pavo cristatus*	Phasianidae	R	LC	I	O
35	Eurasian collared Dove	*Streptopelia decaocto*	Columbidae	R	LC	IV	O

36	Laughing Dove	*Spilopelia senegalensis*	Columbidae	R	LC	IV	O
37	Asian Palm Swift	*Cypsiurus balasiensis*	Apodidae	R	LC	IV	O
38	House Swift	*Apus nipalensis*	Apodidae	R	LC	IV	O
39	Blue Rock Pigeon	*Columba livia*	Columbidae	R	LC	IV	O
40	Common Hoopee	*Upupa epops*	Upupidae	R	LC	IV	O
41	Crested Lark	*Galerida cristata*	Alaudidae	R	LC	IV	O
42	Indian Bush Lark	*Mirafra erythroptera*	Alaudidae	R	LC	IV	O
43	Rufous Tailed Lark	*Ammomanes phoenicura*	Alaudidae	R	LC	IV	O
44	Black crowned Sparrow Lark	*Eremopterix nigriceps*	Alaudidae	R	LC	IV	O
45	Black Drongo	*Dicrurus macrocercus*	Dicruridae	R	LC	IV	O
46	Red vented Bulbul	*Pycnonotus cafer*	Pycnonotidae	R	LC	IV	O
47	White-eared Bulbul	*Pycnonotus leucotis*	Pycnonotidae	R	LC	IV	O
48	Indian Robin	*Saxicoloides fulicatus*	Muscicapidae	R	LC	IV	O
49	Pied Bush Chat	*Saxicola caprata*	Muscicapidae	R	LC	IV	O
50	Indian Hoopee	*Upupa epops*	Upupidae	R	LC	IV	O
51	Indian Silver bill	*Lonchura malabarica*	Estrildidae	R	LC	IV	O
52	Greater Hoopoe-Lark	*Alaemon alaudipes*	Alaudidae	R	LC	IV	R
53	White eared Bulbul	*Pycnonotus leucotis*	Pycnonotidae	R	LC	IV	O
54	Cattle Egret	*Bulbulcus ibis*	Ardeidae	R	LC	IV	O
55	Purple Sunbird	*Cinnyris asiaticus*	Nectariniidae	R	LC	IV	O

Note: A- Aquatic, T-Terrestrial, Migratory-M, Resident-R, LC-Least Concern, NT-Near Threatened, VU-Vulnerable, EN- Endangered, CR-Critically Endangered, Occurrence, O-Observed/Reported, IUCN-International Union for Conservation of Nature, WPA-Wildlife Protection Act ,1972,

An initial bird and bat survey (10 days) was also conducted at the adjoining operational Mokal wind farm to make an inventory of winter visiting birds covering migratory season (Oct-Feb) during 6th to 15th November 2015 . A total of 56 bird species were observed during the survey in the study area and 21 (37.5%) were migratory. As per the IUCN Red list of Threatened Species V 2015.4 2 species, the Red-headed Vulture (*Sarcogyps calvus*) and White-rumped Vulture (*Gyps bengalensis*) are classified as Critically Endangered (CR); 2 species, the Steppe Eagle (*Aquila nepalensis*) and Egyptian Vulture (*Neophron percnopterus*) are classified as Endangered (EN) and 2 species, the Laggar Falcon (*Falco jugger*) and Cinereous Vulture (*Aegypius monachus*) are classified as Near Threatened (NT). The above species are therefore of conservation significance.

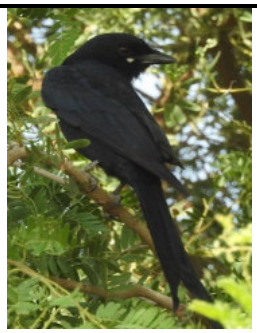
17 species, the Red Headed Vulture (*Sarcogyps calvus*), Short-toed Snake Eagle (*Circaetus gallicus*), Montagu's Harrier (*Circus pygargus*), Common Buzzard (*Buteo buteo*), Long-legged Buzzard (*Buteo ruffinis*), Egyptian Vulture (*Neophron percnopterus*), Common Kestrel (*Falco tinnunculus*), Indian Peafowl (*Pavo cristatus*), Laggar Falcon (*Falco jugger*), Tawny Eagle (*Aquila rapax*), Booted Eagle (*Hieraaetus pennatus*), Steppe Eagle (*Aquila nipalensis*), Peregrine Falcon (*Falco peregrinus*), Eurasian Griffon (*Gyps fulvus*), Cinerous Vulture (*Aegypius monachus*), White-rumped Vulture (*Gyps bengalensis*) and Lesser

Kestrel (*Falco naumanni*) are listed under Schedule 1 of the Indian Wildlife Protection Act, 1972 and amendments, and are accorded the highest protection.

Of the 56 bird species 21 species were reported to be migratory.

Some of the recorded birds are shown in ***Figure 6.8*** and a complete list of bird species, migratory and conservation status is included in ***Table 6.11.***

Figure 6.8 ***Some of the avifaunal species recorded in the Study Area***


Black Drongo


Laughing Dove

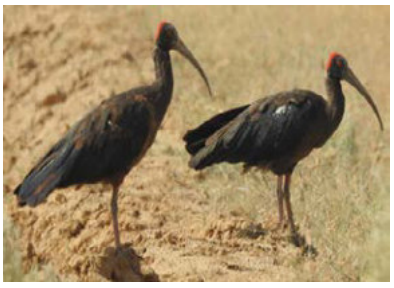

Southern Grey Shrike


Eurasian Griffon


Crested Lark

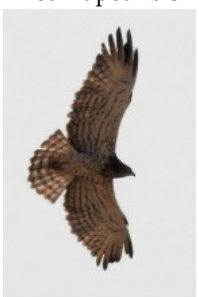

Rosy Starling


Tawny Pipit


Red-naped Ibis


Green Bee-eater


Common kestrel


Short-toed Snake Eagle


Chestnut-bellied Sandgrouse

Northern Wheatear

Cream Coloured Courser

Steppe Eagle

White-eared Bulbul

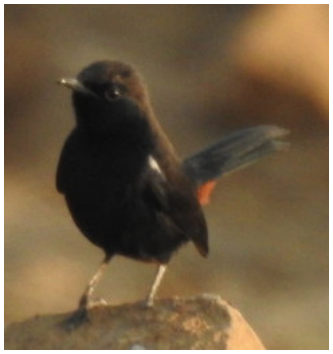
Common Stonechat

Common Starling

Common Babbler

Desert Wheatear

Cinerous Vulture



Indian Robin

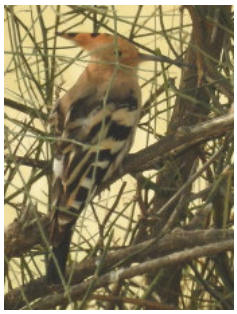
Pied Bushchat

Rufous-fronted Prinia

Booted Eagle

Montagu's Harrier

Grey Francolin



Common Hoopoe

Long-legged Buzzard

Red-headed Vultures

Source: Site and surrounding areas survey by ERM during 06th to 15th November2015.

Table 6.11 Avifaunal Species observed from the Study Area

Sn	Common Name	Scientific Name	Family	Migratory Status	Conservation Status	
					IUCN	WPA,72
1	Rosy Pastor	*Pastor roseus*	Sturnidae	M	LC	IV
2	Grey Francolin	*Francolinus pondicerianus*	Phasianidae	R	LC	IV
3	Chestnut-bellied Sandgrouse	*Pterocles exustus*	Pteroclididae	R	LC	IV
4	Southern Grey Shrike	*Lanius meridionalis*	Laniidae	R	LC	IV
5	Small Green Bee-eater	*Merops orientalis*	Meropidae	R	LC	IV
6	Red Headed Vulture	*Sarcogyps calvus*	Accipitridae	R	CR	I
7	Short-toed Snake Eagle	*Circaetus gallicus*	Accipitridae	R	LC	I
8	Montagu's Harrier	*Circus pygargus*	Accipitridae	M	LC	I
9	Common Buzzard	*Buteo buteo*	Accipitridae	M	LC	I
10	Long-legged Buzzard	*Buteo ruffinis*	Accipitridae	M	LC	I
11	Egyptian Vulture	*Neophron percnopterus*	Accipitridae	R	EN	I
12	Common Kestrel	*Falco tinnunculus*	Falconidae	M	LC	I
13	Indian Peafowl	*Pavo cristatus*	Phasianidae	R	LC	I
14	Eurasian collared Dove	*Streptopelia decaocto*	Columbidae	R	LC	IV
15	Laughing Dove	*Spilopelia senegalensis*	Columbidae	R	LC	IV
16	Laggar Falcon	*Falco jugger*	Falconidae	R	NT	I
17	Tawny Eagle	*Aquila rapax*	Accipitridae	R	LC	I
18	Blue Rock Pigeon	*Columba livia*	Columbidae	R	LC	IV
20	Crested Lark	*Galerida cristata*	Alaudidae	R	LC	IV
21	Black-crowned Sparrow Lark	*Eremopterix nigriceps*	Alaudidae	R	LC	IV
22	Black Drongo	*Dicrurus macrocercus*	Dicruridae	R	LC	IV
23	Red-vented Bulbul	*Pycnonotus cafer*	Pycnonotidae	R	LC	IV
24	White-eared Bulbul	*Pycnonotus leucotis*	Pycnonotidae	R	LC	IV
25	Pied Bush Chat	*Saxicola caprata*	Muscicapidae	R	LC	IV

Sn	Common Name	Scientific Name	Family	Migratory Status	Conservation Status	
					IUCN	WPA,72
26	Indian Hoopee	*Upupa epops*	Upupidae	R	LC	IV
27	Indian Silverbill	*Lonchura malabarica*	Estrildidae	R	LC	IV
28	Indian Robin	*Saxicoloides fulicatus*	Muscicapidae	R	LC	IV
29	Common Myna	*Acridotheres tristis*	Sturnidae	R	LC	IV
30	House Crow	*Corvus splendens*	Corvidae	R	LC	V
31	Black-winged Stilt	*Himantopus himantopus*	Recurvirostridae	R	LC	IV
32	Common Sandpiper	*Actitis hypoleucos*	Scolopacidae	M	LC	IV
33	Indian Roller	*Coracias benghalensis*	Coraciidae	R	LC	IV
34	Red-wattled Lapwing	*Vanellus indicus*	Charadriidae	R	LC	IV
35	White-breasted Kingfisher	*Halcyon smyrnensis*	Halcyonidae	R	LC	IV
36	Common Babbler	*Turdoides caudata*	Timaliidae	R	LC	IV
37	Cream-coloured Courser	*Cursorius cursor*	Glareolidae	M	LC	IV
38	Booted Eagle	*Hieraaetus pennatus*	Accipitridae	M	LC	I
39	Steppe Eagle	*Aquila nipalensis*	Accipitridae	M	EN	I
40	Peregrine Falcon	*Falco peregrinus*	Falconidae	R	LC	I
41	Eurasian Griffon	*Gyps fulvus*	Accipitridae	M	LC	I
42	Red-naped Ibis	*Pseudibis papillosa*	Threskiornithidae	R	LC	IV
43	Greater Short-toed Lark	*Calandrella brachydactyla*	Alaudidae	M	LC	IV
44	Desert Lark	*Ammomanes deserti*	Alaudidae	R	LC	IV
45	Common Starling	*Sturnus vulgaris*	Sturnidae	M	LC	IV
46	Tawny Pipit	*Anthus campestris*	Motacillidae	M	LC	IV
47	Long Billed Pipit	*Anthus similis*	Motacillidae	M	LC	IV
48	Rufous-fronted Prinia	*Prinia buchanani*	Cisticolidae	R	LC	IV
49	Rufous-tailed Shrike	*Lanius isabellinus*	Laniidae	M	LC	IV
50	Cinerous Vulture	*Aegypius monachus*	Accipitridae	M	NT	I
51	Citrine Wagtail	*Motacilla citreola*	Motacillidae	M	LC	IV
52	Isabelline Wheatear	*Oenanthe isabellina*	Muscicapidae	M	LC	IV
53	Desert Wheatear	*Oenanthe deserti*	Muscicapidae	M	LC	IV
54	Northern Wheatear	*Oenanthe picata*	Muscicapidae	M	LC	IV
55	White-rumped Vulture	*Gyps bengalensis*	Accipitridae	R	CR	I
56	Lesser Kestrel	*Falco naumanni*	Falconidae	M	LC	I

Notes Acronyms: LC – Least Concern, NT – Near Threatened, NT – Near Threatened; I – Schedule I of IWP, IV – Schedule IV of IWP, V – Schedule V of IWP; M – Migrant and R – Resident.

Mammals

A total of 9 species of 9 genera belonging to 7 families were observed/ reported from the study area. `Indian Gazelle (*Gazella bennettii*) and Asiatic Wild Cat (*Felis sylvestris*) are listed as Sch. I species as per Wildlife Protection Act, 1972. A list of species observed/reported from the study area are given in ***Table 6.12*** and represented in ***Figure 6.9***.

Table 6.12 Details of Mammals observed/ reported from the Study area

Sn.	English Name	Scientific Name	Family	Occurrence	WPA Schedule / IUCN Status	O/R
1	Indian Gazelle	*Gazella bennettii*	Bovidae	Common	Sch.I/LC	O
2	Golden Jackal	*Canis aurens*	Canidae	Common	Sch.II/LC	R
3	Desert Fox	*Vulpes vulpes pusilla*	Canidae	Occasional	Sch.II/LC	R
4	Asiatic Wild Cat	*Felis sylvestris*	Felidae	Rare	Sch.I./LC	R
5	Indian Hare	*Lepus nigricollis*	Leporidae	Common	Sch.IV/LC	O
6	Indian hedgehog	*Paraechinus micropus*	Erinaceidae	Uncommon	Sch.IV/LC	R
7	Asian house shrew	*Suncus murinus*	Soricidae	Common	Not Listed/LC	R
8	Greater Mouse-tailed Bat	*Rhinopoma microphyllum*	Rhinopomatidae	Uncommon	LC/V	R
9	Lesser Mouse-tailed Bat	*Rhinopoma hardwickii*	Rhinopomatidae	Uncommon	LC/V	R

Notes: IUCN-International Union for Conservation of Nature, WPA-Wildlife Protection Act ,1972, LC-Least Concern,

Figure 6.9 Mammalian Species observed within the Study Area

Indian Gazelle/Chinkara

Greater Mouse –tailed Bat

6.5.6 Protected Area-Desert National Park

The wind farm site is at a distance of 16 km (approx.) from the Desert National Park. The Desert National Park (IN-RJ-03 - A1= Threatened species; A3=Biome species) (1) is an Important Bird Areas (IBAs) identified by Birdlife International. The National Park is 3162 km² in area. It was protected by the Government of India as a National Park in 1992. This national park was created in order to protect the unique biodiversity and habitat in the Thar Desert. The area is home to many rare and endangered birds and mammal species. Primarily the Desert National Park is known for supporting large populations of species of Bustard family i.e. Great Indian Bustard, Houbara Bustard and Lesser Florican. Of these, Great Indian Bustard and Lesser Floricans are known to breed in good numbers and Houbara Bustards are known to winter in this landscape. This Important Bird Area (IBA) is known to harbour 4 critically endangered species, 3 vulnerable species, and 1 near threatened species as listed in ***Table 6.13*** and shown in ***Figure 6.10.***

Table 6.13 IBA Criteria for Desert National Park (IN-RJ-03 - A1= Threatened species; A3=Biome species)

Sn	Species (Common Name (Scientific Name)	Category/Criteria
1	Oriental White-backed Vulture (*Gyps bengalensis*)	Critically Endangered
2	Long-billed Vulture (*Gyps indicus*)	Critically Endangered
3	Great Indian Bustard (*Ardeotis nigriceps*)	Critically Endangered
4	Red-headed Vulture (*Sarcogyps calvus*)	Critically Endangered
5	Greater Spotted Eagle (*Aquila clanga*)	Vulnerable
6	Stoliczka's Bushchat (*Saxicola macrorhyncha*)	Vulnerable
7	Macqueen's Houbara (*Chlamydotis macqueeni*)	Vulnerable
8	Cinereous Vulture (*Aegypius monachus*)	Near Threatened
9	Spotted Sandgrouse (*Pterocles senegallus*)	Biome-13: Saharo-Sindian Desert
10	Sykes' Nightjar (*Caprimulgus mahrattensis*)	Biome-13: Saharo-Sindian Desert
11	Desert Finch-Lark (*Ammomanes deserti*)	Biome-13: Saharo-Sindian Desert
12	Greater Hoopoe-Lark (*Alaemon alaudipes*)	Biome-13: Saharo-Sindian Desert

(1) http://ibcn.in/wp-content/uploads/2011/12/37-847_897-Rajasthan.pdf

Sn	Species (Common Name (Scientific Name)	Category/Criteria
13	White-eared Bulbul (*Pycnonotus leucotis*)	Biome-13: Saharo-Sindian Desert
14	Trumpeter Finch (*Rhodopechys githaginea*)	Biome-13: Saharo-Sindian Desert

Source: http://ibcn.in/wp-content/uploads/2011/12/37-847_897-Rajasthan.pdf

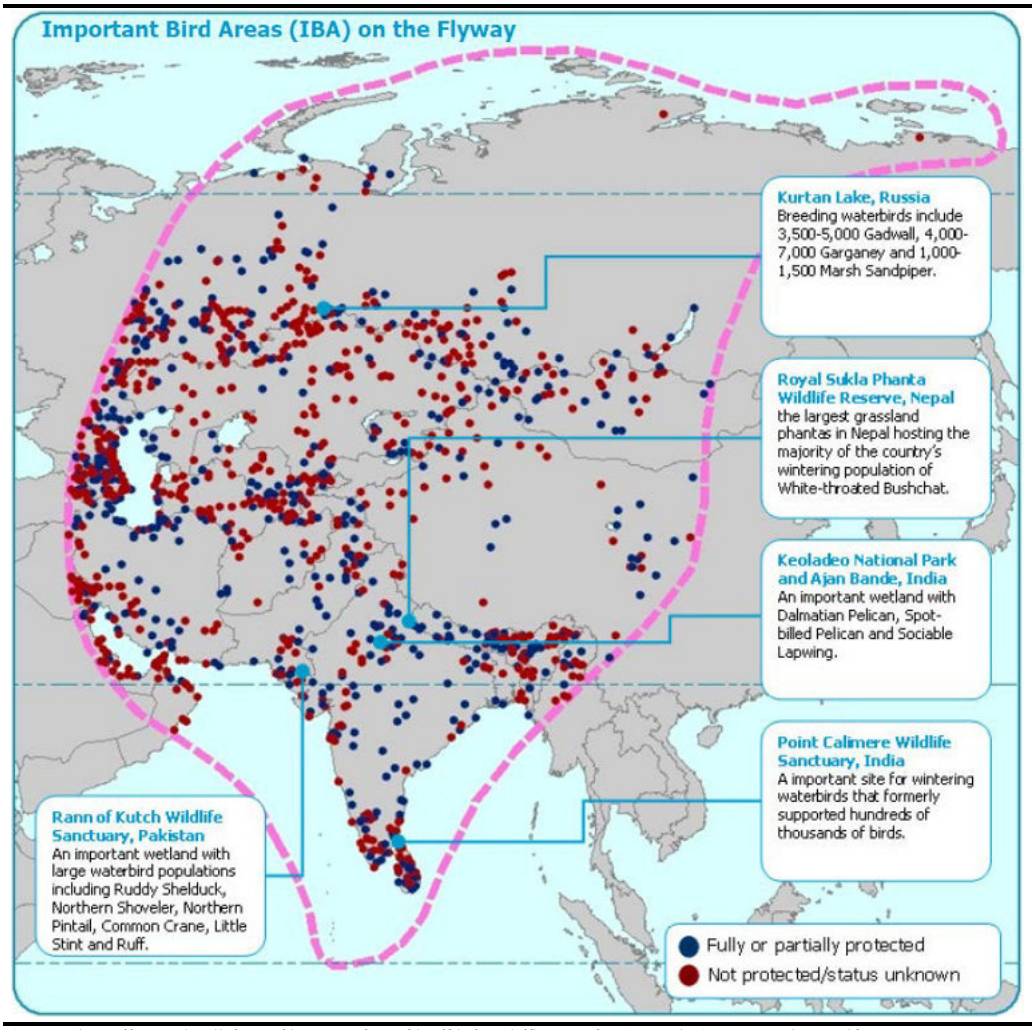
Figure 6.10 Avifauna Display at Desert National Park, Jaisalmer

Source: Source: Photographed by ERM during survey-9th -12th August, 2014

6.5.7 Migratory Routes

The Central Asian flyway covers entire Indian mainland. The IBA's as shown in the map (Refer ***Figure 6.11***) below denotes the major congregation's areas of these migratory birds for stop over and move further south. As the survey was undertaken in July a survey is required to be undertaken during the migratory season (Oct-Feb) to understand the migratory species visiting the area.

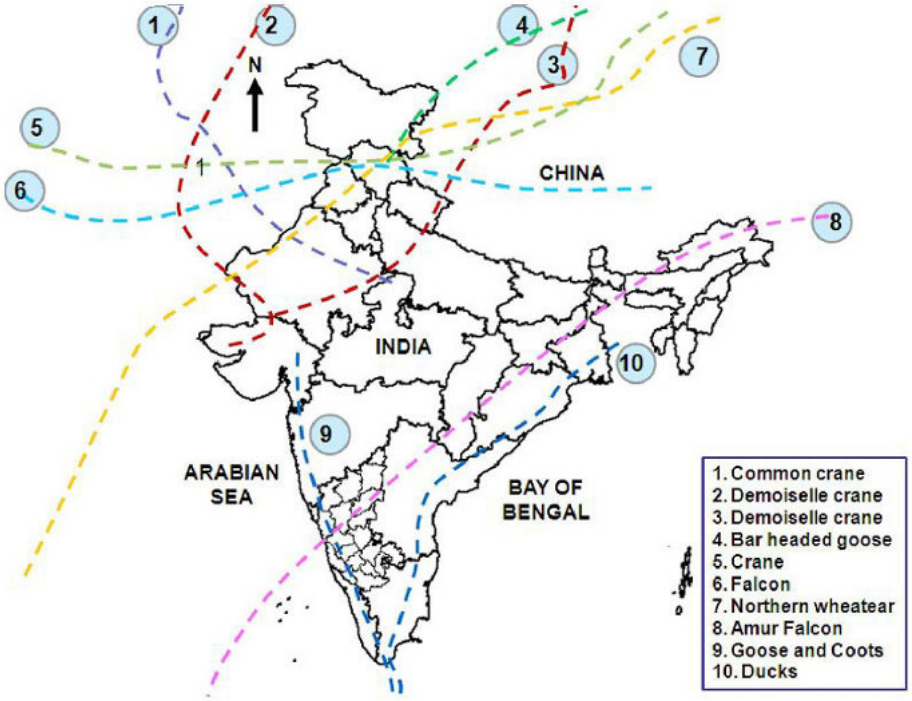
Figure 6.11 Map showing Central Asian Flyway and IBA with respect to India



Source: http://www.birdlife.org/datazone/userfiles/file/sowb/flyways/7_Central_Asia_Factsheet.pdf

The available migratory routes passing through India is provided in ***Figure 6.12*** and suggests movement of Demoiselle Crane (*Anthropoides virgo*) and Northern Wheatear (*Oenanthe oenanthe*) from the project site. Both species are LC (IUCN 2015.4) and not in Schedule I of the IWPA (1972) though the former is a Convention for Migratory Species (CMS) instrument species.

Figure 6.12 Major migratory routes passing through India



Source: Ramachandra T.V, Durga Madhab Mahapatra, M. Boominathan, K. Sankara Rao and Harish R. Bhat, 2011. Environmental Impact Assessment of the National Large Solar Telescope Project and its ecological impact in Merak area., CES Technical Report : 123, Energy & Wetlands Research Group, Centre for Ecological Sciences, Indian Institute of Science, Bangalore 560 012. doi:http://wgbis.ces.iisc.ernet.in/biodiversity/pubs/ces_tr/TR123/index.htm

6.6 SOCIO-ECONOMIC BASELINE

This section provides an understanding of the administrative set up of the district, the demographic profile of the villages in the project area, the social groups present, the land use patterns in the area, the livelihood profile of the community, the common property resources, the social and physical infrastructure available in terms of the education and health infrastructure, the water supply for irrigation and drinking purposes, sanitation facilities and connectivity. The purpose of this section is to allow for an increased understanding of the key issues identified as well as identify areas of intervention in future scenarios.

As discussed above in S***ection 6.2*** of this chapter, the AoI for this baseline is understood as the area within a 5 km radius. The methodology adopted for the social assessment is as follows.

6.6.1 *Social Baseline Data Collection Methodology*

The social baseline for the AoI has been established on the basis of the visual observations made during the site survey, stakeholder consultations undertaken and a review of the secondary information available in the public domain. The following sub section provides an understanding of the methodology followed for the social baseline data collection.

Review of Secondary Information

For the purpose of establishing the social baseline for the AoI, a review of the secondary information available in the public domain was undertaken. The list of secondary sources of information used is as follows:

- Census of India 2011 data
- Maps of India
- Panchayati Raj Website of Rajasthan
- Official Website of Jaisalmer, managed by Government of Rajasthan
- Agricultural Contingency Plan, 2012, Jaisalmer District
- http://www.indianrajputs.com/history/
- http://meghhistory.blogspot.in/2010/08/meghwal-samaj.html
- http://manganiar.com/music.html
- http://www.gurjarsutharsocialgroup.com/whoarethesuthars.html
- http://joshuaproject.net/people_groups/16711/IN
- http://www.ncpcr.gov.in/view_file.php?fid=120\

Stakeholder Identification and Analysis

As part of the social baseline generation and assessment, the stakeholders for the project were identified. The stakeholders are understood as those groups which may be impacted or have an influence on the project. As part of the stakeholder analysis, an understanding was developed of the individual concerns, expectations and influences of the stakeholder on the project. The purpose of such an understanding was to allow for a proper assessment and mitigation of the impacts. On the basis of this understanding, an exercise of stakeholder mapping was undertaken, the purpose of which was to:

- Identification of stakeholder groups;
- Understanding of their profile and the nature of the stakes;
- Understanding each group's specific issues, concerns as well as expectations from the project;
- Gauge their influence on the Project.

On the basis of this understanding, the stakeholder were categorised into High Influence/Priority, Medium Influence/Priority and Low Influence/Priority on the basis of their influence/power as well as interest in the project.

Site Survey and Stakeholder Consultations

As part of the baseline data collection process, consultations were undertaken with the local stakeholders identified for the project.

Figure 6.13 Stakeholder Consultations Undertaken

Source: ERM Site Visit, July 2015

The following ***Table 6.14*** provides a list of the consultations undertaken, as part of the site visit.

Table 6.14 Consultations undertaken for the Project

Date	Stakeholder Details
12-07-2015	FGD with women group (Habur)
12-07-2015	Discussion with village leaders (Habur)
13-07-2015	FGD with local community (Serawa)
13-07-2015	FGD with local community (Mokal)
13-07-2015	FGD with women group (Mokal)
14-07-2015	Discussion with member of Village Development Committee (Habur)

As part of these consultations an attempt was made to develop an understanding of the stakeholder groups' key concerns and expectations from the project, the stakeholder groups' perception of the project and to triangulate the secondary information available on the area. Details of various stakeholders consulted are provided in the ***Chapter 9*** of this report.

6.6.2 Administrative setting

For administrative purposes, Jaisalmer is divided in four sub-divisions or tehsils. The Project lies in the Jaisalmer tehsil and is surrounded by the villages of Poonamnagar (Habur), Mokal and Serawa, the nearest of these being Habur villages, lying approximately 5 km west. No other villages or settlements are located in the Project area. Tehsil map of Jaisalmer is shown in ***Figure*** 6.14 Tehsil map of Jaisalmer district showing location of proposed windfarm site

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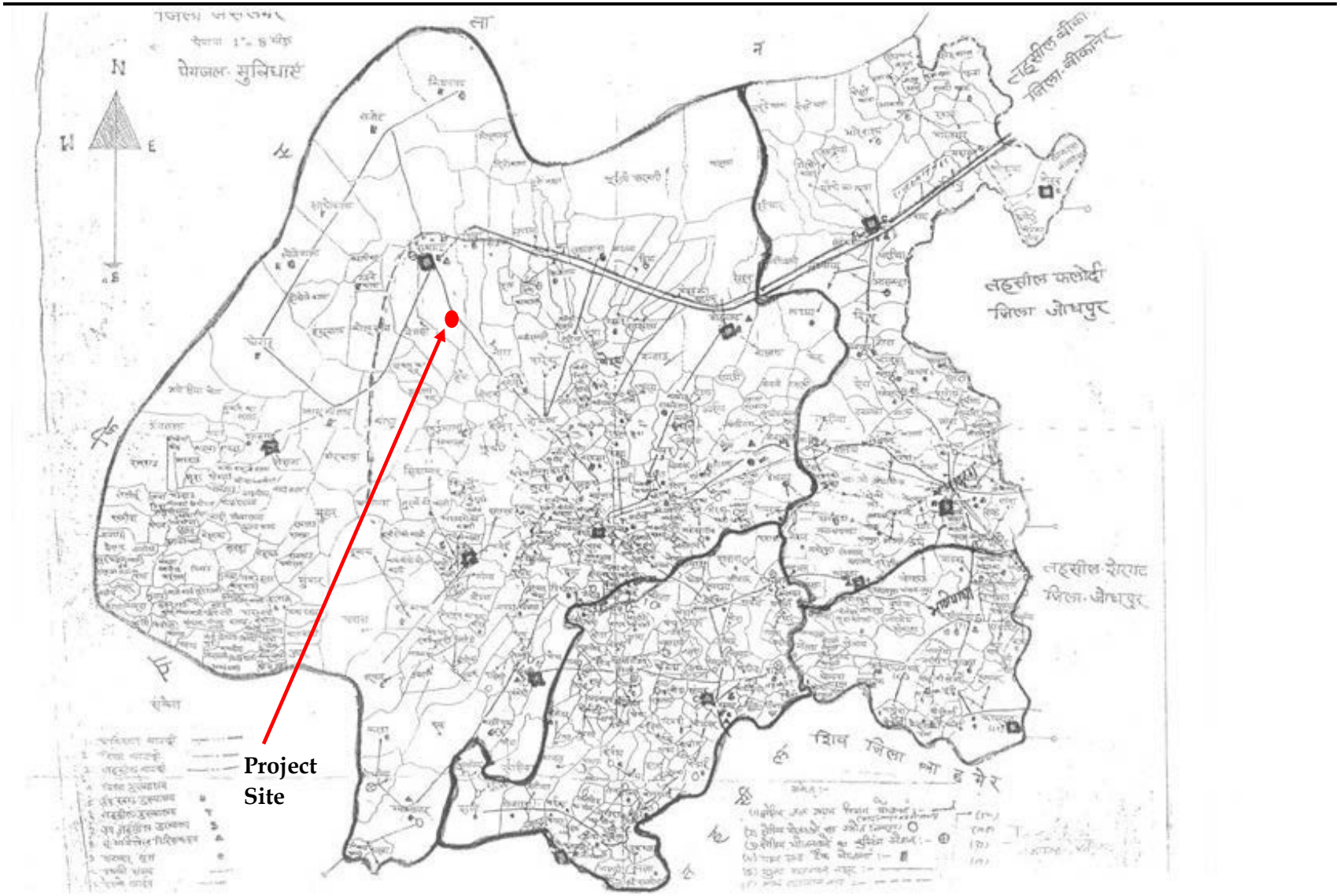
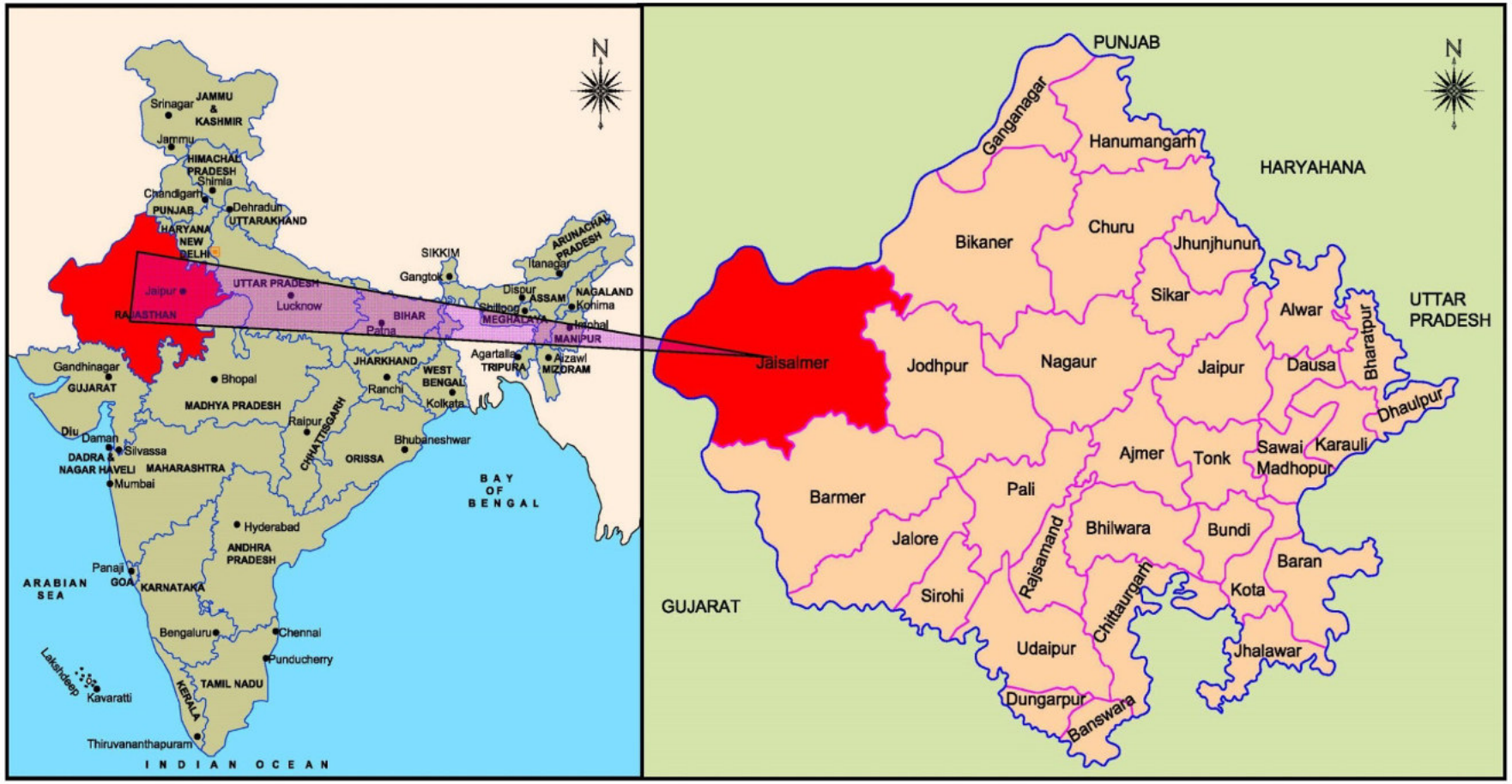
Figure 6.14 *Tehsil map of Jaisalmer district showing location of proposed windfarm site*



Source: http://jaisalmer.nic.in

Figure 6.15 Rajasthan and Jaisalmer



Source : Copyright © Compare Infobase Pvt. Ltd. 2004

Details about access to the Project location have been provided in the ***Section 2*** of this report.

6.6.3 State Profile: Rajasthan

Rajasthan is situated in the northern part of India and the capital of the state is Jaipur, which is also known as the "Pink City". It is the largest state in India by area constituting 10.4 % of the total geographical area of India and it accounts for 5.67 percent of population of India according to the provisional data of Census 2011.

The capital Rajasthan shares a border with Pakistan and is also bordered by other Indian states; Gujarat to the southwest; Madhya Pradesh to the southeast; Uttar Pradesh and Haryana to the northeast; and Punjab to the north. Deserts in the state constitute a large chunk of the land mass, where the settlements are scattered and the density of population is quite low. Rajasthan is administratively divided into 7 divisions, 33 districts and 44,672 villages, as of Census 2011 (***Figure 6.16***)

Figure 6.16 Administrative Structure of Rajasthan

Source: Panchayati Raj Website of Rajasthan

The state has a predominant rural population, which has undergone a minimal change from 76.61% in the 2001 census to 75.13% in 2011. Though, there have been significant efforts towards urbanisation in the past decade, but the outcome has been confined to a few cities only. The urban population grew at a rate of 29.3% while the rural population grew at a rate of 19%. The sex ratio has increased from 921 females per thousand males to 928 females per thousand males, in the last decade, however, the state lags behind the national average of 940 females per thousand males. The population density is lower in the state in comparison to the country (382 persons per sq. km in Census 2011). In terms of SC and ST population, the state is ranked 7th in terms of the proportion of SC population and 4th in terms of the ST population.

Table 6.15 Rajasthan Demographic Profile

Attribute	Number	% of India
Area (ha)	34,223,900	10.41
Total population	6,85,48,437	5.66
Males	3,55,50,997	5.71
Females	3,29,97,440	5.62
Sex ratio	928	NA

Attribute	Number	% of India
Percentage of rural Population	75.13	NA
Percentage of urban population	24.87	NA
Population density	200	NA
Percentage of SC population	17.83	NA
Percentage of ST population	13.48	NA
Total literacy rate	66.11	NA
Male Literacy rate	79.19	NA
Female Literacy Rate	47.76	NA
Rural Literacy	61.44	NA

Source: Census of India, 2011 data

About 18% of the total population in the state of Rajasthan belongs to Scheduled Caste population and about 13% belongs to the Scheduled Tribe population. The state has 34 recognized Scheduled Caste groups which include Bairwa, Balmiki, Chamar, Kalbelia, Bargi etc., and 12 recognized Scheduled Tribe groups including Bhil, Bhil Mina, Koli, Mina, Sahariya etc. In addition, several districts/tehsils of the State are considered as Schedule V areas with a significant tribal population.

The decadal population growth rate (2001-2011) of Rajasthan has been 21.44%. The Literacy rate of Rajasthan has increased from 60.41% in 2001 to 66.11% in 2011, but is still significantly behind the national average of 74.04%. Female literacy rate is quite low in the state, as it stands at 47.76%, compared to the national female literacy of 65.46%.

6.6.4 District Profile: Jaisalmer

Jaisalmer is the largest district (38,40,100 Ha) of the Jodhpur Division and shares the International border with Pakistan, running up to 471 km. (1) For administrative purposes, the district is divided into four sub-divisions viz. Jaisalmer, Pokaran, Fatehgarh and Bhaniyana and four tehsils, i.e. Jaisalmer,Pokaran, Fatehgarh and Bhaniyana. The developmental activities of the district are being looked after by three Panchayat Samities, i.e. Jaisalmer, Sam and Sankra. There are total 835 revenue villages and 140 Gram panchayats in the district, as shown in the ***Figure 6.17*** **.**

Figure 6.17 Administrative Structure of Jaisalmer

Source: Official Website of Jaisalmer, managed by Government of Rajasthan

(1) http://jaisalmer.rajasthan.gov.in/content/raj/jaisalmer/en/about-jaisalmer/geographical-and-physical-features.html

Table 6.16 Jaisalmer district Demographic Profile vis-à-vis Rajasthan

Attribute	Rajasthan	Jaisalmer District
Population	68,548,437	6,69,919
Population Density	200	17
% of SC population	18	15
% of ST population	13	6
Sex Ratio	928	852
% total literacy rate	66	57
% female literacy rate	52	40
% rural population	75.13	86.71

Source: Census of India 2011 data

The population of Jaisalmer district is 6,69,919 individuals which forms 0.97% of the total population of Rajasthan. Jaisalmer district has a predominantly rural population, comprising 86.71% of total population in the district. The total percentage decadal growth rate of Jaisalmer District is 32% which is relatively higher than the decadal growth rate of Rajasthan (21.31%). A significant growth has been witnessed by the rural areas with almost 35% as opposed to the urban areas with a growth rate of 17%. The data released by Census of India 2011, shows that density of Jaisalmer district for 2011 is 17 people per sq. km., which is very low compared to the state average of 200. The sex ratio is also highly skewed in the district, with only 852 females per 1000 males.

The literacy profile of the district suggests huge gap from the national literacy rates, with the female literacy rate of 40% being significantly lower than the female literacy rates of the state (52%) and the country (65.46%).

The majority of inhabitants of Jaisalmer are Bhati Rajputs, named after renowned warrior Bhati. Other castes present in the area are Brahmins, (belonging to the General category) and Meghwals, Suthars, Dholis, Jogis, Manganiyars, etc. (all belonging to Scheduled Caste). Muslim population is also present in the area, which, according to social consultations, resides in Muslim dominated settlements.

Jaisalmer District is not notified as Schedule V area (Section 244) as it is not dominated by a majority of tribals unlike districts such as Dungarpur, Banswara and Pratapgarh (select blocks). However, nearly 6% of the population at the District level is comprised of ST population and about 15% of the population is comprised of SC population.

6.6.5 Tehsil Profile: Jaisalmer

Jaisalmer is the largest tehsil (in terms of area) in the district and has a population of 2,65,237 individuals, forming 40% of the total population in the district. The sex ratio in the tehsil is 829, which is quite lower compared to the district sex ratio of 852.

Table 6.17 Demographic Profile of Jaisalmer Tehsil

Attribute	Jaisalmer District	Jaisalmer Tehsil
Population	6,69,919	2,65,237
% of SC population	15	15
% of ST population	6	7
Sex Ratio	852	829
% total literacy rate	57	60
% female literacy rate	40	44

Source: PCA, 2011

The SC and ST population of the Tehsil is comparable to that of the district. However, the literacy rates (both total and female) are higher at the tehsil level, compared to the district.

6.6.6 Area of Influence Profile

The project lies in the Jaisalmer Tehsil of Jaisalmer district, which is the largest Tehsil (in terms of area) in Jaisalmer and shares a border with Pakistan. The area has a huge potential for Wind Power projects and is attracting huge investments in the Wind Energy space. The largest project in the Tehsil is an onshore wind farm by Suzlon Energy, which is also the largest onshore wind farm project in the country.

Demographic Profile

Table 6.18 Demographic Profile of AoI

Village Name	Total Area (in Ha)	HHs	Average HH size	Pop	Pop Density	%SC	%ST	Sex Ratio	% Lit	% F Lit
Habur	15,510	411	6	2569	16.56	7.4	0	907	64.5	42.9
Mokal	5,381	188	5	997	18.53	27.4	0	885	61.3	44.9
Serawa	13,485	94	6	538	3.99	31.8	0.6	942	66.4	44.6
Total	34,376	693	6	4,104	11.94	22.2	0.2	911	64.0	44.1

Source: PCA, 2011

As per the 2011 Census, the AoI, covering 3 villages in the 5 km radius, has a total of 693 households and a population of 4,104. The average household size in the AoI is 6 individuals per HH. Habur village is the closest from the project and has the maximum population of 2,569 individuals. The AoI has a negative sex ratio of 911, of which Mokal village exhibits the lowest sex ratio of 885 females per thousand males and Serawa exhibits relatively highest sex ratio of 942 females per thousand males.

Social Stratification

The entire population in the AoI falls in the rural category and the proportion of SC population is quite varied across the AoI villages, tehsil and the district. There is considerable presence of tribal population in the district, but the AoI houses negligible ST population, compared to the tehsil and the district.

Figure 6.18 Proportion of SC/ST Population in the AoI vis-a-vis the Tehsil and District

Source: Census of India, 2011

Mokal and Serawa villages have the maximum concentration of Scheduled Caste population, in the AoI, tehsil or the district. While Habur has the least presence of SC population (7.4%), Mokal and Serawa have nearly 27% and 32 % Scheduled Caste population. The majority of SC population consists of Meghwals, Manganiars, Suthars and Dholis. According to the information made available during the consultations and the visual observations during the site visit, it is understood that there is no demarcation on the basis of caste or religion in the settlement patterns in the AoI. Furthermore, these groups are involved in the Village Development Committee and are involved in the planning of the utilization of the Community Development Funds of the Wind Power Projects. There is also not reported to be any differentiation across caste/tribe groups on the basis of access to resources or economic opportunities.

Box 6.1 Main Social groups in Jaisalmer

- **Rajput**: The Rajputs have been traditionally known as the warrior clan and have enjoyed a higher social status in the Indian Caste system. Rajputs (meaning, son of a King) have governed the majority of princely states in Rajasthan and Saurashtra.
- **Meghwal:** The Meghwals are primarily found in the north-western parts of India and belong to the Scheduled Caste. Traditionally, they have been a part of the weaver community in India.1
- **Manganiar**: Manganiars belong to both Hindu and Muslim communities in the desert of Rajasthan and border districts of Pakistan. They are famous for their classical folk music. They are the groups of hereditary professional musicians, whose music has been supported by wealthy landlords and aristocrats for generations.
- **Suthar:** The Suthar or Sutar is a Hindu caste within the Vishwakarma community of India. They are also found in the province of Sindh in Pakistan. Their traditional occupation is that of carpentry and they are classified as a Scheduled Caste.
- **Dholi:** Dholi (coming from the word Dhol, known as drum) people are a community, indigenous to Rajasthan and are traditionally engage in music and play drums during weddings and other festive occasions. They claim to be the descendants of Rajput community; however, it is doubtful, as they are currently classified as Scheduled Caste.

Source: [1] http://meghhistory.blogspot.in/2010/08/meghwal-samaj.html, http://manganiar.com/music.html http://www.gurjarsutharsocialgroup.com/whoarethesuthars.html, [1] http://joshuaproject.net/people_groups/16711/IN

Gender: Role in Society

The Jaisalmer district is characterised by a patrilineal society, with economic, political and social decision making power residing with the male population. The district has a sharply skewed ratio of 852 females per 1000 males, which could be resultant from the preference of a male child over a female child, prevalent in the area. However, there is considerable improvement in the sex ratio from the past decade; while the adult sex ratio has improved from 821 in 2001 to 852 in 2011, the child sex ratio (0-6 years) has improved from 869 in 2001 to 874 in 2011.

Figure 6.19 Comparison of Adult and Child Sex Ratios across AoI, Tehsil and District

Source: Census of India, 2011

Within the AoI, Serawa registers the highest sex ratio, when compared to the tehsil, district and other villages, with an adult sex ratio of 942 and a positive child sex ratio of 1113 girls per 1000 boys.

Box 6.2 Case Study on Gender Dynamics

The National Commission for Protection of Child Rights (NCPCR) received several complaints of female infanticide/foeticide from Jaisalmer District. In 2011, the Commission was sent to investigate the deaths of baby girls occurred in the year. The Commission also rescued nine children, the youngest being 3 years old, working in the mines in Pithola GP in Jaisalmer District. NCPCR took up several issues with the District administration, in particular the high prevalence of child marriage; stigma and discrimination against children infected and affected by HIV and AIDS, inadequate ICDS services, out of school children and female foeticide.

Source: http://www.ncpcr.gov.in/view_file.php?fid=120

Women continue to be rooted in traditional norms of social behaviour which include *Purdaah* system, early marriages and child marriage, minimal participation in household or economic decision making, lesser economic freedom and limited opportunity to socialize with other females in the village. The market relations, trade or sale aspects are mostly managed by the male members of the family. It was brought to light during social consultations that none of the villages in the AoI had any formal women's groups.

The productive roles of women however vary across caste and religious groups in the AoI. The women of Rajput families are generally confined to their houses and carry out household chores like cooking, animal husbandry (does not include grazing) and working on their own agricultural fields, at the most. However, the women belonging to the lower social strata take up jobs as construction and agricultural labourers in nearby areas, driven by their weak economic status. It was reported during community consultations, that

women are paid lesser wages than their male counterparts for the same nature, amount and duration of work. The common reason reported for the disparity was the perceived lesser efficiency of women by the contractors.

The Rajputs are a part of the affluent group with larger land-holding, while the SC population is among the poor/backward groups with relatively low landholdings. Thus, driven by the weaker economic status, the SC women take up work as labourers, in addition to household responsibilities, while the Rajput women take care of the household chores only.

Land use pattern

Land resources, whether private or common are an extremely important asset for rural communities, especially so in the resource scarce desert regions. At the village level, it is the land resources which provides for the fulfilment of the needs/demands of fuel wood, and fodder for livestock and other everyday resources.

A significant proportion of land area, nearly 70% at the District level is categorized as culturable waste land [(1)] and only about 20% is categorized as the net sown area. The AoI also has similar attributes as the district in terms of culturable waste land being nearly 74%, but the net sown area is quite lower, at 2.5%.

Figure 6.20 Land Use in the vicinity of the WTGs

Source: ERM Site Visit, July 2015

Due to the low productivity of land in the area, sandy soil and scarcity of rainfall/irrigation, the local community undertakes opportunistic cultivation on the government land surrounding the villages in case of good rainfall (which happens approx. every 4-5 years). This cultivation is mostly of food grains in the monsoon season (Kharif), used for self-consumption of the cultivators and is heavily dependent upon the level of rainfall. As it is government land, with no recognized private rights the cultivators are recognized as encroachers and penalised for usage of the same by the

[1] The culturable waste land denotes land available for cultivation but not taken up and includes permanent pastures and other grazing land and land under miscellaneous trees, crops and groves.

government, however are allowed to complete the crop cycle. While the community considers this as claim over the land, it is not recognized by the state law. Also, across monsoon cycles, the cultivators are known to shift locations, thereby not being associated with any particular piece of land.

Figure 6.21 Squatting on Government Land

Source: ERM Site Visit, July 2015

The villagers have been allocated lands by the Government, but at a distance of 20-30 km from their village, and the distance makes it a little cumbersome for the people to cultivate the land. Thus, the local community reported a number of individuals cultivating wasteland. For this purpose, the individuals either mark a boundary or plough the area they wish to cultivate, this is understood to be an acceptable form of staking a claim on the land for agricultural purposes, though not legal nonetheless.

Literacy Profile

The villages in the AoI exhibit relatively higher literacy rates (for males and females both), compared to the Tehsil and the District level literacy rates (***Figure 6.22***). The sex ratio is also higher in the villages compared to tehsil and district average, probably driven by the proximity of the villages to the biggest city of Jaisalmer.

Figure 6.22 Comparative Overview of the Literacy Rate across AoI villages, Tehsil and District Level

Source: PCA, 2011

The literacy rate observed in the state for the population above 7 years (57.2%) is much lower than that reported at the national level (72.99%). The male literacy rate in the district is very high (72%), compared to the female literacy rate (39.7%), which reflects the state of exposure and awareness of women.

There is also a marked difference in the rural and urban literacy, with 53.8% rural literacy and 78.02% urban literacy.

It was highlighted during social consultations that the girls in the AoI start dropping out of schools after 5th class. The primary reasons behind the practice are child marriages, absence of all-girls schools in and around the villages and absence of female teachers in the schools. The consultations point towards a relatively better scenario in Serawa, where some girls attend schools till 12th class and the primary reason for the attitudinal shift is the availability of an all-girls hostel in the school which is around 7 km from the village.

The social consultations in villages revealed that the boys attain education till 12th class, but only few go for higher education (university and above), as the facilities are situated away from the village. However, there is a growing inclination towards literacy and skill based trainings such as ITI courses (Industrial Training Institutes), fuelled by the prospective job opportunities with Wind Power projects mushrooming in nearby areas.

Livelihood Profile

The AoI has 34% working population, out of which majority of the population is classified as "main workers", i.e., they are employed for more than six months in a year. The Work Participation Ratio is the highest in Mokal, compared to other villages or the tehsil, at large. Serawa village does not have any marginal working population, according to Census data, 2011.

Table 6.19 Proportion and break-up of working population in the AoI

Description	Habur	Mokal	Serawa	AoI	Jaisalmer Tehsil
WPR	29	46	27	34	42
Main Workers % to total workers	50	46	100	65.3	70
Marginal workers % to total workers	50	54	0	34.6	30
Non-workers % to total Population	71	54	73	66	58

Source: PCA, 2011

The area has witnessed economic activity in the form of wind projects coming up over a period of almost 4 years. The livelihood profile of the villages in the AoI vary based on the proximity of wind power projects as the presence of wind projects has resulted in a shift from complete dependence on agriculture to partial dependence to farm and non-farm based activities. Some of the key economic opportunities resultant from the Wind Energy projects in the area comprise of locals securing jobs as security guards and people providing their vehicles for use in the project.

Figure 6.23 Distribution of Main Working Population in the AoI

Source: Census Data, 2011
Note: the category 'Other workers' is comprised of workers not included in the categories of Cultivators, agricultural labourers and household industry. This category includes groups such as private or government service, business, construction labour etc. this group has been identified in this baseline under non-farm based activity

Figure 6.24 Distribution of Marginal Working Population in the AoI

Source: Census Data, 2011

The following categories comprise the main occupational activities within the AoI:

- Farm Based Activities (cultivators, agricultural labourers and livestock rearing);
- Non-farm based activities (contractual labour for construction)

Farm Based Livelihoods

As can be seen from the ***Figure 6.23***, approximately 31% of the main working population in the AoI is dependent upon farm based activities for their livelihood, in spite of the fact that the agriculture is totally rain-fed. The farm based activities comprise of agriculture, agricultural labour and livestock rearing.

The primary crops in the region comprise of pearl millet, cluster bean (guar) and moth bean (moong) amongst Kharif crops and gram, mustard and isabgol being the Rabi crops. In addition, the people also cultivate sesame and groundnut in some parts of the AoI, as suggested from the social consultations. The dependence on monsoons for agriculture is high and is resultant from the lack of irrigation canals in the region, low water retention of the soil, hard quality and greater depth of ground water (500-600 feet). However, it is reported the soil is naturally fertile and in the presence of adequate rain, no fertilizers or pesticides are required for a good yield.

Figure 6.25 Major Kharif Crops in Jaisalmer district

Source: Agricultural Contingency Plan, 2012, Jaisalmer District

Among the major Kharif crops, the productivity of Moth bean is the highest, while its production is lower than other Kharif crops. In Rabi crops, the production and productivity of mustard is relatively higher than that of gram and Isabgol.

Figure 6.26 Major Rabi Crops in Jaisalmer district

Source: Agricultural Contingency Plan, 2012, Jaisalmer District

After harvest, a small part of the Rabi crops produce is retained by the farmer for household consumption and the majority is sold, whereas the Kharif crops are mainly for self-consumption purpose, in particular bajra (millet). Bajra forms the key component of diet in this area and hence maintaining stocks for self-consumption purpose is critical.

As reported in the Agricultural Contingency Plan (2012) of Jaisalmer District, the region is prone to several contingencies, of which droughts are frequent whereas the infrequent ones are heat wave, cold wave, frost, windstorm and pests and disease outbreak.

Apart from agriculture, livestock holdings play an important part in the livelihoods of the community, in terms of providing extra income in addition to meeting the nutritional intake of the household. The main livestock holdings in the area comprise of Cows, Goats, Sheep and Camel. A large number of households are reported to be involved into sale of livestock (mostly sheep and goats), which generally happens within the village as traders keep visiting the villages regularly. While there are no reported household maintaining livestock holdings for sale of milk for commercial purposes, sale of livestock forms a significant source of their income. The general rates for a sheep or goat ranges between Rs. 3,000 to 4,500 depending on the age and health of the animal.

Figure 6.27 Livestock Holdings in the villages

Source: ERM Site Visit, July 2015

The community consultations also revealed that one prominent reason leading to sale of cattle is the limited availability of fodder during dry months (December to May) and reducing time with the increasing trend of taking up jobs as labourers, by the villagers.

Non-Farm Based Livelihoods

As can be seen in the ***Figure 6.23*** and ***Figure 6.24***, the non-farm based livelihoods comprise of approximately 66% of the main working population and nearly 26% of the marginal worker population in the AoI. The non-farm based livelihoods in the area primarily comprise of casual labour in construction sites of houses in nearby villages and Jaisalmer. The influx of Wind Power plants in the area is also providing employment opportunities to people as local labour is being employed for construction of access roads and as security guards for WTGs. These livelihood sources are used to support the livelihood from agricultural activities in the area, and are fully dependent upon only in situations of low agricultural productivity (due to low rainfall).

6.6.7 Social and Physical Infrastructure

Water Supply and Sanitation

The AoI is characterised by poor sanitation facilities with open drains, nurturing flies and mosquitos, which increases the risk of diseases amongst people. The status of water availability also varies across the three villages.

Habur has a well-established network of water resources, with bore wells, uncovered wells, hand pumps and water tanks serving the village population. The water is reported to be of a hard quality, but the people have grown accustomed to it. Wells and ponds are present in and around the village and the people have started constructing water tanks in their houses in order to store rain water as well as water from Tankers.

Figure 6.28 Water Tanks in Households

Source: ERM Site Visit, July 2015

Serawa and Mokal villages however have severe crunch of fresh water resources as there is no bore well in the villages and the people have to fetch water from bore-wells in nearby villages and ponds. The villagers have to call for water tanks and pay an amount ranging from Rs. 300-500 per tank, which lasts for nearly 7-8 days for a family of 5 members.

The community consultations have revealed that toilets complexes are there in only 10% households and their usage is even lesser, as some of the units have become dysfunctional. However, toilets are being constructed in the villages under the Swachh Bharat Mission, and the people seem to be interested in using them after completion of construction.

Education

The AoI is characterised by the presence of co-educational primary schools in all three villages, however, as pointed out during community consultations, there is a dire need of all-girls schools to boost education of girls in the area.

According to Census of India, Primary Schools provide education from class 1st to 5th, Middle Schools cater to children studying from classes 6th to 8th, Secondary School provides education to students of classes 9th and 10th and similarly, senior secondary school teaches children studying in classes 11th and 12th. One interesting fact here is that, a composite school with classes 1st to 12th, will be treated as four separate units and will be counted separately as a Primary, Middle, Secondary and Senior Secondary school. [1]

There are no Government Pre-primary schools in the AoI, nor was the need of Pre-primary schools, cited during community consultations. Habur has 2 Government Middle schools and 1 Government Senior Secondary school, however, as pointed out earlier, the girls do not go beyond primary education in most cases.

[1] http://www.censusindia.gov.in/2011census/dchb/DCHB%202011-Concepts%20&%20Definitions%20Village%20and%20Town%20Directory.pdf

Table 6.20 Availability of Schools in the AoI

Village Name	Government Pre-Primary school (PP)	Government Primary school (P)	Government Middle school (M)	Government Secondary School (S)	Government Senior Secondary school (SS)
Habur	0	2	2	1	1
Mokal	0	1	0	0	0
Serawa	0	1	0	0	0

Source, Census Data, 2011

Both Mokal and Serawa have primary schools, but the consultations have revealed that there is a need of secondary and senior secondary schools in the villages. The cost, time and distance involved in commuting to schools also leads to a lot of students dropping out of schools. Thus, attending schools becomes difficult for some children, beyond 5th class in Mokal and Serawa and higher education is a viable proposition only for the affluent class.

The access to electricity in the area is reported to be good, except in Mokal, where there are frequent power cuts, as reported during community consultation. One challenge in smooth electricity supply in the region, as brought up during consultations, is the fact that transmission lines are old and register frequent faults. In Serawa and Habur, people seemed quite satisfied with the status of electricity and reported that the power outages occurred rarely, that too in case of faults.

Health Facilities and Health Seeking Behaviour

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

It is reported that all the three villages in the AoI have access to the medical facilities at Sub Health Centres, and Habur has a PHC. The people generally suffer from Common fever, Joint pains, Chicken Pox, Malaria, Jaundice and Typhoid and the people travel to the city of Jaisalmer in case of serious ailments. There is a provision for ambulance in case of deliveries; however, people have to arrange for vehicles on their own in case of other illnesses.

Markets and Banks

The people of the AoI villages are frequent visitors of Jaisalmer city and are well connected to banks, with most of them having bank accounts. In terms of

buying provision for daily purposes, the shops in 3-4 km radius of the villages serve the purpose, however, for trading purposes, one of the main markets is Jaisalmer The trend of lending money to peers and villagers is not very prominent in the villages and people seek financial help from the banks.

7 IMPACT ASSESSMENT

7.1 INTRODUCTION

This section assesses the manner in which the Project will interact with elements of the physical, ecological or social environment to produce impacts to resources/ receptors. It has been organized as per the various phases of the project life cycle to understand the risks and impacts associated with each phase.

7.2 SCOPE OF THE ASSESSMENT

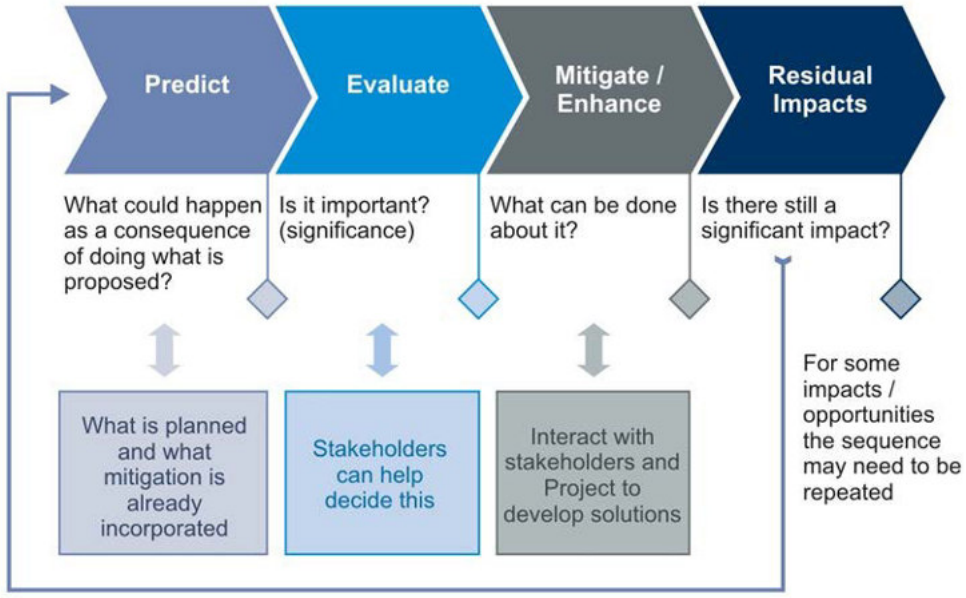
The scope of the assessment captures the understanding on the envisaged risks and impacts assessed during the scoping exercise of this impact assessment study as well as the risks identified during subsequent physical baseline assessment and impact evaluation process. The key environmental and social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

7.3 ASSESSMENT METHODOLOGY

Impact identification and assessment starts with scoping and continues through the remainder of the IA Process. The principal IA steps are summarized in ***Figure 7.1*** and comprises of

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

Figure 7.1 Impact Assessment Process



Prediction of Impacts

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

Evaluation of Impacts

Each impact was described in terms of its various relevant characteristics (e.g., type, scale, duration, frequency, extent). The terminology used to describe impact characteristics is shown in ***Table 7.1.***

Table 7.1 Impact Characteristic Terminology

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

Characteristic	Definition	Designations
Frequency	A measure of the constancy or periodicity of the impact.	[no fixed designations; intended to be a numerical value or a qualitative description]

The definitions for the *type* designations are given in ***Table 7.2.*** Definitions for the other designations are resource/receptor-specific.

Table 7.2 Impact Type Definitions

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

The above characteristics and definitions apply to planned and unplanned events. An additional characteristic that pertains only to unplanned events is likelihood. The likelihood of an unplanned event occurring was designated using a qualitative scale, as described in ***Table 7.3.***

Table 7.3 Definitions for Likelihood Designations

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

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

- Extent
- Duration
- Scale
- Frequency

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

- Positive

- Negligible
- Small
- Medium
- Large

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

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

- Low
- Medium
- High

Once magnitude of impact and sensitivity/ vulnerability/ importance of resource/ receptor have been characterised, the significance was assigned for each impact. Impact significance is designated using the matrix shown in ***Figure 7.2.***

Figure 7.2 Impact Significance

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

The matrix applies universally to all resources/receptors, and all impacts to these resources/receptors, as the resource/receptor-specific considerations are factored into the assignment of magnitude and sensitivity/ vulnerability/ importance designations that enter into the matrix. ***Box 7.1*** provides a context of what the various impact significance ratings imply.

Box 7.1 Context of Impact Significances

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

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

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

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

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

Identification of Mitigation and Enhancement Measures

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

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

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

Management and Monitoring

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

7.4 KEY POTENTIAL RISKS

Based on the Potential Interactions Matrix for Project activities and likely impacted resources/ receptors for construction phase of the proposed project as shown in ***Table 5.2*** following areas of impacts have been identified: The identified interactions that are likely to result in significant impacts has been shown in ***Table 5.3*** has been discussed in detail in this chapter and the scoped out interactions as shown in ***Table 5.4*** has been left out with the justifications provided there in or discussed very briefly.

7.4.1 *Key environmental risks*

- Change in Land use
- Impacts on Land and Soil Environment;
- Impact on Water resources and quality;
- Ambient Air Quality;
- Ambient Noise Level;

7.4.2 *Impact on Ecology;*

- Impact on habitat of herpetofaunal species, resident avifaunal species and mammals;
- Construction activity leading to habitat disturbance for Indian Gazelle;
- Laying of approach roads leading to road kills of Herpetofauna
- Mortality of Avifaunal and bat species due to collision risk

7.4.3 *Key Social risk*

- Occupational health and safety of workers;
- Community health and safety impacts; and
- Potential impact on labour working conditions;

Drawing on the outcomes of scoping, the following *Sections 7.5* to *7.7* present the detailed assessment of the key potential environmental and social impacts associated with the seismic survey.

7.5 KEY ENVIRONMENTAL RISKS

7.5.1 *Change in Land Use*

For the purpose of assessment of impacts on land use of the area, the following Project activities leading to alteration in land use of the area during the Project life cycle were considered:

- Construction of temporary structures such as construction site office, store yard, batching plant;
- Construction/ upgradation of access roads;

- Vehicular movement for transportation of WTG components and construction materials;
- Movement of construction equipment like cranes, excavators, dumpers, trucks; and
- Erection of WTGs and associated transformer yard and permanent site office.

Criteria

For the assessment of land use, the sensitivity and magnitude criteria outlined in ***Table 7.4*** and ***Table 7.5*** have been used respectively.

Table 7.4 Sensitivity Assessment Criteria for Land Use

Land Use Sensitivity	Criteria
Low	The Project footprint is present in wasteland with no human settlement
Medium	The Project is present in agricultural land or combination of agricultural land and wasteland or residential land.
High	The Project is present in any forest land, or national park or of national Importance covered by international and/or national designation.

Table 7.5 Criteria for Impact Magnitude for Assessment of Impact to Land Use

Magnitude	Criteria
Negligible	An imperceptible, barely or rarely perceptible change in landuse characteristics. The change may be short term.
Small	A subtle change in landuse character over a wide area of a more noticeable change either over a restricted area or infrequently perceived. The change may be short term.
Medium	A noticeable change in landuse character, frequently perceived or continuous and over a wide area; or a clearly evident change over a restricted area that may be infrequently perceived. The change may be medium to long term and may not be reversible.
Large	A clearly evident, frequently perceived and continuous change in landuse characteristics affecting an extensive area. The change may be long term and would not be reversible.

Context

Currently, the entire Project area is primarily used for grazing purposes with some land patches being utilized for agriculture. WTGs near Mokal village on the south-eastern edge of the proposed project namely NDH 47 to NDH 53, had some agricultural activities (Though as reported by site representative, the land was revenue land and any improvement on the land observed, was primarily an encroachment). The agriculture in this part is heavily rain dependent and there is only one cropping season in the year.

The project would result in change of the land use where the WTGs, substation and internal roads are proposed. One hectare of land will be required per WTG and further land would be required for internal access and installation of transmission towers. Additional land will be required for labor

camp, storage yards, batching plants, site office that would temporarily alter the land use.

The project activities which may alter the land use of the area during the project life cycle for over a period of time are given below:

Table 7.6 Periodic alteration of land use

SN.	Activity	Duration
1	Siting of site office, labor camp, batching plant, storage yard	Temporary (10-11 months)
2	Access road construction/strengthening and its consequent usage	Permanent
4	WTG erection, PSS, transmission towers with transmission lines	Permanent

The land use change will be primarily for the batching plant, site office and labour camps. The sub-station complex is built near NDH 20 and NDH 21 and the land there has no agricultural activity and very little grazing. Further, the construction of internal transmission lines is expected to create disturbance for agricultural activity for a short amount of time. The diversion of land for erection of WTGs will lead to a permanent change in land use as the procured land will be utilised for safety and security of the WTGs during the operation stage. Agricultural areas are avoided for siting of temporary facilities such as labor camp and batching plant.

As the land procurement and planning of construction is executed prior to construction activity, the amount of land where land use pattern will be affected is known beforehand. As a result impact assessment of land use change has not been carried out for the entire Project life cycle and has not been performed separately for construction and operation phases.

Embedded/ in-built control

The impacts during the construction activity will be short term and the construction of the Project will be executed in a phased manner (approximately 10 -12 months). Additionally, the EPC contractors will be instructed to avoid any unnecessary disturbance to nearby surrounding features or land parcels. Further, construction activities ad land disturbance will be restricted to the footprint of the Project components and remaining area to be kept undisturbed to the extent possible. After completion of the construction work, areas utilised for labour camp and batching plant will be restored to their original form.

Significance of Impact

As the main land use of the Project Area as per the land use map presented in Section 7.4.1 is mainly sandy area and sparse scrub, the land resource sensitivity is low. As a result, the impact significance is assessed to be **minor.**

Additional Mitigation Measures

The following mitigation measures will be implemented to minimize potential impacts on land use:

- Construction activities should be restricted to designated area.
- Waste should not be allowed to litter in and around the project area
- On completion of construction activities, land used for temporary facilities will be restored to the extent possible.
- The land use in and around the permanent project facilities will not be disturbed.

Residual impact Assessment

The evaluation of significance is done for the activities that can have an impact on land use that can be identified at planning stage and consequently adequate mitigation measures can be adopted. The impact on land use is majorly envisaged during construction stage.

Table 7.7 Impact on land use as a result of the Project

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

Significance of Residual Impact

The residual impact is expected vary from **negligible to minor** post implementation of mitigation measures.

7.5.2 Impacts on Land and Soil Environment

For the impact assessment, following phases of the project cycle were considered for potential impacts on soil and land capability. The phase wise project activities are listed below that may result in land and soil impacts:

Construction phase:

- Establishment of access roads;
- Selective clearing of vegetation in areas designated for WTG erection and other surface infrastructure;
- Stripping and stockpiling of soil layers;
- Digging for WTG foundations and electrical poles;
- Storage of materials as well as transport of construction material; and
- General building/construction activities.

Operational phase:

- Monitoring of WTG operations;
- Routine maintenance activities at WTG locations;
- Storage of oil and lubricants onsite.

Decommissioning:

- Removal of WTGs;
- Removal of infrastructure from soil surfaces; and
- Increased traffic on roads to transport dismantled WTG components and waste materials.

Soil Quality Criteria

For the assessment of soil quality, the sensitivity and magnitude criteria outlined in ***Table 7.8*** and ***Table 7.9*** respectively have been used.

Table 7.8: Sensitivity Assessment Criteria for Soil quality (compaction, erosion and contamination)

Sensitivity Criteria	**Contributing Criteria**	
	Environment	*Social*
Soil Quality related criteria as compaction, erosion and contamination	The extent to which the soil and quality plays an ecosystem role in terms of supporting biodiversity. This includes its role as in supporting a lifecycle stage	The extent to which the soil a quality provides a use (agricultural use, fishing) to the local communities and businesses, or is important in terms of national resource protection objectives, targets and legislation
Low	• The soil quality does not support diverse habitat or populations and/or supports habitat or population of low quality.	• The soil quality has little or no role in provisioning of services as agricultural uses for the local community.
Medium	• The soil quality supports diverse habitat or population of flora and fauna and supports habitats commonly available in the Project AoI.	• The soil has local importance in terms of provisioning services as agricultural services but there is ample capacity and / or adequate opportunity for alternative sources of comparable quality ie ready

		availability across the AoI.
High	• The soil quality supports economically important or biologically unique species or provides essential habitat for such species.	• The soil is wholly relied upon locally, with no suitable technically or economically feasible alternatives, or is important at a regional level for provisioning services.

Table 7.9 Criteria for Impact Magnitude for Assessment of Impact to Soil

Magnitude Criteria	Negligible	Small	medium	Large
Soil compaction, erosion and contamination	• Qualitative-No perceptible or readily measurable change from baseline conditions • Scale-Localized area as Particular activity areas • Time-Short duration (few days) or one time as temporary	• Perceptible change from baseline conditions but likely to easily revert back to earlier stage with mitigation • Scale- -Project site, activity areas and immediate vicinity not impacting any sensitive receptor • Short term-Only during particular activities or phase of the project lifecycle as civil works or construction phase (few months)	• Clearly evident (e.g. perceptible and readily measurable) change from baseline conditions and/or likely take time to revert back to earlier stage with mitigation • Scale- Project site, activity areas and immediate vicinity impacting sensitive receptor/s • Long term-Spread across several phases of the project lifecycle (few years)	• Major (e.g. order of magnitude) change in comparison to baseline conditions and/or likely difficult or may not to revert back to earlier stage with mitigation • Scale- Regional or international; • Permanent change

Table 7.10 Impacts on land and soil environment during the project life cycle

SN.	Impact	Project stage at which the impact may occur		
		Construction	Operation and maintenance	Decommissioning
1	Soil Erosion	Yes	No	No
2	Soil Compaction	Yes	No	Yes
3	Impact on Land due Improper waste disposal	Yes	Yes	Yes
4	Soil contamination due to Leaks/spills	Yes	Yes	No

The impacts which are likely to occur during different stages of the project and create effects on the land and soil environment of the project area (coloured green) are mentioned next.

Construction Phase

Soil Erosion

Context

During the construction phase, top soil will be susceptible to erosion to some extent due to site clearance activities. The scale of site clearance activities would be small at WTG footprints at different parcel of lands, whereas in areas of new internal road construction, excavated loose soil would be susceptible to erosion. The removal of stabilized top soil would result in slope destabilization and increased soil erosion.

As the project is located in dry sandy land and during the visit the surface water bodies were observed to be dry, which, reportedly is the case during most of the year due to scanty rainfall, indirect impacts of soil erosion on waterways are not expected; though it would contribute to the higher levels of particulate matter in ambient air quality.

Embedded/in-built control

- Using existing roads to access the site to the extent possible;
- Construction materials and wastes will be stored in designated areas. Stripping of topsoil shall not be conducted earlier than required; (vegetation cover will be maintained for as long as possible) in order to prevent the erosion (wind and water) of soil;
- Topography shall be restored to the extent possible and re-vegetated to prevent soil erosion to the extent possible;

Significance of Impact

Based on the above the impact after incorporating the embedded control the impact significance is considered to be **negligible.**

Additional Mitigation Measures

As the embedded controls are sufficient to address the effects of the impact, no mitigation measures are deemed essential.

Table 7.11 Soil Erosion during construction phase

Impact	Soil erosion				
Impact Nature	Negative	Positive	Neutral		
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Limited to Project area (specifically construction areas)				
Frequency	As per the construction schedule				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource /Receptor Sensitivity	Low	Medium	High		
Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **negligible.**				

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

Significance of Residual Impacts

The significance of residual impacts will be **negligible**.

Soil Compaction

Context

The project will undertake the soil compaction activity to ensure soil stability during the establishment of storage areas for WTG components, access road, installation of batching plant, establishment of substation, CMS building etc. During construction activities, there would be compaction of soil in the project area during movement of vehicles/ construction machinery and work force movement. In addition, laying of electrical wires in the agricultural field during erection of internal and external transmission lines will also lead to the compaction of agricultural soil to certain extent.

The soil compaction would lead to impact the soil physical properties such as reduction in pore spaces, water infiltration rate and soil strength etc. However it should be noted that soil in this area (only in flat area) is used for agriculture and that is a secondary occupation.

Embedded/in-built control

The routes for movement of heavy machinery shall be designated to avoid the soil compaction in other areas;

Significance of Impact

Based on the above the impact after incorporating the embedded control the impact significance is considered to be **negligible.**

Additional Mitigation Measures

As the embedded controls are sufficient to address the effects of the impact, no mitigation measures are deemed essential.

Table 7.12 Soil Compaction during construction phase

Impact	Soil compaction			
Impact Nature	Negative	Positive	Neutral	
Impact Type	Direct	Indirect	Induced	
Impact Duration	Temporary	Short-term	Long-term	Permanent
Impact Extent	Local	Regional	International	

Impact Scale	Limited to Project area (specifically construction areas)				
Frequency	As per the construction schedule				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource /Receptor Sensitivity	Low	Medium	High		
Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **negligible.**				
Residual Impact Magnitude	Positive	Negligible	Small	Medium	Large
Residual Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **negligible.**				

Significance of Residual Impacts

The significance of impact will be **negligible**.

Impact on land due to improper waste disposal

Context

General construction waste generated onsite will comprise of surplus or off-specification materials such as concrete, wooden pallets, steel cuttings/filings, packaging paper or plastic, wood, metals etc. Municipal domestic wastes consisting of food waste, plastic, glass, aluminium cans and waste paper will also be generated by the construction workforce at any canteen facility/ rest area which shall be constructed for them. A small proportion of the waste generated during construction phase will be hazardous and may include used oil, hydraulic fluids, waste fuel, grease and waste oil containing rags. If improperly managed, solid waste could create impacts on land.

Embedded/in-built control

- The construction contractors will have control over the amount and types of waste (hazardous and non- hazardous) produced at the site. Workers will be strictly instructed about random disposal of any waste generated from the construction activity;
- Construction contractor should ensure that no unauthorized dumping of used oil and other hazardous wastes is undertaken from the site;

Significance of Impact

Based on the above the impact after incorporating the embedded control the impact significance is considered to be **minor.**

Additional Mitigation Measures

- Municipal domestic waste generated at site to be segregated onsite;

- Ensure hazardous waste containers are properly labelled and stored onsite provided with impervious surface, shed and secondary containment system;
- Ensure routinely disposal of hazardous waste through approved vendors and records are properly documented; and
- Disposal of hazardous wastes will be done strictly as per the conditions of authorisation granted by RSPCB.
- Construction contractor should ensure daily collection and periodic (weekly) disposal of construction waste generated debris, concrete, metal cuttings wastes, waste/used oil etc.;
- Ensure hazardous waste is properly labelled, stored onsite at a location provided with impervious surface, shed and secondary containment system as per in accordance to Hazardous Wastes Rules, 2008
- The municipal waste from the labour camp will only be routed through proper collection and handover to local municipal body for further disposal. The hazardous wastes will be temporarily stored in labelled drums on impervious surface at designated area onsite and will be disposed of through approved vendors in accordance to Hazardous Wastes Rules, 2008. The nearest Common Hazardous Waste transfer Station and Disposal Facility (CHWTSDF) is located at Balotra (Kher Village) in Barmer District of Rajasthan.

Table 7.13 Impact on land due to Improper waste disposal during construction phase

Impact	Improper waste disposal (hazardous and non-hazardous)				
Impact Nature	Negative	Positive	Neutral		
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Limited to Project area (specifically construction areas, labour camp, batching plant)				
Frequency	As per the construction schedule				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource /Receptor Sensitivity	Low	Medium	High		
Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **minor.**				
Residual Impact Magnitude	Positive	Negligible	Small	Medium	Large
Residual Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **negligible.**				

Significance of Residual Impacts

The significance of impact will be reduced to **negligible** on implementation of mitigation measures.

Soil Contamination due to Leaks/Spills

Context

Diesel storage will be provided at batching plant onsite during construction phase. Other materials such as oil, paints and solvents will be stored in drums in storage area having impervious floors.

Soil contamination during the construction phase may result from leaks and spills of oil, lubricants, or fuel from heavy equipment, improper handling of chemical/fuel storage and wastewater. Such spills could have a long-term impact on soil quality, but are expected to be localised in nature.

Embedded/in-built control

- Spill control measures such as the storage and handling of chemicals and fuel in concrete areas with secondary containment will be implemented to minimize impacts in the event of a spill.

Significance of Impact

- Based on the above the impact after incorporating the embedded control the impact significance is considered to be **minor.**

Additional Mitigation Measures

- Use of spill control kits to contain and clean small spills and leaks.
- The sewage generated onsite will be treated and disposed through septic tanks and soak pits as per specifications given in IS 2470: 1995 (Part I and II).
- Transport vehicles and equipment should undergo regular maintenance to avoid any oil leakages; and
- Any unloading and loading protocols should be prepared for diesel, oil and used oil respectively and workers trained to prevent/contain spills and leaks.

Table 7.14 Soil contamination due to Leaks/spills during construction phase

Impact	Leaks/Spills				
Impact Nature	Negative	Positive	Neutral		
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Limited to Project area (specifically construction area footprint, batching plant)				
Frequency	Cannot be precisely determined				
Likelihood	Unlikely				
Impact Magnitude	Positive	Negligible	Small	Medium	Large

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

Significance of Residual Impacts

The significance of impact will be reduced to **negligible** on implementation of mitigation measures.

Operation phase

The operational phase of the project will have limited impacts on soil in form of waste generation and soil contamination due to accidental spillages/ leakages.

Impact on land due to Improper waste disposal

Context

During operation phase, the waste generated from project will include domestic solid waste at SCADA building, Central Monitoring Station (CMS) and substation and hazardous waste like waste oil and lubricants and oil containing jutes and rags will be generated during maintenance activities. The quantity of hazardous waste generated will be much lesser quantity than during the construction stage.

Embedded/in-built control

The waste generated will be disposed of through approved vendors in accordance with *Hazardous Waste Rules, 2008*. The hazardous wastes will be stored onsite at separate designated covered area provided with impervious flooring and sent for disposal to nearest CHWTSDF located at Balotra (Kher Village) in Barmer District of Rajasthan. During operation phase, the quantity of municipal waste and hazardous waste generated is less and probability of the hazardous waste generation is only during WTG maintenance and therefore occasional. The waste generated would be routed through proper collection and containment.

Significance of Impact

- Based on the above the impact after incorporating the embedded control the impact significance is considered to be **negligible.**

Additional Mitigation measures

As the embedded controls are sufficient to address the impact no mitigation measures are deemed necessary.

Residual Impact Assessment

Table 7.15 Improper waste disposal during operation phase

Impact	Improper waste disposal (hazardous and non-hazardous)				
Impact Nature	Negative	Positive	Neutral		
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Limited to Project footprint area				
Frequency	Operation phase				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource /Receptor Sensitivity	Low	Medium	High		
Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **negligible.**				
Residual Impact Magnitude	Positive	Negligible	Small	Medium	Large
Residual Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **negligible.**				

Significance of Residual Impacts

The significance of residual impacts will be **negligible**.

<u>Soil Contamination due to Leaks/Spills</u>

Context

There are chances of spillage of oil during maintenance work such as lubricating oils from gearbox systems, hydraulic systems of the turbine etc. The accidental spillages at oil/lubricants and hazardous waste storage areas may cause contamination of soil and ground water.

Embedded/in-built control

- Ensure oil/ lubricants are stored on impervious floor in the storage area having secondary containment;
- Use of spill control kits to contain and clean small spills and leaks during O&M activities; and
- The guidelines and procedures shall be prepared and followed for immediate clean-up actions following any spillages.

The probability of the impact is only during WTG maintenance and therefore occasional. In case of accidental spillage, the impacts will be confined to the WTG land parcels and storage area.

Significance of Impact

- Based on the above the impact after incorporating the embedded control the impact significance is considered to be **negligible.**

Additional Mitigation measures

As the embedded controls are sufficient to address the impacts additional mitigations measures are not deemed necessary.

Residual Impact significance

Table 7.16 Leaks/Spills during operation phase

Impact	Leaks/Spills				
Impact Nature	Negative	Positive	Neutral		
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Limited to WTG locations, sub-station and storage yard				
Frequency	Cannot be precisely determined				
Likelihood	Unlikely				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource /Receptor Sensitivity	Low	Medium	High		
Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **negligible.**				
Residual Impact Magnitude	Positive	Negligible	Small	Medium	Large
Residual Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **negligible.**				

The significance of impact will be **negligible**.

Decommissioning Phase

The decommissioning activities will cause following impacts on soil:

- Soil compaction due to the increased vehicular and workforce movement, dismantling and storage of WTG components on the adjacent land, removal of internal electric lines/ poles etc.
- Waste will be generated in form of dismantled WTG components and demolition debris from WTG foundations, storage yard and substation

complex. Electric components such as transformers, insulators, wires will be generated. The waste will be mainly of inert nature;
- The possibility of soil contamination during decommissioning phase is very less though may occur due to leakage from machinery and transportation vehicles and during collection of remaining oil/ lubricants in the WTGs.

Embedded/in-built control

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

Impact Significance

The overall significance of impacts on soil environment due to decommissioning activities is assessed as **minor.**

Additional Mitigation Measures

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

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

Significance of Residual Impacts

Table 7.17 Impact to Soil and Land environment during decommissioning phase

Impact	Impact on soil and land environment from decommissioning activities				
Impact Nature	Negative	Positive	Neutral		
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Limited to Project area				
Frequency	Decommissioning phase				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource /Receptor Sensitivity	Low	Medium	High		
Impact Significance	Negligible	Minor	Moderate	Major	

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

The significance of impact will vary from **negligible to minor** on implementation of mitigation measures.

7.5.3 *Impact on Water Resources*

The impacts of proposed project on water environment are assessed with respect to following:

- Decreased water availability form the water resources of the area due to consumption of water for carrying out project activities; and
- Decreased water quality due to wastewater release and spills/leaks from project activities.

Criteria

For the assessment of water quality, the sensitivity and magnitude criteria outlined in ***Table 7.18*** and ***Table 7.19*** respectively have been used.

Table 7.18 Sensitivity Assessment Criteria for Water Resources (Surface water and Ground water)

Sensitivity Criteria	Contributing Criteria	
	Environment	*Social*
Water Resources - Surface water and ground water (quality/quantity related criteria)	The extent to which the water resource plays an ecosystem or amenity role in terms of supporting biodiversity either directly or indirectly, particularly with respect to dependent ecosystems.	The extent to which the water resource provides or could provide a use (drinking water, agricultural uses, washing and other domestic or industrial, use as waterways) to the local communities and businesses, or is important in terms of national resource protection objectives, targets and legislation.
Low	The water resource does not support diverse aquatic habitat or populations, or supports aquatic habitat or population that is of low quality.	The water resource has little or no role in terms of provisioning services as agricultural water source, other domestic uses as washing, bathing, industrial use and waterways for the local community. The groundwater resource is not currently abstracted and used in the vicinity of the Project, but is of sufficient quality and yield to be used for that purpose in the future (and there is a reasonable potential for future use).
Medium	The water resource supports diverse populations of flora and / or fauna but available in	The surface water resources have local importance in terms of provisioning services but there is ample capacity and / or adequate opportunity for alternative sources

Sensitivity	Criteria	Contributing Criteria
	the surface water bodies in the region.	of comparable quality. The groundwater resource is an important water supply, and is currently used, but there is capacity and / or adequate opportunity for alternative sources of comparable quality.
High	The water resource supports economically important or biologically unique aquatic species or provides essential habitat for such species	The surface water resources are wholly relied upon locally, with no suitable technically or economically feasible alternatives, or is important at a regional or transboundary watershed level for provisioning services The groundwater resource is wholly relied upon locally, with no suitable technically or economically feasible alternatives, or is important at a regional or national level for water supply or contribution to groundwater dependent ecosystems (e.g. transboundary rivers).

Table 7.19 ***Criteria for Impact Magnitude for Assessment of Impact to Surface and Ground water Resources***

Magnitude Criteria	Negligible	Small	Medium	Large
General Criteria	No perceptible or readily measurable change from baseline conditions.	Perceptible change from baseline conditions but likely to be within applicable norms and standards for mode of use.	Clearly evident (e.g. perceptible and readily measurable) change from baseline conditions and / or likely to approach and even occasionally exceed applicable norms and standards for mode of use.	Major changes in comparison to baseline conditions and / or likely to regularly or continually exceed applicable norms and standards for mode of use.
Water Quantity	There is likely to be negligible (less than 1% of lean season flow) or no consumption of surface water by the Project at any time	The Project will consume surface water, but the amounts abstracted are likely to be relatively small in comparison to the resource available at the time of use (i.e. taking into account seasonal fluctuation)	The Project will consume surface water, and the amounts abstracted are likely to be significant in comparison to the resource available at the time of use (i.e. taking into account seasonal fluctuation)	The Project will consume surface water, and the amounts abstracted are likely to be very significant in comparison to the resource available at the time of use (i.e. taking into account seasonal fluctuation)
	There is likely to be negligible or no abstraction, use of or discharge to the groundwater by the Project at any time.	The Project will consume groundwater or deliver discharge to groundwater, but the amounts abstracted /	The Project will consume groundwater or discharge to groundwater, and the amounts abstracted / discharged are likely	The Project will consume groundwater or discharge to groundwater, and the amounts abstracted /

Magnitude Criteria	Negligible	Small	Medium	Large
		discharged are likely to be relatively small in comparison to the resource available at the time of use (i.e. taking into account seasonal fluctuation).	to be significant in comparison to the resource available at the time of use (i.e. taking into account seasonal fluctuation).	discharged are likely to be very significant in comparison to the resource available at the time of use (i.e. taking into account seasonal fluctuation).
Water Quality	Discharges are expected to be well within statutory limits	Discharges are expected to be within statutory limits	Occasional breach(es) of statutory discharge limits (limited periods) expected	Repeated breaches of statutory discharge limits (over extended periods) expected
	Abstractions from or discharge to aquifer(s) are unlikely to cause water quality issues.	Groundwater quality be within ambient levels or allowable criteria or may exceed for 1-2 parameters which is common occurrence due to geological regime of the area. Abstraction or discharge to aquifer(s) may cause small but local changes in water quality in the aquifer system. These can be considered potential short-term localized effects on groundwater quality which is likely to return to equilibrium conditions within a short (months) timeframe.	Groundwater quality exceeds ambient levels or allowable criteria for key parameters. Abstraction or discharge to aquifer(s) are expected to cause potential localized effects on groundwater quality which are likely to be fairly long lasting and / or give rise to indirect ecological and / or socio-economic impacts.	Groundwater quality exceeds ambient levels or allowable criteria. Abstractions or discharge to aquifer(s) are expected to cause potentially severe effects on groundwater quality which are likely to be long-lasting (e.g. years or permanent) and / or give rise to indirect ecological and / or socio-economic impacts.

Construction Phase

Impact on water availability

Context

Water will be required for civil works during the construction of the foundation for all WTGs estimating 100 m^3 of water for each WTG foundation and about 100 m^3 for pooling substation construction. This water demand will be met through procurement of water tankers sourcing water from Jaisalmer.

There are no natural perennial water bodies in the Project area. There is a small pond maintained by villagers in Mokkal Village through water brought in by tankers, however this was far away from the WTG foot print area.

Embedded/in-built control

- Water tankers should be utilised to fulfil supply required for all purposes, including construction work, use in labour camp and site office and local surface water bodies should not be utilised for these purposes.

Impact Significance

The sensitivity of water resource in the area is considered as medium due to the fact that the project area is generally a dry area with very little rainfall, hardly any surface water bodies and experiences shortage of water. It is categorized as Over Exploited category of CGWB. However, the direct negative impact on water resources due to construction activities will be short term and limited mainly to construction phase of the project. Also the requirement will be in a phased manner and procured mostly from Jaisalmer city or partly from Kushari village. Based on the above the impact is assessed to be **minor**.

Additional Mitigation Measures

Following mitigation measures are proposed for conservation of water resources of the area:

- Construction labour deputed onsite to be sensitised about water conservation and encouraged for optimal use of water;
- Regular inspection for identification of water leakages and preventing wastage of water from water supply tankers.
- Blending of low quality water with fresh water for construction uses.
- Recycling/reusing to the extent possible.

Table 7.20 Decreased water availability

Impact	Impact on water availability			
Impact Nature	Negative	Positive	Neutral	
Impact Type	Direct	Indirect	Induced	
Impact Duration	Temporary	Short-term	Long-term	Permanent
Impact Extent	Local	Regional	International	

Impact Scale	Limited to Project area				
Frequency	Construction phase				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource Sensitivity	Low		Medium		High
Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **moderate.**				
Residual Impact Magnitude	Positive	Negligible	Small	Medium	Large
Residual Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **negligible to minor.**				

Residual Impact Significance

The significance of impact will be **negligible to** minor on implementation of mitigation measures.

Impact on Water Quality

Context

There is a potential for contamination of surface and groundwater resources resulting from improper management of sewage (~ 10 m^3/day) at project site office or other accidental spills/leaks at the storage areas.

Embedded/in-built control

- The provisions of septic tank and soak pits will be provided (as per specifications given in IS 2470 1995 Part I and Part II) onsite for treatment and disposal of sewage, thereby minimizing the impacts of wastewater discharge. Planning of toilets, soak pits and septic tanks, waste collection areas should be away from natural drainage channels;
- Ensure proper cover and stacking of loose construction material at Batching plant site and WTG's site to prevent surface runoff and contamination of receiving water body;
- Use of licensed contractors for management and disposal of waste and sludge;
- Labourers will be given training towards proactive use of designated areas/bins for waste disposal and encouraged for use of toilets. Open defecation and random disposal of sewage will be strictly restricted;
- Spill/ leakage clearance plan to be adopted for immediate cleaning of spills and leakages.

Impact Significance

There are no surface water bodies in vicinity of the foot print area which could be directly impacted from project activities. Groundwater levels are very deep

due to deep aquifers[1] and chances of contamination from project activities is considered low. Based on the above the impact is assessed to be **negligible**.

Additional Mitigation Measures

As the impact is sufficiently addressed by the embedded controls the requirement of additional mitigation measures is not foreseen for this impact.

Residual Impact Significance

Table 7.21 Impact on water quality

Impact	Impact on water quality				
Impact Nature	Negative	Positive	Neutral		
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Limited to Project area				
Frequency	Construction phase				
Likelihood	Possible				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource Sensitivity	Low	Medium	High		
Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **negligible.**				
Residual Impact Magnitude	Positive	Negligible	Small	Medium	Large
Residual Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **negligible.**				

Residual significance of impacts during construction phase will be **negligible**.

Operation Phase

Impact on Water Availability

Context

Around 4 m^3/day water is required during operation phase to meet domestic requirements of O&M staff and for use in the SCADA building and sub-station complex.

[1] http://www.aquiferindia.org/About_AQUIM_Parts_of_Thar_Rajasthan4.aspx show that aquifers are encountered in the depth range of 45 to 70 m and 125 to 160 m. Depth to ground water levels vary from 15 to 110 m.

Embedded/in-built control

- Domestic water demand will be met through tankers and bottled potable water purchased.
- Optimising water usage in the SCADA building and substation area by application of water conservation measures such as sensor based taps, low flush urinals etc.;

Impact Significance

The overall significance of impacts on water availability due to operational activities is assessed as **negligible.**

Additional Mitigation measures

As the impact is sufficiently addressed by the embedded controls additional mitigation measures are not foreseen for this impact.

Residual Impact Significance

Table 7.22 Impact on water availability during operation

Impact	Impact on water availability				
Impact Nature	Negative	Positive	Neutral		
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Limited to site office, sub-station area				
Frequency	Operation phase				
Likelihood	Likely				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource Sensitivity	Low	Medium	High		
Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **negligible.**				
Residual Impact Magnitude	Positive	Negligible	Small	Medium	Large
Residual Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **negligible.**				

The significance of the residual impact will be **negligible**.

<u>Impact on Water Quality</u>

Context

During operation phase, there will be no wastewater generation from the power generation process. Only sewage would be generated from substation

and CMS building and this will also be of negligible quantity. The estimated sewage generation from project site will be less than 2 m^3/day.

Embedded/in-built control

- The drainage and sewerage system will be provided for the collection and treatment of waste water at SCADA building/ CMS and substation areas.
- No wastewater discharge on open land will be practiced.

Impact Significance

The overall significance of impacts on water quality due to operational activities is assessed as **negligible.**

Additional Mitigation Measures

As the impact is sufficiently addressed by the embedded controls the requirement of additional mitigation measures is not foreseen for this impact.

Residual Impact Significance

Table 7.23 Impact on water quality during operation phase

Impact	Decreased water quality				
Impact Nature	Negative	Positive	Neutral		
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Limited to substation and CMS building				
Frequency	Operation phase				
Likelihood	Possible				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource Sensitivity	Low	Medium	High		
Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **negligible.**				
Residual Impact Magnitude	Positive	Negligible	Small	Medium	Large
Residual Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **negligible.**				

The significance of the residual impacts will be **negligible**.

7.5.4 Impact on Air Quality

The impact assessment with respect to air quality of the study area has been undertaken for the project activities described below:

- Construction activities including site preparation, construction of WTG foundation, erection of internal and external transmission line, construction of office building;
- Transportation of WTG components, construction material, construction machinery and personnel;
- Operation of batching plant;
- Operation of DG sets for emergency power backup;
- Operation and maintenance activities during operation phase; and
- Decommissioning activities.

Criteria

For the assessment of air quality, the sensitivity and magnitude criteria outlined in ***Table 7.24*** and ***Table 7.25*** respectively have been used.
The standards considered for assessment of potential impacts to air quality, are covered in ***Annexure B Table 2.7***). The air quality impacts associated with the construction activities have been assessed qualitatively, using professional judgement and based on past experience from similar projects.

Table 7.24 Sensitivity Criteria for Air quality

Sensitivity Criteria	Contributing Criteria	
	Human Receptors	*Ecological Receptors*
Low	Locations where human exposure is transient.[1]	Locally designated sites; and/or areas of specific ecological interest, not subject to statutory protection (for example, as defined by the project ecology team).
Medium	Few Receptors(settlements) within 500 m of project activity area as roads, batching plant, WTG s etc.	Nationally designated sites.
High	Densely populated receptors (settlements) within 500 m of project activity area as roads, batching plant, WTG s etc.	Internationally designated sites.

Table 7.25 Criteria for Impact Magnitude for Assessment of Impact to Air Quality (Construction Phase)

Magnitude Criteria	Negligible	Small	Medium	Large
Air Quality	• Soil type with large grain size (eg sand); and/or No emissions/dust generation due to Project across	• Soil type with large grain size (eg sand); and/or • Limited emissions/dust generations	• Moderately dusty soil type (eg silt); and/or • Dust generation and emissions	• Potentially dusty soil type (eg clay, which will be prone to suspension when dry due to small particle size); and

[1] As per the NAAQS and World Bank/IFC guidelines, there are no standards that apply to short –term exposure, eg one or two hours, but there is still a risk of health impacts, albeit less certain.

Magnitude Criteria	Negligible	Small	Medium	Large
	all phases	for short duration	from Projects for long duration	• Significant process emissions from Project for the entire Project cycle.

Construction Phase

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

- Fugitive dust emissions from site clearing, excavation work, cutting and levelling work at WTG sites and access/ internal roads, stacking of soils, handling of construction material, transportation of material, emission due to movement of vehicles and heavy construction machinery etc.;
- Vehicular emissions due to traffic movement on site and on access roads;
- Particulate emissions from operation of batching plant;
- Exhaust emissions from construction machineries, other heavy equipment like bull dozers, excavators, and compactors;
- Emissions from emergency power diesel generator required during construction activity.

Further the WTGs are spread across a larger area and the air quality impacts would largely be limited to 100m -200 m of the construction activity area, batching plant and material storage area and will not have any long term impact on the ambient air quality of the area.

Receptors

There are no receptors falling within 500 m of any of the WTGs as well as near access roads/dirt tracks to be used for the project. Mostly the exposure will be transient in nature.

Embedded/in-built control

- Preventive measures such as storage of construction material in sheds, covering of construction materials during transportation will be undertaken, for reducing dust as part of the embedded controls.
- Emissions from the emergency DG set and other stationary machines will be controlled by ensuring that the engines are always properly tuned and maintained.
- Minimize stockpiling by coordinating excavations, spreading, re-grading and compaction activities;
- Speed of vehicles on site will be limited to 10-15 km/hr which will help in minimizing fugitive dust emissions due to vehicular movement;

- Cease or phase down work if excess fugitive dust is observed. Investigate the source of dust and ensure proper suppression measures;
- Proper maintenance of engines and use of vehicles with Pollution Under Control (PUC) Certificate; and
- Idling of vehicles and equipment will be prevented

Impact Significance

The impact on air quality will be local and short-term, restricted to the construction period. The overall impacts are assessed to be **negligible.**

Residual Impact Significance

Table 7.26 Impact on air quality during construction phase

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

The residual impact due to the Project on air quality will be **negligible**.

Operation Phase

Source of Impacts

As the Project is a renewable and clean energy development project, the operation phase will be largely free from air emissions.

Decommissioning Phase

The decommissioning activities will have limited impact on the air quality of the area and will be mainly in form of dust emissions due demolition of office building. The increased vehicular movement for transportation of dismantled WTGs, demolition debris, scrap materials will also generate fugitive dust emissions.

Significance of Impact

The impact on air quality during decommissioning phase of the Project is assessed to be **negligible.**

Additional Mitigation Measures

The embedded measures need to be implemented.

Residual Impact Significance

Table 7.27 Impact on air quality during decommissioning phase

Impact	*Ambient Air quality*				
Impact Nature	Negative	Positive	Neutral		
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Project footprint area, access roads, batching plant and surroundings				
Frequency	Construction phase				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource Sensitivity	Low	Medium	High		
Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **minor.**				
Residual Impact Magnitude	Positive	Negligible	Small	Medium	Large
Residual Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **negligible.**				

The residual impact due to the Project on air quality will be **negligible**.

7.5.5 Impact on Ambient Noise Levels

Context

For the purpose of impact assessment on ambient noise levels in the area, following project activities were considered:

- Construction activities including site preparation, construction of WTG foundation, erection of transmission line, construction of SCADA building and substation;
- Transportation of WTG components, construction material, construction machinery and personnel;
- Operation of DG sets;
- Operation of batching plant; and
- Operation of the WTGs;

Criteria

For the assessment of air quality, the sensitivity and magnitude criteria outlined in ***Table 7.24*** and ***Table 7.29*** respectively have been used. Noise standards notified by the MoEFCC vide gazette notification dated 14 February 2000 as amended in 2010 based on the *A* weighted equivalent noise level (L_{eq}) for residential areas will be followed (***Table 7.30***), which are similar to the noise emission criteria specified in the WB/IFC EHS Guidelines, as presented in ***Table 7.31***, has been used for assessment of noise impacts. In order to assess the significance of the impact, noise impact should not exceed the levels presented in ***Table 7.31***, or result in a maximum increase in background levels of 3 dB at the nearest receptor location off-site.

Table 7.28 Sensitivity Criteria for Ambient Noise

Sensitivity Criteria	Contributing Criteria	
	Human Receptors	*Ecological Receptors*
Low	Industrial Use or transient receptors.	Locally designated sites; and/or areas of specific ecological interest, not subject to statutory protection (for example, as defined by the project ecology team).
Medium	Residential and Recreational Space	Nationally designated sites.
High	Educational/ Religious/ Medical Facilities	Internationally designated sites.

Table 7.29 Criteria for Impact Magnitude for Assessment of Impact to Ambient noise levels

Magnitude Criteria	Negligible	Small	Medium	Large
Noise Quality	• Predicted noise levels are at or less than 3 dB (A) above the relevant limits / thresholds (Refer Table 7.16)*. • Short term exposure (Few hours in a day and not continuous)	• Predicted noise levels are 3 to less than 5 dB (A) above the relevant limits / thresholds (Refer Table 7.16)*. • Short term exposure (< 1 month)	• Predicted noise levels are between 5 and 10 dB (A) above the relevant limits / thresholds(Refer Table 7.16)*. • Medium Term Exposure (1 to 6 months)	• Predicted noise levels are more than 10 dB (A) above the relevant limits / thresholds(Refer Table 7.16) • Long term exposure (> 6 months)

Table 7.30 Ambient Air Quality Standards in respect of Noise[1]

Area Code	Category of Area	Limits in dB(A) L_{eq}*	
		Day Time	Night Time

Area Code	Category of Area	Limits in dB(A) L_{eq}*	
		Day Time	Night Time
(A)	Industrial Area	75	70
(B)	Commercial Area	65	55
(C)	***Residential Area***	***55***	***45***
(D)	Silence Zone	50	40

Note:

1. *Day time shall mean from 6.00 a.m. and 10.00 p.m.*
2. *Night time shall mean from 10.00 p.m. and 6.00 a.m.*
3. *Silence zone is an area comprising not less than 100 metres around hospitals, educational institutions, courts, religious places or any other area which is declared as such by the competent authority.*
4. *Mixed categories of areas may be declared as one of the four above mentioned categories by the competent authority.*

** dB(A) Leq denotes the time weighted average of the level of sound in decibels on scale A which is relatable to human hearing. A "decibel" is a unit in which noise is measured. "A", in dB(A) Leq, denotes the frequency weighting in the measurement of noise and corresponds to frequency response characteristics of the human ear. Leq: It is an energy mean of the noise level over a specified period.*

[1] *[Source: Schedule of The Noise Pollution (Regulation and Control) Rules, 2000 vide S. O. 123(E), dated 14.2.2000 and subsequently amended vide S.O. 1046(E), dated 22.11.2000, S.O. 1088(E), dated 11.10.2002, S.O. 1569 (E), dated 19.09.2006 and S.O. 50 (E) dated 11.01.2010 under the Environment (Protection) Act, 1986.)]*

Table 7.31 Noise Emission Criteria [1]

Location	Noise Level Limit (dB(A)	
	Daytime (0700 – 2200 hrs)	Night-time (2200 – 0700 hrs)
Industrial; commercial	70	70
Residential; institutional; educational	55	45

[1] *Guidelines values are for noise levels measured out of doors. Source: Guidelines for Community Noise, World Health Organisation (WHO), 1999.*

Receptors

There are no settlements within the project foot print area, hence the increase in ambient noise levels are not likely to be experienced by any communities. Further, there are no receptors near the dirt tracks or paved roads lying in the Project area or on the access roads to the Project area for Jaisalmer town. However, the core zone is frequented by herders and grazing animals during the day time. High ambient noise levels during construction phases might be a cause of discomfort for these. The impact assessment for higher ambient noise has been performed considering this factor.

Construction Phase

Embedded/in-built control

Based on the scattered activity areas and the consulting firm's's previous experiences, impact of construction activities will be limited within 500 m of the WTGs locations and within 100 m from the road network, which will be

developed/upgraded and used for man and material movement within and outside the project area.
All the noise generating equipment such as DG sets, batching plant etc. will be located away from village settlement. There would not be any continuous noise emission from the construction activity area however intermittent at source can go from 85 dB(A) to 100 dB(A) at source depending upon the equipment and in –built noise control measure. Furthermore as the receptors are located beyond 500 m from any of the activity area hence incremental noise during day time at these receptors will be well within the applicable standards. However the background noise level in the study area is already higher than the applicable standards and hence the incremental noise would not be heard at the receptors.

Significance of Impact

The impact on noise quality during construction phase of the Project is assessed to be **negligible.**

Additional Mitigation Measures

As the embedded controls are sufficient to address the effects of the impact any additional mitigation measures are not foreseen.

Residual Impact Significance

Table 7.32 Increased ambient noise during construction phase

Impact	Noise generation from construction activities and transportation of man/material				
Impact Nature	Negative	Positive	Neutral		
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Limited to within 500 m of WTGs and 100 m of access dirt tracks to be used for resource transportation and possible camp site				
Frequency	Construction phase				
Likelihood	Likely				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Receptor Sensitivity	Low	Medium	High		
Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **negligible.**				
Residual Impact Magnitude	Positive	Negligible	Small	Medium	Large
Residual Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **negligible.**				

The significance of the residual impact will remain **negligible**.

Operation Phase

Context

The emanation of noise form the operation of WTGs is of the following two types: (a) mechanical noise, from interaction of turbine components; and (b) aerodynamic noise, produced by the flow of air over blades. Mechanical sounds originate from the relative motion of mechanical components and the dynamic response among them. Sources of such sounds include:

- Gearbox
- Generator
- Yaw drives
- Cooling fans
- Auxiliary equipment (e.g. hydraulics)

Aerodynamic sound is typically the largest component of wind turbine acoustic emissions. It originates from the flow of air around the blades. Aerodynamic sound generally increases with rotor speed.

The Project will have 53 WTGs of 1.7 MW each with 103 m rotor diameter and 80 m hub height.

Receptors

The nearest settlement was 800 m away from any WTG location. No noise modelling was carried out as there were no receptors that would get impacted by the operations of the WTGs. The only receptors are the herders who frequent the area during the day.

Embedded/in-built control

- Regular maintenance of WTGs;
- Periodic monitoring of noise near to the sources of generation to ensure compliance with design specification;

Significance of Impact

The impact on air quality during decommissioning phase of the Project is assessed to be **negligible.**

Additional Mitigation Measures

As the Impact Significance is negligible for this impact, embedded controls are sufficient to address the effects of the impact. Therefore, any additional mitigation measures are not suggested.

Significance of Residual Impacts

Table 7.33 Higher ambient noise during operation phase

Impact	Higher ambient noise during operation phase				
Impact Nature	Negative	Positive	Neutral		
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Limited to within 300-500 m of WTGs				
Frequency	Operation phase				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Receptor Sensitivity	Low	Medium	High		
Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **negligible.**				
Residual Impact Magnitude	Positive	Negligible	Small	Medium	Large
Residual Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **negligible.**				

Residual Impact Significance

The significance of the residual impact will remain **negligible.**

Decommissioning Phase

Similar impacts as during the construction Phase will be observed in the decommissioning phase.

7.6 KEY ECOLOGICAL RISKS

7.6.1 Criteria

The impact assessments were undertaken based on following impact assessment matrix for species as presented in ***Table 7.34.***

Table 7.34 Species-Impact Assessment Criteria

Baseline Species Sensitivity/ Value	Magnitude of Effect on Baseline Habitats			
	Negligible	Small	Medium	Large
Negligible	Not significant	Not significant	Not significant	Not significant
Low	Not significant	Not significant	Minor	Moderate
Medium	Not significant	Minor	Moderate	Major
High	Not significant	Moderate	Major	Critical

Table 7.35 Impact Magnitude for Species

Value	Description
Negligible	Effect is within the normal range of variation for the population of the species.
Small	Effect does not cause a substantial change in the population of the species, or other species dependent on it.
Medium	Effect causes a substantial change in abundance and / or reduction in distribution of a population over one, or more generations, but does not threaten the long term viability / function of that population, or any population dependent on it.
Large	Affects entire population, or a significant part of it causing a substantial decline in abundance and / or change in and recovery of the population (or another dependent on it) is not possible either at all, or within several generations due to natural recruitment (reproduction, immigration from unaffected areas).

Table 7.36 Receptor Sensitivity

Value	Description
Negligible	Species with no specific value or importance attached to them.
Low	Species and sub-species of LC on the IUCN Red List, or not meeting criteria for medium or high value.
Medium	Species on IUCN Red List as VU, NT, or DD, species protected under national legislation, nationally restricted range species, nationally important numbers of migratory, or congregatory species, species not meeting criteria for high value, and species vital to the survival of a medium value species.
High	Species on IUCN Red List as CR, or EN. Species having a globally restricted range (ie plants endemic to a site, or found globally at fewer than 10 sites, fauna having a distribution range (or globally breeding range for bird species) less than 50,000 km2), internationally important numbers of migratory, or congregatory species, key evolutionary species, and species vital to the survival of a high value species.

Impacts during construction Phase

The wind farm area is devoid of any major or large vegetation patch. The construction area is revenue lands, the associated ecological impacts of the construction phase are due to following construction activities;

- clearance of vegetation for storage yards;
- laying of WTG foundation and WTG installation
- laying of transmission lines and transmission towers
- laying of approach roads

7.6.2 *Impact on habitat of herpetofaunal species, resident avifaunal species and mammals*

Context and Source of Impact

The land clearance activities for the construction activities lead to removal of vegetation at the WTG location and access roads. Vegetation clearance may reduce the fodder for wild animals such as Indian Gazelle (*Gazelle bennetii*- IUCN Least Concern; IWPA,1972-Schedule I species) as well as disturb their

habitat. This may also expose the species to venture to new areas and expose to poaching and hunting.

Significance of Impact

The vegetation removal in the region may impact the habitat of herpetofaunal species, resident avifaunal species and mammals. The vegetation removal will also impact the grassland specific bird species which use this shrubby habitat as shelter. Overall residual impact significance (refer to ***Table 7.37***) of the vegetation clearance is assessed as ***minor***.

Additional Mitigation Measures

Following mitigation measures will further reduce the impact significance on the habitat and species to negligible.

- Vegetation clearance shall be limited to the project activity area;
- No major vegetation should be removed, alternate route should be planned in case any tree/large shrubs is falling within access road alignment;
- Top soil should be stored separately for restoration of the habitat;
- Strict prohibition on use of fuel wood and shrubs from nearby areas as kitchen fuel;
- Local grass species should be seeded in disturbed areas during monsoon period.

Residual impact significance

The impacts of vegetation clearance will be both direct and indirect and limited to construction phase of the project. Overall residual impact significance (refer to ***Table 7.37***) of the vegetation clearance will remain as ***minor***.

Table 7.37 Impact due to Clearance of Vegetation

Impact	Clearance of vegetation				
Impact Nature	Negative	Positive	Neutral		
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Limited to Wind Farm area (specifically construction areas)				
Frequency	Construction phase				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource Sensitivity (Habitat)	Low	Medium	High		
Resource Sensitivity (Species)	Low	Medium	High		
Impact Significance	Negligible	Minor	Moderate	Major	

	Significance of impact is considered **minor.**

Overall residual impact significance (refer to ***Table 7.37***) of the vegetation clearance is assessed as ***minor***.

7.6.3 Construction activity leading to habitat disturbance for Indian Gazelle

Context and receptor

The WTG foundation laying and WTG component installation will require camping/ of work force on site, movement of vehicles for transportation of man and material, construction noise due to excavation etc. These activities will cause habitat disturbance for Indian Gazelle (*Gazalle benetii*-IUCN 2015 ver.2-LC/IWPA Sch-I) and they tend to avoid such area. The habitat alteration may also lead to fresh man-animal conflict and exposure to fresh predators. Noise generated by construction activities and vehicle movement may further disturb the wild life movement in the nearby areas.

Significance of Impact

The impacts of construction of WTG foundation and installation of WTG will be both direct and indirect and limited to construction phase of the project. Overall impact significance (Refer to ***Table 7.38***) is assessed as ***minor***.

Additional Mitigation measures

Following mitigation measures will further reduce the impact significance:

- It is suggested to start the project in phased manner;
- Good housekeeping should be followed for construction activities, waste packaging material should be properly disposed;
- Efforts should be made to minimize construction noise should be made;
- Labour movement should be restricted between construction camps and construction sites;
- Proper training shall be provided to construction staff for handling of reptilian species;
- Camp and kitchen waste should be collected and disposed in a manner that it does not attract wild animals;
- Temporary barriers should be installed on excavated areas;
- The footprint of the construction activities should be kept to the minimum to reduce disturbance to flora and fauna.
- General awareness regarding wildlife should be enhanced through trainings, posters etc. among the staff and labourers;
- Proper sanitation facilities should be provided at the labour camps; and
- Anti -poaching/hunting policy should be strictly enforced.

Residual Impact significance

With the implementation of the suggestive measures, the residual impacts on the habitat and species will be **negligible**.

Table 7.38 Impact due to construction activities

Impact	Construction activities				
Impact Nature	Negative	Positive	Neutral		
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Limited to Project area (specifically construction areas)				
Frequency	Construction phase				
Likelihood	Likely				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource Sensitivity (Habitat)	Low	Medium	High		
Resource Sensitivity (Species)	Low	Medium	High		
Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **minor.**				

7.6.4 Laying of approach roads leading to road kills of Herpetofauna

Context and receptor

Approach roads are integral part of any wind farm projects as they are established usually away from habitation and main commutation routes. These approach roads are solely used for project related activities. These are generally unpaved and contribute to the dust deposition on the nearby vegetation. Movement of vehicles in unpaved roads often leads to dust deposition on nearby vegetation areas and which may affect photosynthesis, respiration, transpiration and overall affect the productivity. In addition, the construction of new approach roads will lead to reduction in native species diversity of the area and may facilitate introduction of exotic and invasive species and subsequently their range expansion.

Unregulated vehicle speed on such roads also leads to road kills of herpetofauna and moving wildlife such as Indian Gazelle (*Gazalle benetii*- IUCN 2015 ver.2-LC/IWPA Sch-I) which will impact their movement areas.

Significance of Impacts

The impacts of laying of approach road will be both direct and indirect and limited to construction phase of the project. Overall impact significance of the construction of approach roads (Refer to ***Table 7.39***) is assessed as ***moderate***.

Additional Mitigation measures

The suggestive mitigation measures for minimization of impacts due to construction activities are;

Based on the ecological assessment as well as impact significance, the following mitigation measures have been suggested:

- Construction activities should be planned and undertaken in a phased manner;
- Project related activities should be avoided during the night time.
- Damage to the natural topography and landscape should be minimized;
- Strict prohibition should be implemented on trapping, hunting or injuring wildlife within the subcontractors and should bring a penalty clause under contractual agreements;
- A minimum possible number of routes should be authorized for use during construction by the labourers and staff, speed limit of the vehicles plying in these routes should be kept 20-25 km/hr to avoid road kill;
- Where natural drainage crossing is envisaged at approach roads, culverts should be provided for crossing of herpetofaunal species;

Residual Impact significance

With the implementation of the suggestive measures, the residual impacts will be **minor**.

Table 7.39 Impact due to construction of approach road

Impact	Construction of Approach roads				
Impact Nature	Negative	Positive	Neutral		
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Limited to approach roads and construction areas				
Frequency	Construction phase				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource Sensitivity (Habitat)	Low	Medium	High		
Resource Sensitivity (Species)	Low	Medium	High		
Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **moderate.**				

Impacts during Operation Phase

Wind farm operation has direct and indirect impacts on the bird and bat communities. The impact during operation phase of the wind farm is discussed in the sections below.

7.6.5 Mortality of Avifaunal and bat species due to collision risk

Context and Receptor

The impacts of operation phase on the avifaunal and bat species are discussed in the sections below. Based on the field survey during the ESIA study (11th July to 15th July, 2015) and initial Bird and Bat study in the migratory season (6th Nov to 15th November, 2015) species of conservational significance were enumerated from the project site (wind farm area) and 5 km buffer area. The above said two survey confirms the presence of IUCN Red list of Threatened Species V 2015.4, 2 species, the Red-headed Vulture (*Sarcogyps calvus*) and White-rumped Vulture (*Gyps bengalensis*) are classified as Critically Endangered (CR); 2 species, the Steppe Eagle (*Aquila nepalensis*) and Egyptian Vulture (*Neophron percnopterus*) are classified as Endangered (EN) were observed. The study also observed presence of 21 migratory species in and surrounding areas of wind farm site17 bird species are listed in Schedule 1 of the Indian Wildlife Protection Act, 1972 and amendments.

During the initial migratory survey some collisions were recorded for raptors (Steppe Eagle IUCN-EN v4, 2015) and migratory vultures (Eurasian Griffon IUCN-LC v4, 2015) in the adjoining Mokal wind farms (approximately 1 km from Nidhi Site) which are operational for the last four (04) years. The first phase of the long term bird and bat survey (February 2016) also recorded collision of the above species in the adjoining Mokal wind farm (on north west of Nidhi Site), adjoining Ostro wind farm operational since last 6 month (in southwest of Nidhi Site) and adjoining Tanot Power Wind Farm (South of Nidhi site) operational from 4 months.

Migratory species such as water-birds were not recorded near the Nidhi site due to the absence of perennial surface water bodies. In addition to the above species the following threatened species in IUCN V 2015.4 2 species were recorded at the wind farm site during the initial survey; the Red-headed Vulture (*Sarcogyps calvus*) and White-rumped Vulture (*Gyps bengalensis*) Critically Endangered (CR); the Steppe Eagle (*Aquila nepalensis*) and Egyptian Vulture (*Neophron percnopterus* Endangered (EN). These species were also recorded during the first phase of the long term survey (February 2016). Mortality of the Eurasian griffon indicates that other vulture species flying at similar height are at risk of potential collision. However all of these vulture species are widespread across Indian Sub-continent. It is unlikely that mortality at this site will be responsible for any decline of their population. The presence of these vulture species is primarily linked to the dead carcass at the site. The mitigation lies in the better carcass disposal which can be easily undertaken by the project. An electrocution of a steppe eagle was observed. The species is adversely affected by power lines and is highly vulnerable to the impacts of potential wind energy developments (Strix 2012, Meyburg and Boesman 2013). However steppe eagle is widely distributed in Rajasthan as well as all across India in winter and we cannot attribute any cause for population decline to this site. However, this mortality rate (uncorrected for scavenger removal and observer efficiency) is low when compared to

mortality rates from globally available data [1].This document will be updated when the long term bird and bat study had completed (initial report is included in 5.2)

Bird Mortality due to electrocution

The transmission line to be used for power evacuation from the WTG to sub-station may pose threat of electrocution to passing bird species. Some bird species tend to use these wires and poles for roosting can get electrocuted.

There are various technical modifications suggested by various avifaunal research and conservation organizations such as Birdlife International to minimize the electrocution of avifaunal species. These modifications are suggested in the mitigation measures.

The external transmission line does not pass through any forest land and waterbody. The sensitive waterbodies for example (Village Pond at Biprasar netsi) is atleast 4.27 km from the transmission line so any impact on the migratory birds from the waterbody is not envisaged due to transmission line.

Significance of Impacts

Based on the above standard we categorize the wind farm area resource sensitivity to be **high** with respect to species. The wind farm is used by globally endangered and nationally protected species of vulture and eagle species. We have observed mortality of the Eurasian Griffon, through both collision with WTGs and electrocution. Though this not an endangered or protected species its mortality indicates that other threatened species of vultures may face similar risks as they are likely to feed on live-stock carcasses in proximity to the wind farm. Impacts magnitudes to these species from collision and electrocution are categorized as **medium** as these may cause a substantial change in abundance and / or reduction in distribution of a population over one, or more generations, but does not threaten the long term viability/function of that population

There is limited embedded control in the project design presently. The impact due to movement of blades resulting into collision risk of birds and electrocution is assessed as **major.** However, impact significance may change subject to outcome of the long term bird and bat survey**.**

External transmission lines are not envisaged to have electrocution impact on the birds as sufficient distance between conductors is considered in the design to avoid electrocution.

(1) Wind turbine interactions with birds, bats and their habitats. A summary of research results and priority questions. http://www1.eere.energy.gov/wind/pdfs/birds_and_bats_fact_sheet.pdf

Additional Mitigation Measures

A common tendency has been noticed in Jaisalmer area. Most of the villages, when there is any cattle cattle/livestock causality, this disposes any carcasses outside the village area

/grazing area. These carcasses are been spotted by the soaring scavengers (Vultures) in search of food and they get attracted to such disposal sites (Refer ***Figure 7.3***.). The vulture's flight path when descending from their flight height may fall in line with the wind turbine and may collide with the operational WTGs.

Figure 7.3 Carcass disposal sites attracting Egyptian Vultures near project site

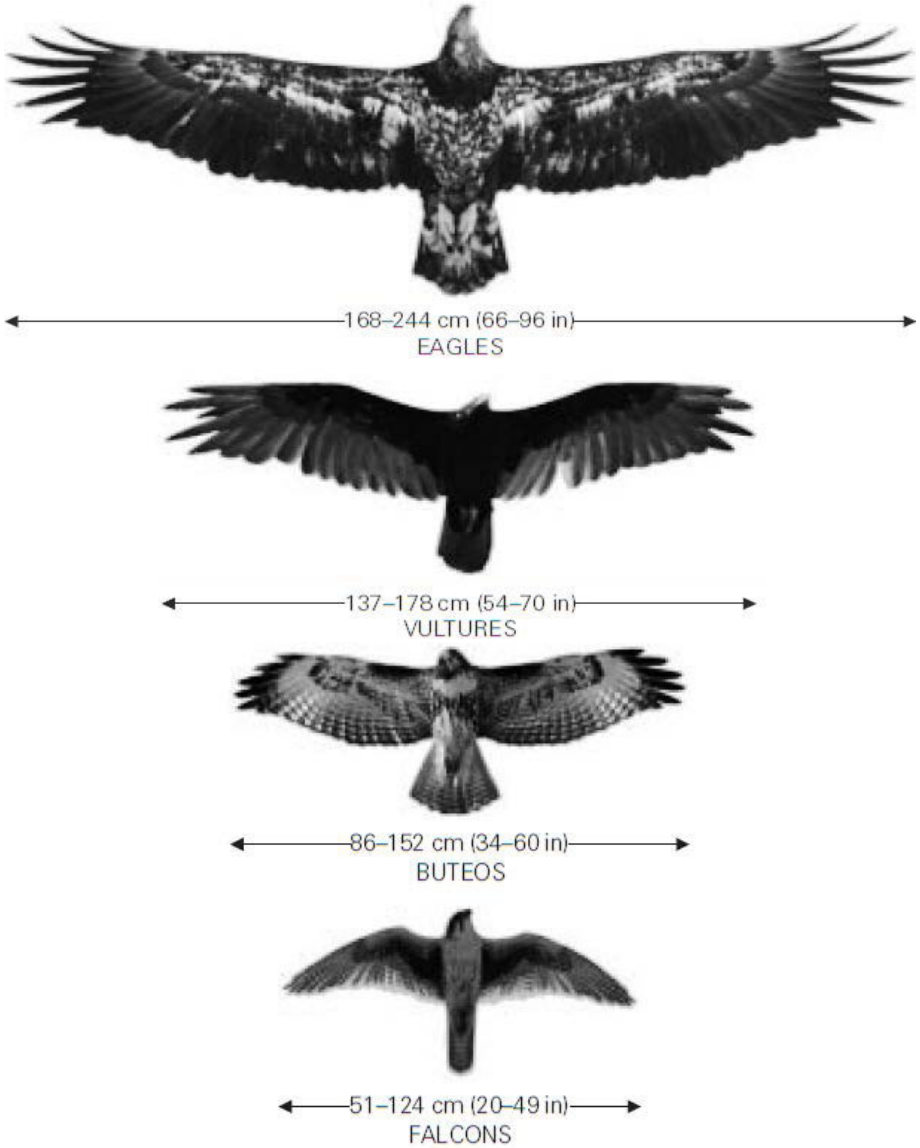
Source: Site and surrounding areas survey by ERM during 11th July to 15th July, 2015

Following appropriate mitigation measures should be undertaken for reduction in bird and bat collision:

- To reduce collision risk, livestock carcass management is to be undertaken in the wind farm area. All carcasses detected inside the wind farm area are to be removed and dumped at designated livestock dumping locations. This will reduce the probability of vultures occurring in the wind farm area, thereby reducing the risk of collision with operating WTGs.
- Proper communication needs to be established between resident of local villagers and nomadic shepherds in the area. Any incident of livestock causality should be immediately brought to the attention of Mytrah (point of contact) for such incidents and carcases should be immediately removed from the site.
- A designated cattle carcass disposal site should be identified in consultation of District Authorities, forest departments and the representatives of Habur, Mokal and other stakeholders in the area. The cattle carcass so discovered should be transported immediately.
- Wingspans of raptors (eagles, vultures, buzzards and falcons) recorded in the study area is shown in ***Figure 7.4***

- ***Figure 7.5.*** exhibits electrical pole modifications such as usage of suspended insulators and insulation of conductors in order to reduce bird and bat mortality through electrocution should be incorporated.
- Birds get electrocuted if their wings come into contact with two of the exposed pins. As shown in ***Figure 7.4*** below, if the electrocution clearance for a species of bird is 152 centimetres (cm) a horizontal and vertical clearance of 152 cm and 102 cm is required to reduce the risk of electrocution for the species. As wingspans vary based on bird size, electrocution clearances will also vary to ensure that power poles are safe for different raptor species.
- Post operational Monitoring: Post operational monitoring of the wind farm area should be undertaken through independent third party organizations to assess the efficacy of carcass management practices for a period of two years. Additional surveys are also recommended to monitor bird carcasses during the migratory season.

Figure 7.4 Wingspan of raptors found in the Study Area



Wingspan of raptors recorded in the study area, provided in centimetres and inches.

Source: Avian Power Line Interaction Committee, "Suggested practices for avian protection on power lines: The state of the art in 2006," Edison Electric Institute, APLIC, and the California Energy Commission, Washington, D.C. and Sacramento, CA, PIER Final Project Rep. CEC-500-2006-022, 2006, p. 207.

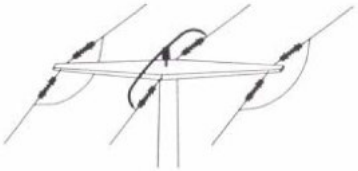
Avoidance

Following appropriate mitigation measures should be considered for avoidance of bird collision with wind turbine blades and electrocution with transmission lines:

- Bird-safe strain poles require insulating chains at least 60 cm in length; uninsulated poles are causing risk of electrocution at the adjoining Mokal wind farm as represented in ***Figure 7.6***Flash lamps on the WTGs will prevent bird collision at nights.
- Regular checking of the vacuums or holes in the towers to avoid nesting by any of the birds;
- Marking overhead cables using diffractors and avoiding use over areas of high bird concentrations, for species vulnerable to collision.

Figure 7.5 Electrical Pole Modification

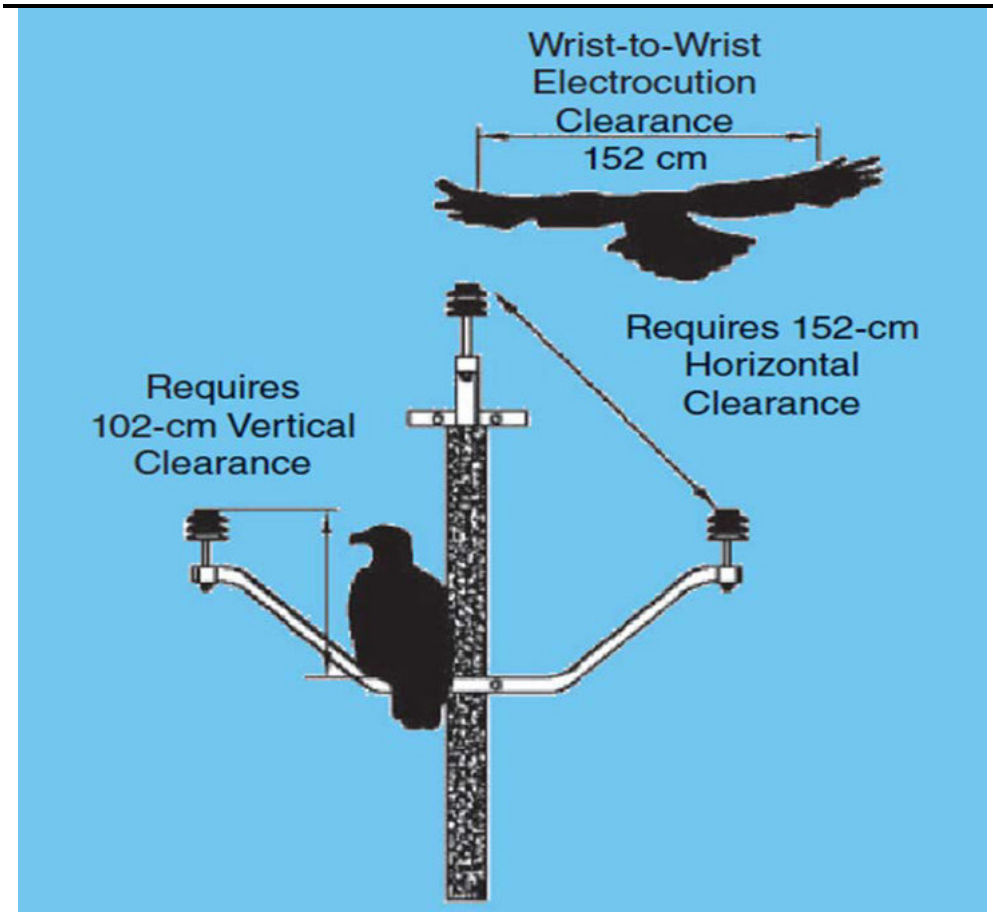
Existing Un insulated Pole chains at adjoining Mokal Wind farm site



Bird-safe strain poles

Source: Site and surrounding areas survey by ERM during 11th July to 15th July, 2015

Figure 7.6 Schematic representation of power pole with raptor safe design features



Source: Harness, Richard E., and Pranay Rao Juvvadi. "Preventing Bird Electrocutions: Alternative Construction Methods Could Help Birds and Utilities." Industry Applications Magazine, IEEE 21.3 (2015): 22-26.

Residual Impact significance

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

The mitigation measures for transmission line route will be same as suggested for the wind farms such as Livestock Carcass Management all along the route.

We however believe that consequent to the mitigation through management of live-stock disposal and design changes in transmission poles, mortality of vultures and eagles can be substantially reduced. The impact magnitude post mitigation would change to **small** (as there is always a chance of some mortality despite these mitigation measures). The impact significance would thereby change to **moderate.**

Table 7.40 Impact significance for species observed

Impact	Bird Collision Risk and Electrocution -Operation Phase			
Impact Nature	Negative	Positive	Neutral	
Impact Type	Direct	Indirect	Induced	
Impact Duration	Temporary	Short-term	Long-term	Permanent

Impact Extent	Local		Regional		International
Impact Scale	Limited to Project Boundary (specifically WTG locations, substation, Across ROW of internal and external transmission line)				
Frequency	Operational Phase				
Likelihood	Likely				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource Sensitivity (Species)	Low		Medium		High
Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **Major** for Species				
Residual Impact Magnitude	Positive	Negligible	Small	Medium	Large
Residual Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **moderate.**				

7.7 *IMPACT DUE TO CLIMATE CHANGE*

Project Nidhi can be at a risk from the potential impacts of climate change as changes in wind speed, temperature, precipitation etc. For this MEIL ensures the design by considering following data/ reports.

- Soil testing report
- Weather conditions – Rainfall, Temperature , wind speed , wind direction
- Total weight of Nazzle and Weight of Nacelle and blade.

Generally the past 20 years data is considered. Based upon the analysis, designing is done by manufacturer keeping in view all the adverse factors.

The major impacting factor for viability of the project is the change in wind speed. Based on the details (as can be referred from ***Annexure C***), it is anticipated that wind speed changes would not occur in immediate 10 years. Anticipated risk of climate change for Project Nidhi is covered in detail in ***Annexure C***.

7.8 KEY SOCIAL RISK

Criteria

For the assessment of social impacts, the sensitivity and magnitude criteria outlined in ***Table 7.41*** and ***Table 7.42*** respectively have been used.
The social impacts associated with the construction, operations and decommissioning stages have been assessed qualitatively and in some cases quantitatively (subject to availability of data), using professional judgement and based on past experience from similar projects.

Table 7.41 Impact Magnitude for Local Communities

	Extent / Duration / Scale / Frequency
Large	Change dominates over baseline conditions. Affects the majority of the area or population in the area of influence and/or persists over many years. The impact may be experienced over a regional or national area.
Medium	Clearly evident difference from baseline conditions. Tendency is that impact affects a substantial area or number of people and/or is of medium duration. Frequency may be occasional and impact may potentially be regional in scale.
Small	Perceptible difference from baseline conditions. Tendency is that impact is local, rare and affects a small proportion of receptors and is of a short duration.
Negligible	Change remains within the range commonly experienced within the household or community.

Table 7.42 Receptor Sensitivity for Local Communities

Category	
High	Profound or multiple levels of vulnerability that undermine the ability to adapt to changes brought by the Project.
Medium	Some but few areas of vulnerability; but still retaining an ability to at least in part adapt to change brought by the Project.
Low	Minimal vulnerability; consequently with a high ability to adapt to changes brought by the Project and opportunities associated with it.

7.8.2 *Community Health and Safety*

Context and receptor

The receptors for impacts on community health and safety include the local community within the AoI who may be present in the vicinity of the project activities, for grazing purposes or while commuting. The construction phase activities such as the erection of the WTGs, construction of the transmission line and substations and movement of material and personnel may result in impacts on the health and safety of the community. These activities will involve the use of heavy machinery and live transmission power lines. Furthermore, the movement of material and personnel via the access roads may result in damage to human life or livestock due to accidents.

The community health and safety risks associated with the construction, operations and decommissioning of onshore wind power projects are similar to those of most large industrial facilities and infrastructure projects. The main risks include structural safety of project infrastructure, life and fire safety, public accessibility and management of emergency situations.

Embedded/ In Built Control

MEIL has a health and safety policy in place which applies to all activities being undertaken as part of the project. MEIL, also as part of its sub-contractor agreements requires each contractor to have an EHS plan in place, as well as procedures for monitoring of the EHS performance of contractors and their workers.

Impact Significance

Based on the above the impact is assessed to be **minor**.

Additional Mitigation Measures

In addition to the embedded measures, the following risk mitigation measures are suggested to minimize the risks/hazards of construction activities onsite:

- As part of the stakeholder engagement and information disclosure process, the community will be provided with an understanding of the activities to be undertaken and the precautions taken for safety;
- As part of stakeholder engagement, the project will also propagate health awareness amongst the community;
- The traffic movement for the project in the area will be regulated to ensure road and pedestrian (including livestock) safety;
- Put in place a grievance mechanism to allow for the workers and community members to report any concern or grievance related to project activities;

Residual Impact Significance

Table 7.43 Impact Significance on Community Health and Safety

Impact	***Community Health and Safety***				
Impact Nature	Negative	Positive	Neutral		
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Limited to Project Footprint area				
Frequency	Project lifecycle				
Likelihood	Possible				
Impact Magnitude	Positive	Negligible	small	Medium	Large
Resource/Receptor Sensitivity	Low	Medium	High		
Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **Minor**				

Impact	*Community Health and Safety*				
Residual Impact Magnitude	Positive	Negligible	Small	Medium	Large
Residual Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of Residual Impacts is considered **Negligible** to **Minor**				

The significance of impact will be reduced to **negligible to minor** on implementation of mitigation measures.

7.8.3 Accidental Impacts- Blade-throw and Natural Disasters

Context and receptor

The failure in the rotor blade can result in the 'throwing' of a rotor blade which may affect public safety. Further, there are chances of malfunction or destructions due to natural disasters such as storms, cyclones, earthquakes and lightning.

Any communities lying in close proximity to the WTG are receptors of this type of impact. Blade throw risk for public safety is treated as extremely low as in the event of failure the blade can reach between 15-100 m from the wind turbine. Hence, micro-siting guidelines keep this in mind for prescribing a safety setback distance.

The project area is not prone to storms and cyclones and does not fall in an active earthquake prone zone. The Project area falls in Zone III according to the Seismic Hazard Map of India. Zone III is defined as a zone having moderate damage risk zone and vulnerable to earthquakes of intensity MSK VII (as defined by *Building Materials and Technology Promotion Council*).

Embedded/built-in controls

The WTG design and micro-planning guidelines reduces the likelihood of safety risks to public to a great extent. Reportedly, the WTGs have embedded lighting protection. The rotor blades are equipped with a lightning receptors mounted in the blade. The turbine is grounded and shielded to protect against lightning, however, lightning is an unpredictable force of nature, and it is possible that a lightning strike could damage various components notwithstanding the lightning protection deployed in the machine. The lightning may cause fire on the WTG but will have no potential to spread as there is no nearby human habitation and scanty vegetation.

Significance of Impact

Based on the above the impact after implementing the embedded controls is assessed to be **negligible**.

Additional Mitigation/Management Measures

Although the embedded controls are sufficient to address the effects of accidental impacts, we suggest following measures to be included in the ESMP:

Residual Impact Significance

Table 7.44 Significance of impacts of accidents

Impact	Accidents and natural disasters				
Impact Nature	Negative	Positive	Neutral		
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Within 100 m of the WTGs. There are no communities in close proximity to any of the WTGs.				
Frequency	Operation phase.				
Likelihood	Unlikely				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Receptor Sensitivity	Low	Medium	High		
Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **negligible.**				
Residual Impact Magnitude	Positive	Negligible	Small	Medium	Large
Residual Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered **negligible.**				

The significance of the residual impact will remain **negligible.**

7.8.4 Occupational Health and Safety

Context and receptor

The receptors of the impacts on occupational health and safety include the workers, both regular and contractual working on the project. The construction phase activities such as construction of WTGs, access roads, transmission lines and other project components and maintenance activities in the operations phase are likely to result in a risk on the health and safety of the workers on the project.

According to the IFC EHS Guidelines, the occupational health and safety risks during the construction, operations and decommissioning of an onshore wind power project is generally similar to those of the large industrial facilities and infrastructure projects. The main risks of occupational health and safety include working at heights, working with rotating machinery, and falling objects

Embedded/In Built Control

MEIL has a health and safety policy in place which applies to all activities being undertaken as part of the project. MEIL, also as part of its sub-contractor agreements requires each contractor to have an EHS plan in place, as well as procedures for monitoring of the EHS performance of contractors and their workers.

Significance of Impact

Based on the above the impact after implementing the embedded controls is assessed to be **Minor.**

Additional Mitigation Measures

In addition to the embedded measures, the following risk mitigation measures are suggested to minimize the risks/hazards related to health and safety onsite:

- The workers (both regular and contractual) on the project will be provided with trainings on the Health and Safety policy in place, and their role in the same and refresher courses will be provided throughout the life of the project
- Establish a grievance redressal mechanism in place, to allow for the employees and workers to report any concern or grievance related to work activities
- Put in place measures to reduce the risk of prevalence of diseases, including screening of workers, undertaking health awareness amongst the workers, implementation of vector control programs, avoiding presence of unsanitary conditions and better facilities in the project site, such as safe drinking water, proper waste collection and disposal etc.

Residual Impact significance

The assessment of the residual impacts on occupational health and safety are given below.

Table 7.45 Impact Significance on Occupational Health and Safety

Impact	***Occupational Health and Safety***				
Impact Nature	Negative	Positive	Neutral		
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	Limited to Project Footprint area				
Frequency	Project life cycle				
Likelihood	likely				
Impact Magnitude	Positive	Negligible	small	Medium	Large
Resource/Receptor Sensitivity	Low	Medium	High		
Impact	Negligible	Minor	Moderate	Major	

Impact	*Occupational Health and Safety*				
Significance	Significance of impact is considered to be **Minor**				
Residual Impact Magnitude	Positive	Negligible	Small	Medium	Large
Residual Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of Residual Impacts is considered **Negligible** to **Minor**				

The significance of the impacts will be reduced to **negligible to minor** on implementation of mitigation measures

7.8.5 Labour Rights and Welfare

Context

The projects will employ skilled, semi-skilled and un-skilled workers, across the project lifecycle, which will include contractual and regular employees and local and migrant workers. The regular skilled workers are likely to be comprised of migrant workers, from different districts and states in the country, depending upon the need for technical expertise. It is understood that a labour camp for the contractual labourers during the construction phase will be set up near the project area at Habur.

The water requirements for the labour camps will be met through private tanker facilities, with no local water body or ground water source being used for majority of the construction phase of the project.

Embedded/In Built Control

MEIL, also as part of its sub-contractor agreements requires each contractor to have an EHS plan in place, as well as procedures for monitoring of the EHS performance of contractors and their workers. As part of the monitoring process, MEIL will also monitor the camp facilities, payment of wages and other regulatory requirements. However, the details of the monitoring process and components are presently not available.

Significance of Impact

Based on the above the impact after implementing the embedded controls is assessed to be **Moderate.**

Additional Mitigation Measures

The following additional mitigation measures are suggested in order to ensure compliance with labour laws/provisions as per the industry best practices:

- The labour camp at Habur for labourers should be constructed to meet the requirements of the applicable reference framework in terms of space per worker, water and sanitation facilities, first aid, lighting and ventilation etc. and regular monitoring should be undertaken to ensure compliance through the project lifecycle

- MEIL should establish a monthly monitoring and regular auditing mechanism for monitoring their sub-contractors and suppliers with respect to compliance to the applicable reference framework, in terms of resources, migrant workers, child labour and forced labour, health and safety, payment of wages etc.
- Strengthening security personnel around labour camps in order to maintain adequate law and order and avoid any possible tensions between the migrant workforce and host community.
- Establish a grievance redressal mechanism in place, to allow for the employees and workers to report any concern or grievance related to work activities

Residual Impact significance

The assessment of the residual impacts on labour rights and welfare are given below.

Table 7.46 Impact Significance on Labour Rights and Welfare

Impact	*Labour Rights and Welfare*				
Impact Nature	Negative	Positive	Neutral		
Impact Type	Direct	Indirect	Induced		
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local	Regional	International		
Impact Scale	The project will employ local workers primarily on a contractual basis, including semi-skilled and unskilled workers, whereas the skilled workers, are expected to be mostly migrant workers and regular employees of MEIL.				
Frequency	Project life cycle				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource/Receptor Sensitivity	Low	Medium	High		
Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered to be **Moderate**				
Residual Impact Magnitude	Positive	Negligible	Small	Medium	Large
Residual Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of Residual Impacts is considered **Minor**				

The significance of impact will be reduced to **minor** on implementation of mitigation measures.

7.8.6 Impact on Indigenous Communities/ Vulnerable Groups

Context

As discussed in ***Section 6.6,*** the AoI is characterised by a SC population of 22.2% and ST population of 0.2%. The majority of the SC population consists of Meghwals, Manganiars, Suthars and Dholis. There is also no reported caste based distinction in terms of habitation patterns, with the various caste groups residing together in the villages. Reportedly, there is no difference across the social groups in terms of access to resources and economic opportunities. Vulnerability in the society is defined on the basis of the economic status of

the households, and the difference in access to social, economic and political power between men and women. The vulnerable groups identified are women, women headed households and Below the Poverty Line People.

The land for the WTGs; transmission line; labour camp, pooling substation and site office, is comprised of solely of government land. The land identified for the project is used by the local community for grazing purposes, and does not have any specific SC/ST group usage in terms of grazing, cultivation, water body and cultural/religious property.

Embedded/In Built Control

As part of the Community Development Activities in the local villages, MEIL will identify specific programmes for SC/ST groups and vulnerable groups.

Significance of Impact

Based on the above the impact after implementing the embedded controls is assessed to be **Minor.**

Additional Mitigation Measures

In addition to the embedded measures, the following additional mitigation measures are identified:

- Ensure that the employment and contracting opportunities generated by the project are equally available across the social groups
- Undertake a profiling of the various social groups in the AoI, to understand the individual needs and concerns of the social groups and identify community development and CSR programmes in accordance to the same
- As part of the stakeholder engagement, ensure adequate representation of the SC/ST groups and vulnerable groups identified, and undertake specific engagement activities with these groups
- Ensure that the grievance management mechanism established is accessible to these groups.

Residual Impact significance

The assessment of the residual impacts on the Indigenous Communities and Vulnerable Groups is given below.

Table 7.47 Impact Significance on Indigenous Communities/Vulnerable Groups

Impact	*Indigenous Communities/Vulnerable Groups*			
Impact Nature	Negative	Positive		Neutral
Impact Type	Direct	Indirect		Induced
Impact Duration	Temporary	Short-term	Long-term	Permanent
Impact Extent	Local	Regional	International	
Impact Scale	the SC/ST Community and vulnerable groups may be negatively impacted			

Impact	*Indigenous Communities/Vulnerable Groups*				
	by the project, in case the economic or developmental opportunities generated by the project are not equally accessible to them in comparison to other social groups.				
Frequency	Project life cycle				
Likelihood	Possible				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource/Receptor Sensitivity	Low	Medium		High	
Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered to be **Minor**				
Residual Impact Magnitude	Positive	Negligible	Small	Medium	Large
Residual Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of Residual Impacts is considered **Negligible**				

The significance of impact will be reduced to **negligible** on implementation of mitigation measures.

7.8.7 Impacts on Economic Opportunities

Context and source

The receptors for impacts on economic opportunities include the local community within the AoI. The construction phase activities of the project including construction of access road, civil works, foundation activities, site clearance and security will involve semi-skilled and unskilled workers, who are likely to be recruited from the local community.

As discussed in the social baseline (***Section 6.6***), the main occupational activities in the AoI are farm based activities (agriculture and livestock rearing) and non-farm based activities (contractual labour for construction). The influx of wind power projects in the area has resulted in a reduced dependence on agriculture and livestock rearing for income, with the local community choosing to work in the construction of access roads and other project components and as security guards for the WTGs.

According to the information available, MEIL will be the main EPC Contractor for the project. Apart from MEIL, four contractors will be involved in the construction phase of the project, for the civil works, WTG foundations, external access roads and the 132 KV transmission line. These contractors are likely to employ a number of semi-skilled and unskilled labourers from the neighbouring villages, however, the details of the same are presently not available. In addition to this, the construction of the internal access roads is being undertaken by the local community in Habur village. Furthermore, the community has benefited from the project in terms of the cars and drivers hired by the project, with only local cars being used in the project. The project is also likely to create a number of indirect economic opportunities in terms hiring tractors, setting up of tea shops etc.

While the community does undertake opportunistic cultivation on the government land identified for the project, this is restricted to periods of good rainfall. This cultivation is mostly of food grains in the monsoon season (Kharif), used for self-consumption of the cultivators and is heavily dependent upon the level of rainfall. According to the discussions with the local community, the cultivators were not heavily dependent upon this cultivation for their sustenance, with most of the households shifting towards non-farm based activities. However, no private land has been identified for project.

During the operations phase, the employment opportunities will be reduced and restricted to the maintenance of access roads, hiring of cars and drivers, and a few security personnel and housekeeping staff at the site office.

Embedded/ In Built Control

The local community is preferred by the project for the requirement of semi-skilled and unskilled workers to the extent possible. Migrant workers are being hired, as observed during the second site visit, for steel related jobs.

Significance of Impact

The impact is assessed to be **positive.**

Additional enhancement Measures

The project is recommended to have the following additional enhancement measures in place:

- The sourcing of local labour wherever possible should be made obligatory for the sub-contractors and in all major procurement activities
- Preference should be given to the vulnerable population in the AoI
- The project proponent will establish a mechanism to audit subcontractors and suppliers with respect to compliance of utilizing local labour and resources.
- Prior to the commencement of construction activities, MEIL shall undertake an assessment of the project area. In case any cultivation is being undertaken in the area identified, MEIL will pay compensation for the impact on crops, based on a negotiated settlement with the cultivators.

The assessment of impacts on economic opportunities is given below.

Table 7.48 Impact Significance on Economic Opportunities

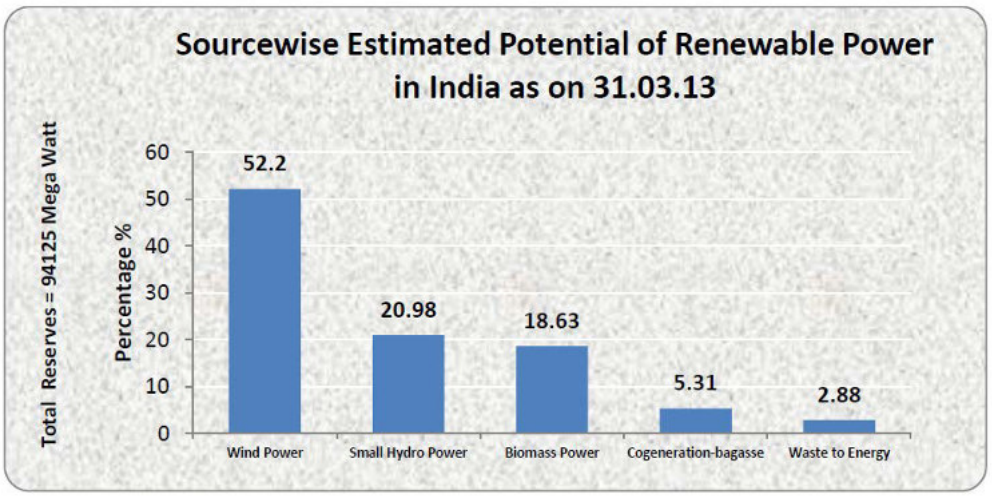
Impact	*Economic Opportunity*			
Impact Nature	Negative	Positive	Neutral	
Impact Type	Direct	Indirect	Induced	
Impact Duration	Temporary	Short-term	Long-term	Permanent
Impact Extent	Local	Regional	International	
Impact Scale	Limited to Project Footprint area and Jaisalmer Tehsil and District			
Frequency	Construction and Operation Phase of the Project			

Impact	*Economic Opportunity*				
Likelihood	likely				
Impact Magnitude	Positive	Negligible	small	Medium	Large
Resource/Receptor Sensitivity	Low	Medium		High	
Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered to be **Positive**				

8.1 THE POWER SCENARIO IN INDIA

India has witnessed unprecedented economic growth over the last decade with real GDP growth of approximately 8.7% in the last five years (7.5% over the last ten years), positioning it amongst the global 'big five' (*Energy Statistics by Central Statistics Office, 2014*). As a consequence of high GDP and the urgency to sustain positive growth, there is surge in energy demand and the need to prospect for new energy reserves and harvest the same. Predictions by the Planning Commission *via* the Twelfth Five Year Plan document indicate that a total of 669.6 million tonnes of oil equivalent (MTOE) will be reached by 2016-17 and 844 MTOE by 2021-22. This will meet around 71 per cent and 69 per cent of expected energy consumption, with the balance to be met from imports, projected to be about 267.8 MTOE by 2016 - 17 and 375.6 MTOE by 2021 - 22. Coal and natural gas (and their imports) will continue to fuel India's growth with a growing need to harvest energy from renewable sources in environmentally responsible and sustainable manner. India generated about 855 BU of electricity in 2012. As of 2012, India had an installed renewable energy capacity about 24.9 GW. During the Eleventh Five Year Plan, nearly 55,000 MW of new generation capacity was created, yet there continued to be an overall energy deficit of 8.7 per cent and peak shortage of 9.0 per cent. Therefore, resources currently allocated to energy supply are not sufficient for narrowing the gap between energy needs and energy availability.

Figure 8.1 Plan wise Growth of Installed Generating Capacity in India



Source: Energy Statistics, 2014

As of 2014, the total potential for renewable power generation in the country as on 31st March, 2013 is estimated at 94125 MW (refer ***Figure 8.1***). This includes wind power potential of 49130 MW (52.2%), SHP (small-hydro power) potential of 19750 MW (20.98%), Biomass power potential of 17,538

MW (18.63%) and 5000 MW (5.31%) from bagasse-based cogeneration in sugar mills.

8.2 ALTERNATIVE SITE LOCATION

Wind energy projects are non -polluting energy generation projects which are site specific and dependent on the availability of wind resource. As per Wind resource mapping and power potential assessment project the option of choosing an alternative area is limited.

8.2.1 *Alternate Location for WTGs and Associated Facilities*

Within the potential area, there is a possibility as well as flexibility of moving the individual WTG locations (micrositing) to avoid any potential issue like:

- near proximity to third party high voltage transmission lines

As for associated facilities such as transmission lines, access pathways, pooling substation, yards, stores, and land department undertakes identification of alternate sites in consultation and joint field visits held with Power Evacuation team, Projects team which are the concerned internal stakeholders. This process has enabled MEIL to choose the best possible alternative to locate the WTGs and other project associated facilities.

The proposed wind power project site has the following location advantages:

- No ecological sensitive receptor such as national Parks, Wildlife Sanctuary, Reserve forest or protected forests within 10 km radius;
- No cultural property of archaeological importance within 3 km radius;
- No habitations falling within 500 m of each WTG.

8.3 ALTERNATE TECHNOLOGY

The wind turbine manufacturer for Project Nidhi is General Electric (GE). GE has been present in India in the wind turbine sector since 1996 and currently offers WTGs across two different specifications: 1.5 MW-77 m Turbine and the 1.6 MW-82.5 m Turbine - Class III B. The WTG used for the proposed Project, GE 1.7-103, is being introduced into the Indian market for the first time.

GE's investments into their 1.6 MW-82.5 m turbine, introduced in 2008, resulted in the introduction of 1.7-103 wind turbines. As per GE, this product evolution provides an increased capacity factor while increasing Annual Energy Production (AEP) by ~30% at 6.5 m/s. GE further states that certain incremental changes to the 1.7-103 wind turbine resulted in a significant performance increase. These enhancements include greater blade length and

controls improvements, resulting in an increase in AEP, capacity factor and controlled sound performance.

Further, GE claims that the 1.7-103 wind turbines have the highest capacity factor in their class in India. This turbine is a three-blade, upwind, horizontal axis wind turbine with a rotor diameter of 103 meters. The turbine rotor and nacelle are mounted on top of a tubular steel tower, providing a hub height of 80 meters. The turbine uses active yaw control to keep the rotor pointed into the wind. Further, the turbine is designed to operate at a variable speed and has an active blade pitch control (designed to regulate turbine rotor speed), and a doubly-fed induction type generator along with power electronic converter system.

Other specifications of the 1.7-103 are:

- Designed and certified to IEC 61400-1, IEC Class S;
- Standard temperature option;
- Standard tower corrosion protection; C2 internal and C3 external with optional C4 internal and C5 external available;
- Rotational direction: Clockwise viewed from an upwind location;
- Speed regulation: Electric drive pitch control with battery backup;
- Aerodynamic brake: Full feathering of blade pitch.

8.4 ALTERNATE METHODS OF POWER GENERATION

Harnessing wind energy is an eco-friendly process, inexhaustible and possesses a minimal environmental footprint. There are no fuel requirements or large quantities of water for operation of the plant. Wind energy scores over other forms of energy generation as it has a low gestation time: a short lead time is needed to design, install, and start-up (up to a maximum of 2 months after micrositing, approvals and land purchase) a wind farm. ***Table 8.1*** elaborates upon the advantages and disadvantages of various power generation systems.

Table 8.1 Environmental advantages and disadvantages of various power generation systems

Mode	Disadvantage	Advantage
Thermal Power Plant	• High fossil fuel consumption. • Large quantities of water requirement for cooling • High volume of emissions from operation • Accumulation of fly ash (in case of coal powered installations) • Upstream impact from mining and oil exploration • GHG emission estimated as 228gCeq/kWh	• Large scale production potential • Moderate gestation period • Relatively inexpensive • Wider distribution potential

Mode	Disadvantage	Advantage
Hydropower Plant	• Site specific, dependent on reservoir/river etc. • Downstream impact on flow • Long gestation period • Acute and chronic social and ecological impacts	• GHG emission estimated as low as 1.1gCeq/kWh for run of river projects
Nuclear Power	• Availability of fuel source • Hazards associated with radioactive material • High cost of project • Long gestation period • Risk of fallout and meltdown scearios and its impacts on the local populace and environment.	• Cheaper power generation • GHG emissions as low as 2.5gCeq/kWh
Wind Power	• Land requirement of about 2.0 to 2.5 acres per MW • Site specific (associated to wind pattern) • Expensive installation	• Pollution levels are insignificant • Inexpensive power generation • Inexhaustible source • GHG emissions as low as 2.5gCeq/kWh for the Production Chain
Solar Power	• Large land requirement • Site specific to solar insolation • Expensive installation • Concrete foundation on larger area	• Pollution levels are insignificant • Inexpensive power generation • Inexhaustible source • GHG emissions as low as 8.2gCeq/kWh for the Production Chain

Source: International Atomic Energy Agency (IAEA)

8.4.1 *Greenhouse Gases (GHG) Emission*

As per the estimations of International Atomic Energy Agency (IAEA) the grams of carbon-equivalent (including CO_2, CH_4, N_2O, etc.) per kilowatt-hour of electricity (gCeq/kWh) for wind energy project are low and scores better when compared with other forms of conventional and non-conventional sources of energy. ***Table 8.2*** highlights the advantages and disadvantages along with GHG emissions that each technology possesses.

Considering various factors such as wind resource potential in the project districts; favourable environmental and social settings; low GHG emissions in the project life cycle; land availability, governmental assistance, and local community's acceptance of wind energy projects over the last decade in the region, wind energy based power generation is the most appropriate alternative.

Table 8.2 Green House Emissions from Different Electricity Production Chains

Technology	Mean tonnes (CO_2e/GWh)	Low tonnes (CO_2e/GWh)	High tonnes (CO_2e/GWh)
Lignite	1054	790	1372
Coal	888	756	1310

Technology	Mean tonnes (CO_2e/GWh)	Low tonnes (CO_2e/GWh)	High tonnes (CO_2e/GWh)
Oil	733	547	935
Natural Gas	499	362	891
Solar PV	85	13	731
Biomass	45	10	101
Nuclear	29	2	130
Hydroelectric	26	2	237
Wind	26	6	124

Source: World Nuclear Association (WNA)

8.4.2 Water Consumption

The water requirements for producing the different primary energy carriers vary; also, there are significant differences between the different types of electricity generation. Several evaluation methods are being employed to assess the footprint of electricity generation through various ways. The methods are often referred to those by the developed regions to compare energy and water uses; where certain measurements and statistics are a common and accepted practice.

Solar and wind power projects have been known to use almost insignificant water, in comparison to nuclear and coal based power projects. Wind farms require small amounts of water are used to clean wind turbine rotor blades in arid climates (where rainfall does not keep the blades clean).

According to the American Wind Energy Association (AWEA), wind therefore uses less than 1/600 as much water per unit of electricity produced as does nuclear, and approximately 1/500 as much as coal. As per AWEA, water consumption (technology gallons/MWh) is as follows: Nuclear – 620; Coal – 490; Oil – 430; Wind – 1; Solar – 30.

8.4.3 Carbon Offsetting

Hydro, solar and wind energy projects help in offsetting CO_2 emissions from conventional power generation. According to National Renewable Energy Laboratory, 1 MW of wind energy results in 2600 tons of CO_2 offsetting. In case of MEIL, 90.4 MW can offset approximately 234200 tons CO_2 annually

8.4.4 No-Go Alternative

Per the Load Generation Balance Report, 2014-2015 of CEA, there was a power deficit of 20,864 MW (6.3%) in the Northern region (1) during the year 2014-2015. For 2013-14 it faced a shortage of 18,583 MW (6.0%) and for 2015-16, the Northern Region is again forecasted to suffer a shortage of 0.4%.

(1) Northern region consists of State grids of Delhi, Rajasthan, Haryana, Himachal Pradesh, Jammu & Kashmir, Punjab, Uttarakhand and Uttar Pradesh.

As per the same report, Rajasthan faced a shortage of 0.3% in actual power demand in the year 2013-14 and 0% in 2014-15. Further, the state is forecasted to have an excess of power in 2015-16 as shown in ***Table 8.3***.

Table 8.3 ***Actual Power Supply Position in Rajasthan during 2014-2015 and Anticipated Power Supply Position in 2015-2016***

Details	2014-15		2015-16	
	Energy (MU)	**Peak (MW)**	**Energy (MU)**	**Peak (MW)**
Requirement	65,717	10,642	72,132	11,000
Availability	65,310	10,642	74,470	11,128
Surplus (+/-) Deficit	-407	0	2,338	128
Surplus (+/-) Deficit %	-0.6%	0	3.2	1.2

Source: Load Generation Balance Report (2015-2015), CEA

It is evident from the discussion and ***Table 8.3*** that while Rajasthan is moving towards self-sufficiency in power generation, the Northern region is likely to remain in power deficit. Under these circumstances the state of Rajasthan, apart from satisfying own power needs, can also turn into an exporter of electricity, thereby increasing state revenue.

As the wind farm is a part of the proposed power supply in 2015-16, in the scenario of no wind farm project, the State Government will not be able to promise self-sufficiency in electricity supply, let alone selling electricity to Northern region.

8.5 CONCLUSION

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

- The Project will be environment friendly with minimal greenhouse gas emissions;
- It is the most feasible and choice of power generation in the state; and
- It will contribute towards the state of Rajasthan attaining self-sufficiency in power supply and generating a revenue stream through sale of excess electricity to power-deficient states in the Northern region.

A brief climate change risk assessment analysis for the Project Nidhi is attached as ***Annexure C.***

This section provides an outline of the engagement with the stakeholder groups undertaken as part of the assessment process and the key issues identified from the same.

"Stakeholder Analysis" is understood as the process of identifying the individuals or groups that are likely to affect or be affected by a proposed project, and sorting them according to their impact on the project and the impact the project will have on them. This information is then used to assess the manner in which the interests of the stakeholders should be addressed in the project plan, policy, program, or other action.

The importance of such an analysis lies in the role played by this understanding in the assessment of the socio-political environment surrounding the project. It allows for the:

- Identification of key stakeholders, their primary groupings and sub groupings;
- Identification of the interests, concerns and potential risks surrounding the stakeholders, as well as conflicts of interests (if any);
- Identification of relations between stakeholders that may enable "coalitions" of project sponsorship, ownership and co-operation as well as the mechanisms which may have a role in influencing other stakeholders;
- Key groups/ individuals to be pin pointed who need to be informed about the project;
- Identifying stakeholders (those who are likely to have an adverse impact on the project) and taking appropriate measures to combat their influence;
- Identification of the impact and influence of the project on the stakeholders and of the stakeholders on the project;
- Generation of information essential to the planning, implementation and monitoring of the project; and;
- Development of a framework for participatory planning and implementation of various project activities.

9.1 STAKEHOLDER IDENTIFICATION AND CHARACTERIZATION

A stakeholder is "a person, group, or organization that has a direct or indirect stake in a project/organization because it can affect or be affected by the Project/organization's actions, objectives, and policies". Stakeholders thus vary in terms of degree of interest, influence and control they have over the project. While those stakeholders who have a direct impact on or are directly impacted by the project are known as Primary Stakeholders, those who have an indirect impact or are indirectly impacted are known as Secondary

Stakeholders. Keeping in mind the nature of the project and its setting, the stakeholders have been identified and listed in the table given below.

Table 9.1 Stakeholder Group Categorization

Category	Primary Stakeholder	Secondary Stakeholder
Community	• Local Community • Vulnerable Groups • Opinion Makers and Community Leaders	
Institutional Stakeholders	• Local Gram Panchayats • Village Development Committees	• Village Institutions • Political Parties
Government Bodies	• Regulatory Authorities • District Administration	• State Administration
Other Groups	• Contractors and Sub Contractors • Contractual workers	• Other wind power projects • Media

9.1.1 Stakeholder Mapping

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

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

On the basis of such an understanding, the stakeholders are categorised into High Influence/Priority, Medium Influence/ Priority and Low Influence/Priority. The stakeholders who are categorized as high influence are those who have a high influence on the project or are likely to be heavily impacted by the project activities, and are thus high up on the project proponent's priority list for engagement and consultation. Similarly, the stakeholders categorized as medium influence are those who have a moderate influence on the project or even though they are to be impacted by the project, it is unlikely to be substantial and these stakeholders are thus neither high nor low in the project proponent's list for engagement. On the other hand, the stakeholders with low influences are those who have a minimal influence on the decision making process or are to be minimally impacted by the project and are thus low in the project proponent's engagement list. For the purpose of this assessment, the following table provides the stakeholder mapping for the construction and operations phase of the project.

Table 9.2 Stakeholder Profile and Opinions

Relevant Stakeholders	Profile	Concern and Expectations from the project	Influence of Stakeholder on Project	Influence of Project on Stakeholder	Influence Rating
Primary Stakeholders					
Local Community	This stakeholder group is comprised of the local community living in the study area, including the villages of Habur, Serawa and Mokal. The local community is characterised by a population of 4104 individuals across 693 households. The population is characterised by a dominance of Hindu population, with a small proportion of SC and ST groups. The main caste groups in the local community are Rajputs, Meghwals, Suthars, Manganiyars, with Rajputs being in majority	The expectations and concerns of this group from the project: • Receiving benefits from the project in terms of employment and development of infrastructure and the community • Preference to the local community in contractor and employment opportunities from the project • Regular updates on the project activities and the opportunities from the same • Minimal disturbance to the community in regards to access issues, pollution and influx of migrant workers	• The local community's support of the project and its activities is extremely crucial to ensure smooth functioning of the project and meeting of the timelines for the project. • In the past, the local community has been reported to create road blockades and disrupt other project activities in cases where the local community was not given preference in economic opportunities	• Though a number of other wind power projects already exist in the area, the project can play a critical role in the development of the community through economic opportunities and CSR projects	Influence of Stakeholder: High Influence of Project: High/Medium
Vulnerable Groups	This group is comprised of those groups/households considered to be vulnerable due to their social, political or economic status in society. This group in the study area is primarily comprised of the women population, women headed households in the village and the families below the poverty line.	The key expectations and concerns of the group from the project include: • Receiving benefits from the project in terms of economic opportunities and development programmes • Access to the economic opportunities and development programmes because of their status in the society • Regular updates on the project activities and the opportunities from the same • Minimal disturbance to the community in regards to access issues, pollution and influx of migrant workers	• This group's influence on the project stems from the group being part of a larger community	• The project may play a critical role in the development of these groups, by identifying specific opportunities and programmes for the group	Influence of Stakeholder: Low Influence of Project: High
Opinion Makers and Community	This stakeholder group is comprised of those individuals of the local	The expectations and concerns of this group from the project:	• This group may play a critical role in the opinion	• Though a number of other wind power	Influence of Stakeholder:

Relevant Stakeholders	Profile	Concern and Expectations from the project	Influence of Stakeholder on Project	Influence of Project on Stakeholder	Influence Rating
Leaders	community who hold traditional and rational power. These stakeholder group members include the elders, community and political leaders in the village and play a critical role in the decision making in the local community	• Receiving benefits from the project in terms of employment and development of infrastructure and the community • Preference to the local community in contractor and employment opportunities from the project • Regular updates on the project activities and the opportunities from the same • Minimal disturbance to the community in regards to access issues, pollution and influx of migrant workers	formation towards the project and the achievement of a 'social license to operate' • In the past, the local community has been reported to create road blockades and disrupt other project activities in cases where the local community was not given preference in economic opportunities • The stakeholder may also an important role in the implementation of the development and CSR activities planned and the implementation of the management plans such as stakeholder engagement and grievance management	projects already exist in the area, the project can play a critical role in the development of the community through economic opportunities and CSR projects • These groups due to their social status, may already have access to a number of economic benefits from the other wind power projects, and thus may not be completely dependent upon the Project	High Influence of Project: Medium
Local Gram Panchayats	This stakeholder group is comprised of the lowest level of local governance. The gram panchayats consist of one or more revenue villages and are the lowest level of decision making bodies for development activities in the villages	The expectations and concerns of this group from the project: • Receiving benefits from the project in terms of employment and development of infrastructure and the community • Formulation of community development programmes in consultation with the Gram Panchayat and the local community • Preference to the local community in contractor and employment opportunities from the project • Regular updates on the project	• While the wind power projects are not legally required to obtain a NoC from the Gram Panchayats for setting up of project, these groups are important for the formulation of public opinion and for the 'social license to operate' of the project • The stakeholder may also an important role in the implementation of the	• A number of wind power projects exist in the area, which have initiated community development activities in the villages.	Influence of Stakeholder: High Influence of Project: Medium

Relevant Stakeholders	Profile	Concern and Expectations from the project	Influence of Stakeholder on Project	Influence of Project on Stakeholder	Influence Rating
		activities and the opportunities from the same • Minimal disturbance to the community in regards to access issues, pollution and influx of migrant workers	development and CSR activities planned and the implementation of the management plans such as stakeholder engagement and grievance management		
Village Development Committees	This stakeholder group is comprised of the committees set up by the local community for the implementation of the CSR activities of the wind power projects and the utilization of the trust fund set up by the wind power projects in the area	The key expectations and concerns of this group from the project include: • Being involved in the identification and planning for community development and CSR activities • The development and CSR funds should be made available to the VDC in a timely manner, so as to allow for the smooth implementation of the activities planned • Regular updates on the project activities and the opportunities from the same • Minimal disturbance to the community in regards to access issues, pollution and influx of migrant workers	• This group's influence on the project will pertain to the efficacy with which the VDC implements the development and CSR activities and the manner in which the funds are utilized. This may play an important role in the formulation of public opinion towards the project and its activities • The group may also play an important role in the implementation of the management plans such as stakeholder engagement and grievance management and in the formulation of public opinion towards the project	• The influence of the project on the stakeholder group pertains to the process of making available adequate funds for the implementation of the programmes identified by the committee	Influence of Stakeholder: High Influence of Project: Medium
Regulatory Authorities	This stakeholder group is comprised of the central, state and district level regulatory authorities. These authorities influence the project in terms of establishing policy, granting permits and approvals for the project, monitoring and enforcing compliance	The key expectations and concerns of the group from the project include: • Project's compliance to the regulatory requirements • Timely disclosure of information and provisioning of updated through the life of the project	• The failure of the project to comply with the various rules and regulations applicable is instrumental for the timely implementation of the project	• The influence of the project on the stakeholders pertains to the role the project will play in the development of wind energy in the area	Influence of Stakeholder: High Influence of Project: Low

Relevant Stakeholders	Profile	Concern and Expectations from the project	Influence of Stakeholder on Project	Influence of Project on Stakeholder	Influence Rating
	with the applicable rules and regulations		• This stakeholder group is also critical for the obtaining of the various permits/clearances required for the commissioning of the project		
District Administration	This stakeholder group is comprised of the government bodies at the district level. These bodies are vested with funds and decision making authority through the decentralization process. Accordingly the bureaucracy under the Block Development Officers, Block Health Officers, Tehsildaar, Patwari, Revenue Officer have become extremely influential.	The key expectations and concerns of the group from the project include: • Project's compliance to the regulatory requirements • Timely disclosure of information and provisioning of updated through the life of the project	• This stakeholder group is also critical for the obtaining of the various permits/clearances required for the commissioning of the project • This group serves as important points of contact between the state level authorities and the local community	The influence of the project on the stakeholders pertains to the role the project will play in the development of wind energy in the area	Influence of Stakeholder: High Influence of Project: Low
Contractors and Sub-Contractors	This stakeholder group is comprised of agencies/organizations retained by MEIL for the various stages of the projecct. The largest entity within this group is GE, who is executing the WTG erection and operations and maintenance activities for the project.	The primary concerns and expectations of the group from the project include: • the role of the project in continued economic opportunity and work generation • any reputational risks associated with the project due to any future community unrest or project activities • clarity in terms of scope of work, expectations, key performance indicators and timelines • timely and adequate disclosure of information to allow the project activities to be carried out • fair business opportunities and contract closure • business continuity	• this stakeholder group is critical for the smooth functioning and timely implementation of the project • this group may also play an important role in the formation of public opinion towards the project	The influence of the project on the group pertains to the role of the project in business opportunities and the process of contract closure	Influence of Stakeholder: High Influence of Project: High

Relevant Stakeholders	Profile	Concern and Expectations from the project	Influence of Stakeholder on Project	Influence of Project on Stakeholder	Influence Rating
Contractual workers	This group is comprised of skilled and semi-skilled workers, involved in the project on a contractual basis. This group is most likely to be comprised of the semi-skilled workers involved in the foundation activities, access road construction and security of the WTGs. These workers are mostly from nearby areas, however, there are migrant workers involved, especially for skilled jobs pertaining to steel works.	The primary concerns and expectations of the stakeholder group pertaining to the project is as follows: • the role of the project in continued economic opportunity, work generation and a source of income • timely settlement of dues and payments in keeping with the legal requirements • continued work opportunities • safety at work	• This stakeholder group is critical for the smooth functioning and timely implementation of the project • this group may also play an important role in the formation of public opinion towards the project	The influence of the project on the group pertains to the roles of the project in the continuance of economic opportunities, timely payment of wages and ensuring the health and safety of the workers	Influence of Stakeholder: Medium Influence of Project: High
Secondary Stakeholders					
Village Institutions	This stakeholder group is comprised of health and education institutions at the village level. The institutions in the immediate vicinity of the project are the primary schools in the villages	The main concerns and expectations of the group from the project pertain to: • Adequacy of community development activities in the area • Contribution of the project towards the overall development of the area • Involvement in the formulation and implementation of the community development activities • Timely and adequate disclosure of information pertaining to the project	• The influence of the group on the project pertains to the role of the played by these institutions in the opinion formation and implementation of community development programmes and CSR activities	• The influence of the project on the group pertains to the role of the project in the development of these institutions	Influence of Stakeholder: Low Influence of Project: Medium
Political Parties	This stakeholder group is comprised of political parties which are active in the area. this group plays a critical role in the sensitization of the population and the creation of the public opinion	The key expectations and concerns of the group from the project include: • the role of the project in the overall development of the area • the impact of the project on the local community • adequate community development activities throughout the life of the project • Timely disclosure of information pertaining to the project activities	The influence of this stakeholder group on the project pertains to the role of the political parties in the formulation of public opinion towards the project	The influence of the project on the group is expected to be extremely limited, pertaining to the role of the project in the development of the area	Influence of Stakeholder: Low Influence of Project: Low
State	The state administration is comprised	The main expectations and concerns of the	This stakeholder group is also	The influence of the project	Influence of

Relevant Stakeholders	Profile	Concern and Expectations from the project	Influence of Stakeholder on Project	Influence of Project on Stakeholder	Influence Rating
Administration	of the state level agencies of the various departments/authorities such as industries department, revenue department, labour department and land department etc.	stakeholder group from the project include: • Compliance to the regulatory requirements for the project • Project's role in the development of the area • Timely disclosure of information pertaining to the project activities	critical for the obtaining of the various permits/clearances required for the commissioning of the project	on the stakeholders pertains to the role the project will play in the development of wind energy in the state	Stakeholder: High Influence of Project: Low
Other wind power projects	The other wind projects in the area include those by Ostro and Suzlon. The first wind power project in the area was set up in 2011.	The key expectations and concerns of the stakeholder group from the project include: • The role of the project on the community's perception towards wind power projects in the area and their relations with the same • Compliance with the regulatory requirements and legal provisions specific to the project • Maintenance of positive relationship with the local community and other stakeholders	The key influence of this stakeholder group on the project pertains to the role of other wind power projects in the area in the opinion generation towards wind power projects	The project's influence on the stakeholder group pertains to the project's role in opinion formation towards wind power project	Influence of Stakeholder: Low Influence of Project: Low
Media	The media, comprising of both print and visual media, has a significant presence in the district. They are known to have played an extremely important role in generating awareness amongst the community.	The main expectations and concerns of the stakeholder from the project include: • Compliance to the regulatory requirements for the project • Project's role in the development of the area • Maintenance of positive relationship with the local community and other stakeholders • Timely disclosure of information in regards to the project activities	The influence of the stakeholder group on the project is likely to pertain to the opinion formation amongst other stakeholders towards the project	The influence of the project on the stakeholder is likely to be extremely limited due to the nature of the project activities	Influence of Stakeholder: Low Influence of Project: Low

9.2 *ENGAGEMENT PROCESS PRE IMPACT ASSESSMENT*

For the purpose of these projects, the engagement of the local ocmmunit by the developers was restricted to public meetings held in the villages whose land was impacted.

- These meetings were aimed at providing an understanding of the project and its potential impacts.
- As part of these meetings, the project developers and local community also decide on the community development activities to be undertaken by the developer and the manner in which they would be implemented.
- For the purpose of implementing the activities thus identified, Village Development Committees were set up.
- These committees are self-appointed by the local community and include representatives of the various social groups; including vulnerable groups such as women and Below Poverty Line families.

Figure 9.1 Public Meetings with the Local Community at Habur By MEIL

Source: MEIL Project Nidhi team

For the purpose of the Project, MEIL held open meetings with the local community to discuss the project and its implications on the community. The first meeting for the project was held in 2014, while the final meeting was held on 3rd July 2015, prior to the commencement of the construction activities for the substation and access road.

- As part of these meetings, an understanding was provided of the project, its purpose, land requirements and the potential impacts on the community.

- On the basis of this understanding, the community provided a verbatim agreement to the project and identified certain key areas for CSR involvement by the company.
- A village Development Committee was set up to channelize funds for community development. Furthermore, the CSR activities are being conducted through the VDC in each village.
- As part of these meetings, the involvement of the community in the project was also discussed, in terms of manual labour, contracting opportunities for construction activities and vehicles to be hired by the project.

9.3 *ENGAGEMENT PROCESS AS PART OF THE IMPACT ASSESSMENT*

As discussed in ***Section 10***, during the pre-construction phase of the project, the project team undertook a number of meetings with the local community. This sub section provides an understanding of the engagement activities undertaken as part of the ESIA process.

Figure 9.2 Consultations undertaken as part of the ESIA Process

Source: ERM Site Visit, July 2015

For the purpose of the ESIA for the project, the consulting firm undertook consultations with a number of stakeholders. The Minutes for the same have been attached as ***Annexure D***.

Table 9.3 Consultations undertaken as part of the ESIA

Date	Stakeholder Group
12-07-2015	FGD with women group (Habur)
12-07-2015	Discussion with village leaders (Habur)
13-07-2015	FGD with local community (Serawa)
13-07-2015	FGD with local community (Mokal)
13-07-2015	FGD with women group (Mokal)
14-07-2015	Discussion with member of Village Development Committee (Habur)

As part of these consultations an attempt was made to develop an understanding of the stakeholder group's key concerns and expectations from the project, the group's perception of the project and wind power projects in general and to triangulate the secondary information available in the area.

9.3.1 Key Issues Identified

As part of these consultations, some key issues and concerns were identified, and are discussed as follows:

- **Preference for wind power projects over solar power projects:** according to the discussions with the local community representative it was understood that the community prefers wind power projects over solar power projects. The reason attributed for this preference is that while solar power projects are set up over larger contiguous patches of land, wind power projects are scattered in terms of their land footprint. As a result of this, while solar power projects are perceived as projects which will result in loss of access to grazing land, wind power projects are not perceived as resulting in such as loss.
- **Preference to local community in employment**: The local community representatives were of the opinion that as the wind power projects are being set up in their village land, the local communities should be given preference in terms of employment opportunities and small contractors. The community was of the opinion that the semi-skilled and unskilled should be given on a priority to the local community members, in addition to contracts for vehicles and the construction of the internal access road. It was reported that the local community does not allow cars from outside their villages to be used for the wind power projects in the area, resorting to road blocks in case a car is hired from Jaisalmer or other villages in the area.
- **Community development activities:** The representatives were of the opinion that apart from the economic opportunities, the local community should also benefit from the project in terms of community development activities. For this purpose, the community based Village Development Committee undertakes development activities from the funds set up by the Projects in the area. Some of the key areas for development activities identified included, sanitation, access to middle and higher schools, separate schools for girls and trainings for youth and women.

10 GRIEVANCE REDRESSAL AND ENGAGEMENT WITH THE COMMUNITY

Grievance management is an important component of any project's implementation. Over the duration of a project lifecycle, it encounters numerous instances of conflicts, allegations and dissatisfaction within the working and associated human capital and their interactions. Some of the common areas of grievance include timely payment of wages and compensation, failure to fulfil commitments and poor management of construction activities, accidents due to inappropriate planning of vehicle movement. There are also a number of other wind power projects in the area, including those of Suzlon Energy and Ostro Energy, the first of which was started in 2011. This may have an impact on the nature of the relationship and grievances.

Presently, MEIL does not have a formal grievance redressal mechanism in place for external stakeholders. In order to manage these risks, MEIL needs an internal mechanism to allow the aggrieved party/s to lodge their complaints and get them amicably settled prior to approaching the formal legal mode of solutions.

However, according to the consultations undertaken with the local community and the project team, it was understood that the public meetings were used by the local community to voice any concerns. The local community representatives are also reported to have access to the contact information of the project team, who they approach on a need basis in case of any concern/grievance. However, this is an informal process and no records of such communication are maintained. For the remaining project lifecycle, a formal grievance redressal mechanism has been put in place for the project.

10.1 OBJECTIVES OF THE GRIEVANCE REDRESSAL MECHANISM

The primary objective of the mechanism shall be to provide an accessible mechanism to the stakeholders of the project and resolve any social and environmental related grievances. For this purpose, a Grievance Redressal Cell (GRC) shall be established, to resolve non-judicial disputes arising out of various matters related to the implementation of the ESMP, as well as other aspects of the project, as deemed fit to be raised before the GRC.

10.2 COMPOSITION OF THE GRC

The GRC will be driven internally by the Project team and shall have representation from the following teams to ensure fair and timely solution to the grievances:

- Site Manager/Project Manager

- EHS Officer
- Community Relations Officer
- Senior representation on behalf of the Project Company
- Any other concerned person with decision making authority in relevance to the grievance or aggrieved party

The Project Manager (Mr Swaran Kumar, +91- 9515113452) will serve as the Grievance Officer and will head the GRC for the project. The aggrieved party shall register their grievances with the GRC. The GRC shall be empowered to take a decision which is to be considered final and binding on the Project. However, the decision of the GRC is not binding on the aggrieved person and he or she may take the grievance to the administrative setup in case any grievance channel is available at that level or take a legal course, in case not satisfied with the outcome of GRC decision.

10.3 FUNCTIONING OF THE GRC FOR GRIEVANCE REDRESS

The GRC meetings will be held on a regular basis (atleast monthly) at the Projeect's site office. The key responsibilities of the GRC shall be as follows:

- Receive, review, consider and resolve grievances related to the social and environmental aspects of the project
- Entertain grievances of indirectly affected persons and/or persons affected during project implementation;
- Resolve grievances within a period of two weeks at the GRC level and communication of the resolution to the aggrieved party;
- The GRC shall not engage in any review of the legal standing of an "awardee" nor shall deal with any matters pending in the court of law;
- Arrive at decisions through consensus, failing which resolution will be based on majority vote. Any decision made by the GRC must be within the purview of Environmental Management Plan, Corporate EHS and Social Policies or any such documents of relevance of that matter;
- In case the grievance relates to environmental monitoring results or engineering matters, the GRC will validate the information available to it, as provided by the Project Company's Project management team/ environmental monitoring team. However, GRC will not be in a position to question the validity of the data provided to it.
- If needed, may undertake field visits to verify and review the issues, disputes or other relevant matters

10.4 PROCESS OF RECEIVING AND ADDRESSING GRIEVANCES

The grievance redressal mechanism will be disclosed to the community as part of the information disclosure and engagement process, verbally (through community meeting s and discussions with Panchayat) and through flyers across the villages. The mechanism for grievance redressal will allow for grievances/ complaints to be received in written or verbal form. For this

purpose, complaint registers will be maintained at the security gates of the project site office. Complaint drop boxes will also be established in the community, in consultation with the local stakeholders. In addition to this, the stakeholders will also have access to the GRC contact details and will be able to record their grievances in a verbal manner.

The GRC will open the drop boxes and registers on a weekly basis. On receipt of complaint the GRC shall give an acknowledgment to the complainant with date, time and venue of hearing his/her grievance. The GRC shall prepare a brief note on the grievance for discussion on scheduled date. On the given date, the GRC shall hear the complainant and give its decision. A written copy of decision shall be provided to the complainant. If the complainant is satisfied with the decision, an acknowledgement of same shall be obtained from him on the decision copy and the case shall be closed.

While every effort shall be made to resolve the complaint amicably, if the complainant is not satisfied with the outcome of GRC's decision, he or she can opt for any grievance redress forum available at the administrative level or any other arbitration mechanism with mutual agreement. If these alternative mechanisms of resolution of conflict fails, then the aggrieved person may take legal recource However, every effort shall be made to resolve the case amicably without resorting to legal course of action. While the process continues, a proper documentation of the records shall be maintained by the project company, pertaining to each of the grievance in a proper grievance register or record.

10.5 MONITORING AND EVALUATION

Like the other project components, the GRM shall be regularly monitored to ensure that the stakeholders are having no or limited issues with the project and in case there are concerns, they are being adequately addressed as per the mandate. In order to keep track on the effectiveness of GRM, it is the responsibility of the Project Company's Environment and Social team to compile and maintain database on grievances for periodic review. The mechanism shall be based on two components, internal monitoring and reporting and external monitoring and reporting which shall run simultaneously. Mostly this shall be aligned with simultaneous process monitoring rather than doing it separately all the time.

10.6 BUDGETING

MEIL shall ensure adequate budgeting and resource allocation for implementing the GRM.

11 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

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

11.1 THE COMPANY'S ORGANIZATIONAL STRUCTURE

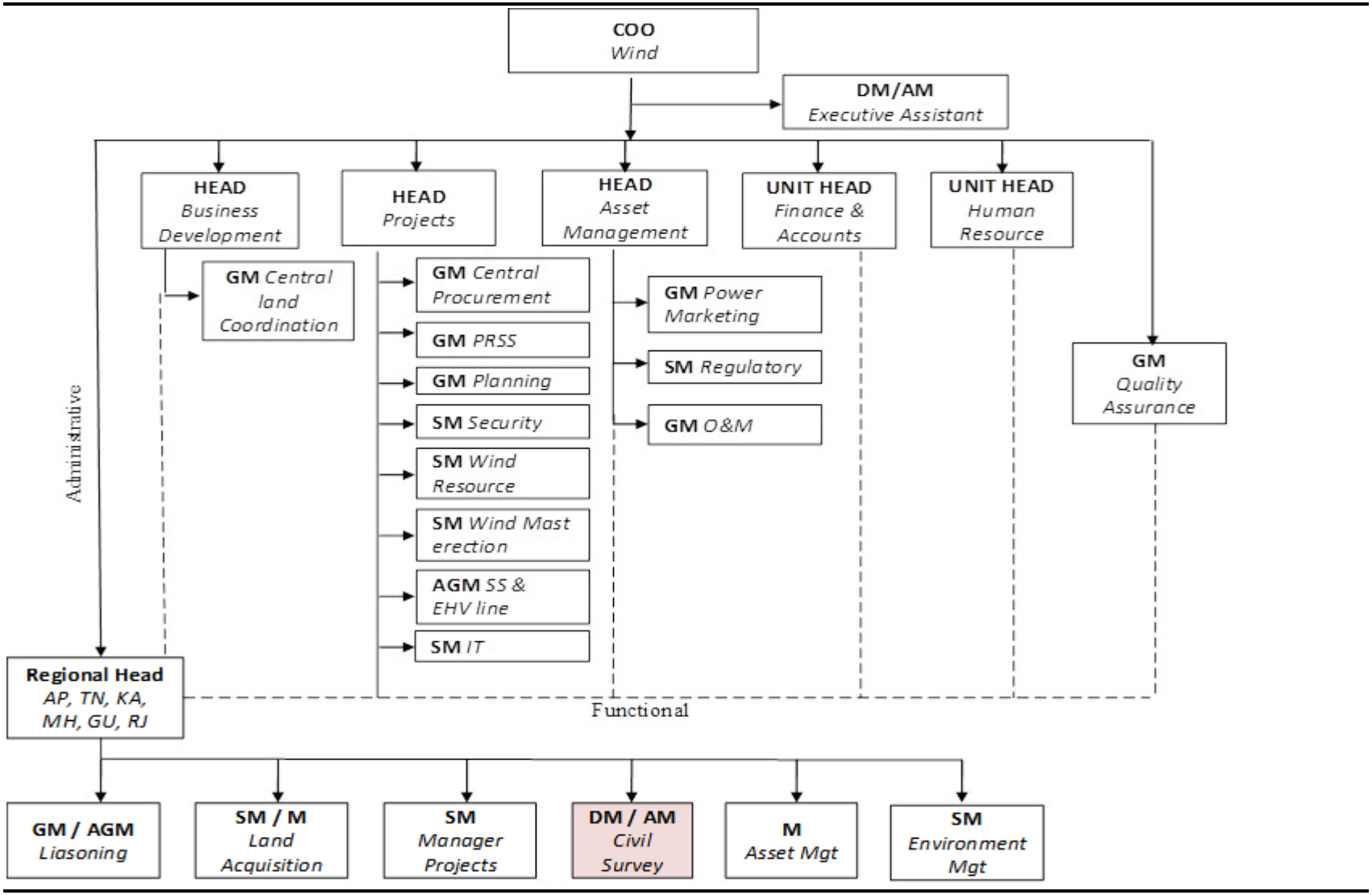
To ensure the efficacy of Environmental and social management plan, certain institutional mechanism with well-defined roles and responsibilities is essential for effective implementation of identified mitigation measures both during construction and operation phases.

The organizational structure for environmental management at proposed wind farm is defined below and is subject to change depending on staffing allowance and budgets and will be reviewed on an annual basis to ensure that effective environmental management is accomplished.

11.1.1 MEIL Management

MEIL has put an organisational structure in place with roles and responsibility for each of the verticals identified at the corporate. The following ***Figure 11.1*** provides a schematic representation of the organizational structure of MEIL at the corporate. The site organization structure can be referred from ***Figure 2.6.***

Figure 11.1 Organization Structure of MEIL at Corporate



11.1.2 Roles and responsibilities of EHS Department

MEIL will have a corporate EHS Head, who will be responsible for ensuring the implementation of the ESMP.

In addition to the Corporate EHS head, MEIL will have in place regional and project level Engineers looking after EHS. The roles and responsibilities include the implementation of the ESMP, either by MEIL directly or through its partners or sub-contractors.

The roles and responsibilities of the EHS head and Managers/Project Level Engineers include:

- Develop the training and awareness programme to understand and implement ESMP.
- Monitor processes to ensure that the ESMP accountabilities along with rights and responsibilities of staff and subcontractors are identified, defined, documented, maintained, understood, and applied.
- Be responsible for ensuring that the inputs consistent with the requirements outlined in the ESMP are provided at project conceptualization, planning, costing, contracting, construction and O&M phases.
- Monitor all internal and external complaints related to EHS and community aspects of MEIL's operations are recorded, acknowledged, and investigated as incidents, the complaints are redressed and feedback provided to aggrieved parties.
- Coordinate effective communication of throughout relevant information on EHS issues and social performance to personnel on a regular basis.
- Decision making at all stages to include monitoring corporate and operational site staff and subcontractors on ESMP issues.
- Review the systems in place to identify, prioritize, plan, document, and monitor training needs and performance for staff and subcontractors.

The project level Engineer looking after EHS will work in coordination with the site management, and the site head will report to corporate EHS head and project head.

11.2 INSPECTION, MONITORING AND AUDIT

Inspection and monitoring of the environmental and social impacts of the Project activities will increase the effectiveness of ESMP. Through the process of inspection and auditing, MEIL will ensure that the conditions stipulated in various permits are complied. The inspection and audits will be done by the project identified EHS staff and any other external agencies identified. The entire process of inspections and audits should being documented. The inspection and audit findings are to be implemented by the site In-charge in their respective areas.

11.3 REPORTING AND DOCUMENTATION

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

11.3.1 External Reporting and Communication

The personnel delegated EHS roles shall be responsible for ensuring that the communication with the regulatory agencies and stakeholders is maintained as per the requirement. All complaints and enquiries are to be appropriately dealt with and records be maintained as discussed in ***Section 10***. All communication made to the regulatory agencies shall also be reported to MEIL's regional and corporate EHS head.

11.3.2 Internal Reporting and Communication

Internally, the personnel delegated EHS roles will share inspection and audit findings with their suggested measures regularly to the senior management for their consideration. The same are also to be communicated within the staff working on the project. To maintain an open communication between the staff and management on
EHS and social issues the followings are being used:

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

11.3.3 Documentation

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

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

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

11.3.4 ESMP Review and Amendments

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

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

11.4 TRAINING PROGRAMME AND CAPACITY BUILDING

Training is needed for effective implementation of ESMP. The training programme will ensure that all concerned members of the team understand the following aspects:

- Purpose of management plan for the project activities;
- Requirements of the management plan and specific Action Plans;
- Understanding of the sensitive environmental and social features within and surrounding the project areas; and
- Aware of the potential risks from the Project activities.

The corporate EHS head through designated personnel will ensure that Environmental health and safety induction training and job specific trainings are identified and given to the concerned personnel for construction activities and during operations of the wind farm.

Also general environmental awareness will be increased among the project's team to encourage the implementation of environmentally sound practices and compliance requirements of the project activities. This will help in minimising adverse environmental impacts, compliance with the applicable regulations and standards, and achieving performance beyond compliance. The same level of awareness and commitment will be imparted to the contractors and sub-contractors prior to the commencement of the project.

11.5 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

This section outlines the potential adverse impacts, mitigation measures, monitoring and management responsibilities during construction and operation phases of the Project.

The purpose of ESMP is to:

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

In order to minimize adverse impacts during different phases of project lifecycle, mitigation measures, monitoring plan and responsibilities for its implementation are given in ***Table10.1*** below. The approximate costs of EMP implementation have been estimated to be INR 6 Lakhs and 5 Lakhs for the construction and operation phase respectively by MEIL. In case any additional studies are required budget will be allocated accordingly.

Please note the ESMP has mainly focussed on impacts with minor and moderate impacts, for the impacts with negligible significance, mitigation measures have already been captured under impacts section and minimal monitoring should be sufficient. If monitoring indicates any escalation of an impact classified as having a negligible impact, MEIL will ensure that the ESMP is updated to management of the impact.

Table 11.1 Environmental and Social Management Plan for Project Nidhi – Pre Construction and Construction phase

S. N.	Environment /Social Parameters/Project Activities	Impacts/Issue	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines /frequency of Monitoring	Responsibility for implementation of monitoring	Supervision responsibility	Reporting Requirements
1.1	**Land Use**								
1.1.1	Change in Land use-Land disturbance to be restricted to the footprint	Change in land use	• Construction activities should be restricted to designated area.	MEIL through sub-contractors	Site inspection	Weekly	EHS- MEIL	EHS - MEIL	To be included in bi-weekly progress report
1.1.2	Restoration of disturbed area to original form to the extent possible after completion of construction work	Change in land use	• On completion of construction activities, land used for temporary facilities will be restored to the extent possible	MEIL, Sub Contractors	Visual Assessment	Monthly	EHS - MEIL	EHS - MEIL	Monthly Progress Report
1.2	**Land and Soil**								
1.2.1	Improper management of solid wastes	Soil contamination	• Municipal domestic waste generated at site to be segregated onsite • The sub-contractors will ensure daily collection and weekly disposal of construction waste generated debris, concrete, metal cuttings wastes, waste/used oil etc.; • The municipal waste from the labour camp	MEIL, Sub Contractors	Site Inspection; Record Keeping Training records; Visual Assessment	Monthly	EHS - MEIL	EHS - MEIL	Monthly Progress Report

S. N.	Environment /Social Parameters/Project Activities	Impacts/Issue	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines /frequency of Monitoring	Responsibility for implementation of monitoring	Supervision responsibility	Reporting Requirements
			will be routed through proper collection and handover to local municipal body for further disposal						
1.2.2	Improper management of hazardous waste	Soil Contamination	• Hazardous waste will be properly labelled, stored onsite at a location provided with impervious surface, shed and secondary containment system as per in accordance to Hazardous Wastes Rules, 2008 • Disposal of hazardous wastes will be done strictly as per the conditions of authorisation granted by RSPCB • Hazardous waste will be disposed routinely through approved vendors and proper records will be maintained of the same	MEIL, Sub Contractors	Site Inspection; Record Keeping Training records; Visual Assessment	Monthly	EHS - MEIL	EHS - MEIL	Monthly Progress Report
1.2.3	Impacts due to leaks and spills	Soil Contamination	• spill control kits will be used to contain and clean small spills	MEIL, Sub Contractors	Site Inspection; Record	Monthly	EHS - MEIL	EHS - MEIL	Monthly Progress Report

S. N.	Environment /Social Parameters/Project Activities	Impacts/Issue	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines /frequency of Monitoring	Responsibility for implementation of monitoring	Supervision responsibility	Reporting Requirements
			and leaks • The sewage generated onsite will be treated and disposed through septic tanks and soak pits as per specifications given in IS 2470: 1995 (Part I and II). • Transport vehicles and equipment shall undergo regular maintenance to avoid any oil leakages • unloading and loading protocols should be prepared for diesel, oil and used oil respectively and workers trained to prevent/contain spills and leaks.		Keeping Training records; Visual Assessment				
1.5	**Water Resource and Quality**								
1.5.1	Water Conservation Contamination due to unmanaged release of sanitary waste water.	Loss of water Resource Site and Ground water Contamination	• Construction Labour deputed onsite to be sensitized about water conservation and encouraged for optimal use of water • The provisions of	MEIL, Sub Contractors	Site Inspection; Training records; Visual Assessment	Monthly	EHS - MEIL	EHS - MEIL	Monthly Progress Report

S. N.	Environment /Social Parameters/Project Activities	Impacts/Issue	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines /frequency of Monitoring	Responsibility for implementation of monitoring	Supervision responsibility	Reporting Requirements
			septic tank and soak pits will be provided (as per specifications given in IS 2470 1995 Part I and Part II) onsite for treatment and disposal of sewage, thereby minimizing the impacts of wastewater discharge. Planning of toilets, soak pits and septic tanks, waste collection areas should be away from natural drainage channels; • Ensure proper cover and stacking of loose construction material at Batching plant site and WTG's site to prevent surface runoff and contamination of receiving water body; • Use of licensed contractors for management and disposal of waste						

S. N.	Environment /Social Parameters/Project Activities	Impacts/Issue	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines /frequency of Monitoring	Responsibility for implementation of monitoring	Supervision responsibility	Reporting Requirements
			and sludge; • Labourers will be given training towards proactive use of designated areas/bins for waste disposal and encouraged for use of toilets. Open defecation and random disposal of sewage will be strictly restricted • Regular inspection for identification of water leakages and preventing wastage of water from water supply tankers. • For construction uses, the low quality water will be blended with fresh water • Recycle and reuse of water to the extent possible.						
1.6	**Impact on Air Quality**								
1.6.1	Dust emissions from construction activities	Impact on Air quality	• Preventive measures such as storage of construction material	MEIL, Sub Contractors	Site Inspection; Training	Monthly	EHS - MEIL	EHS - MEIL	Monthly Progress Report

S. N.	Environment /Social Parameters/Project Activities	Impacts/Issue	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines /frequency of Monitoring	Responsibility for implementation of monitoring	Supervision responsibility	Reporting Requirements
			in sheds, covering of construction materials during transportation will be undertaken, for reducing dust as part of the embedded controls. • Emissions from the emergency DG set and other stationary machines will be controlled by ensuring that the engines are always properly tuned and maintained. • Minimize stockpiling by coordinating excavations, spreading, re-grading and compaction activities; • Speed of vehicles on site will be limited to 10-15 km/hr which will help in minimizing fugitive dust emissions due to vehicular movement;		records; Visual Assessment				

S. N.	Environment /Social Parameters/Project Activities	Impacts/Issue	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines /frequency of Monitoring	Responsibility for implementation of monitoring	Supervision responsibility	Reporting Requirements
			• Cease or phase down work if excess fugitive dust is observed. Investigate the source of dust and ensure proper suppression measures; • Proper maintenance of engines and use of vehicles with Pollution Under Control (PUC) Certificate; and • Idling of vehicles and equipment will be prevented As part of periodical monitoring and auditing program, seek and review data pertaining to accidents and incidents involving vehicle fleets of the project.						
1.7	**Ambient noise**								
1.7.1	Noise from construction activities, transportation**, DG sets**	Increased noise levels	• All the noise generating equipment such as DG sets, batching plant etc. will be located away from village settlement. • Normal working	MEIL, Sub Contractors	Site Inspection; Training records; Visual Assessment	Monthly	EHS – MEIL	EHS - MEIL	Monthly Progress Report

S. N.	Environment /Social Parameters/Project Activities	Impacts/Issue	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines /frequency of Monitoring	Responsibility for implementation of monitoring	Supervision responsibility	Reporting Requirements
			hours of construction to be defined (preferable 8 am to 6pm). If work needs to be undertaken outside these hours, it should be limited to activities which do not generate noise;						
1.8	**Ecology and Biodiversity**								
1.8.1	Clearance of vegetation	Impact on wildlife. The land clearance activities for the construction activities lead to removal of vegetation, habitat disturbance for reptiles, resident birds, and mammals	• Pre-construction surveys for bird and bird habitats should be undertaken . • Vegetation clearance shall be limited to the project activity area; • No major vegetation should be removed, alternate route should be planned in case any tree/large shrubs is falling within access road alignment; • Top soil should be stored separately for restoration of the habitat; • Strict prohibition on use of fuel wood and shrubs from nearby	MEIL	Site Inspection; Training records; Visual Assessment	Monthly	EHS - MEIL	EHS - MEIL	Monthly Progress Report

S. N.	Environment /Social Parameters/Project Activities	Impacts/Issue	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines /frequency of Monitoring	Responsibility for implementation of monitoring	Supervision responsibility	Reporting Requirements
			areas as kitchen fuel; • Local grass species should be seeded in disturbed areas during monsoon period.						
1.8.2	WTG foundation laying and WTG component installation, movement of vehicles for transportation of man and material, construction noise due to excavation etc	Impact on habitat, disturbance to fauna and flora	• It is suggested to start the project in phased manner; • Good housekeeping should be followed for construction activities, waste packaging material should be properly disposed; • Efforts should be made to minimize construction noise should be made; • Labour movement should be restricted between construction camps and construction sites; • Proper training shall be provided to construction staff for handling of reptilian species; • Camp and kitchen waste should be collected and disposed	MEIL	Site Inspection; Training records; Visual Assessment by experts	Monthly	EHS - MEIL	EHS - MEIL	Monthly Progress Report

S. N.	Environment /Social Parameters/Project Activities	Impacts/Issue	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines /frequency of Monitoring	Responsibility for implementation of monitoring	Supervision responsibility	Reporting Requirements
			in a manner that it does not attract wild animals; • Temporary barriers should be installed on excavated areas; • The footprint of the construction activities should be kept to the minimum to reduce disturbance to flora and fauna. • General awareness regarding wildlife should be enhanced through trainings, posters etc. among the staff and labourers; • Proper sanitation facilities should be provided at the labour camps; and • Anti - poaching/hunting policy should be strictly enforced. • A minimum possible number of routes should be authorized for use during construction by the labourers and staff,						

S. N.	Environment /Social Parameters/Project Activities	Impacts/Issue	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines /frequency of Monitoring	Responsibility for implementation of monitoring	Supervision responsibility	Reporting Requirements
			speed limit of the vehicles plying in these routes should be kept 20-25 km/hr to avoid road kill; • Where natural drainage crossing is envisaged at approach roads, culverts should be provided for crossing of herpetofaunal species;						
1.8	**Community Health and Safety**								
1.8.1	Community Health & Safety	Impact on community	• As part of the stakeholder engagement and information disclosure process, the community will be provided with an understanding of the activities to be undertaken and the precautions taken for safety • As part of stakeholder engagement, the project will also propagate health awareness amongst	MEIL, Sub Contractors	Site Inspection; Training records; Visual Assessment	Monthly	EHS - MEIL	EHS - MEIL	Monthly Progress Report

S. N.	Environment /Social Parameters/Project Activities	Impacts/Issue	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines /frequency of Monitoring	Responsibility for implementation of monitoring	Supervision responsibility	Reporting Requirements
			the community; • The traffic movement for the project in the area will be regulated to ensure road and pedestrian (including livestock) safety • The workers (both regular and contractual) on the project will be provided with trainings on the Health and Safety policy in place, and their role in the same and refresher courses will be provided throughout the life of the project • Put in place a grievance mechanism to allow for the workers and community members to report any concern or grievance related to project activities • The disaster						

S. N.	Environment /Social Parameters/Project Activities	Impacts/Issue	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines /frequency of Monitoring	Responsibility for implementation of monitoring	Supervision responsibility	Reporting Requirements
			management cell of the district and the nearest fire-service station should be involved in preparedness for emergency situation; • Company should get adequate third party insurance cover to meet the financial loss to any third party due to such emergencies.						
1.9	**Occupational Health and Safety**								
1.9.1	Health & Safety	Impact on Health and safety of the workers	• The workers (both regular and contractual) on the project will be provided with trainings on the Health and Safety policy in place, and their role in the same and refresher courses will be provided throughout the life of the project • Establish a grievance redressal mechanism in place, to allow for	MEIL, Sub Contractors	Record Keeping	Monthly	EHS - MEIL	EHS - MEIL	Monthly Progress Report

S. N.	Environment /Social Parameters/Project Activities	Impacts/Issue	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines /frequency of Monitoring	Responsibility for implementation of monitoring	Supervision responsibility	Reporting Requirements
			the employees and workers to report any concern or grievance related to work activities • Put in place measures to reduce the risk of prevalence of diseases, including screening of workers, undertaking health awareness amongst the workers, implementation of vector control programs, avoiding presence of unsanitary conditions and better facilities in the project site, such as safe drinking water, proper waste collection and disposal etc.						
1.10	**Social Parameters**								
1.10.1	Impact on Community Use and Access of Land: Grazing; fuel wood collection; collection of endemic herbs etc.	Impact on local community	• The project will engage with the nearby community to understand the most commonly accessed regions/areas on the wind farm site with	MEIL through Sub Contractors	Record Keeping	Quarterly	Community Relations Manager MEIL	EHS - MEIL	Internal Verification Report to EHS Manager

S. N.	Environment /Social Parameters/Project Activities	Impacts/Issue	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines /frequency of Monitoring	Responsibility for implementation of monitoring	Supervision responsibility	Reporting Requirements
			respect to grazing, fodder collection, firewood collection etc.; • Avoid impacting community lands of value to the community and if unavoidable, replace or compensate any community lands and use in consultation with the people; • Land area not required in O&M phase will be allowed for grazing, cultivation or any other usufruct purpose of local community.						
1.9.4	Long-term Employment Opportunities in unskilled and semi-skilled and housekeeping tasks	Impact on local community	• MEIL should establish a procedure for employment scheme which sets reasonable targets and estimates of absorbing workforce from the local communities; • Criteria should be set, wherever reasonable	MEIL	Record Keeping	Quarterly	Community Relations Manager MEIL	EHS - MEIL	Internal Verification Report to EHS Manager

S. N.	Environment /Social Parameters/Project Activities	Impacts/Issue	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines /frequency of Monitoring	Responsibility for implementation of monitoring	Supervision responsibility	Reporting Requirements
			and possible for preference of any vulnerable groups/households like SCs/STs; land sellers who ever rendered marginal/landless; women etc;. though scheduled population was only seen in Habur village. • Strengthening security personnel around labour camps in order to maintain adequate law and order and avoid any possible tensions between the migrant workforce and host community.						
1.9.5	Impact on cultivation due to project activities	Impact on Economic status of land owner.	• Undertake an assessment prior to the commencement of construction activities of agricultural activities in the land identified. In case of any impact on agricultural activity compensate the land	MEIL	Visual Assessment, records of negotiations	Prior to commencement of construction activities	Community Relations Manager MEIL	EHS - MEIL	Internal Verification Report to EHS Manager

S. N.	Environment /Social Parameters/Project Activities	Impacts/Issue	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines /frequency of Monitoring	Responsibility for implementation of monitoring	Supervision responsibility	Reporting Requirements
			owner for the crop loss through negotiated settlements						

Table 11.2 Environmental and Social Management and Monitoring Plan for Project Nidhi - Operation Phase

S. No.	Environment /Social Parameters/Project Activities	Impacts/Issue	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines /frequency of Monitoring	Responsibility for implementation of monitoring	Supervision responsibility	Reporting Requirements
1.1	**Land and soil environment**								
1.1.1	Operations and maintenance	Soil contamination	• Use of spill control kits to contain and clean small spills and leaks during O&M activities; and • The guidelines and procedures shall be prepared and followed for immediate clean-up actions following any spillages.	MEIL	Site Inspection; Training records; Visual Assessment	Monthly	EHS - MEIL	EHS - MEIL	Monthly Report
1.2	**Water Resources**								
1.2.1	Water conservation	Water availability	Optimising water usage in the SCADA building and substation area by application of water conservation measures such as sensor based taps, low flush urinals etc.;	MEIL	Site Inspection; Training records;	Monthly	EHS - MEIL	EHS - MEIL	Monthly Report
1.3	**Ambient Noise**								
1.3.1	Operation of WTGs	Ambient noise level	• Regular maintenance of WTGs; • Periodic monitoring of noise near to the sources of generation to ensure compliance with design specification;	MEIL	Site Inspection; Training records;	Monthly	EHS - MEIL	EHS - MEIL	Monthly Report
1.4	**Ecology and Biodiversity**								
1.4.1	Collision risk to Avifauna during Operations Phase	Impact on Bird/bats movement and Interference	• To reduce collision risk, livestock carcass management is to be undertaken in the wind farm area. All carcasses	MEIL	Site Inspection; ; Visual	Continuous , as and when information	EHS MEIL	Corporate EHS- MEIL	Internal Assessment Report to EHS Corporate

S. No.	Environment /Social Parameters/Project Activities	Impacts/Issue	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines /frequency of Monitoring	Responsibility for implementation of monitoring	Supervision responsibility	Reporting Requirements
			detected inside the wind farm area are to be removed and dumped at designated livestock dumping locations. Livestock dumping locations should be identified in consultation with Forest Department, Local authorities, surrounding 2 km village representatives. The dumping site should be chosen in an area at least 5 km away from the existing and proposed wind farm locations This will reduce the probability of vultures occurring in the wind farm area, thereby reducing the risk of collision with operating WTGs. Dumping sites should be identified before the operationalization of wind farm. • Proper communication needs to be established between resident of local villagers and nomadic shepherds in the area. Any incident of livestock causality should be immediately brought to the attention of Mytrah (point of contact) for such incidents and carcases should be immediately removed from the		Assessment	of a carcass is received			

S. No.	Environment /Social Parameters/Project Activities	Impacts/Issue	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines /frequency of Monitoring	Responsibility for implementation of monitoring	Supervision responsibility	Reporting Requirements
			site. • A designated cattle carcass disposal site should be identified in consultation of district Authorities, forest departments and the representatives of Habur, Mokal and other stakeholders in the area. The cattle carcass so discovered should be transported immediately. • Post operational Monitoring: Post operational monitoring of the wind farm area should be undertaken through independent third party organizations to assess the efficacy of carcass management practices for a period of two years. • Additional surveys are also recommended to monitor bird carcasses during the migratory season.						
	Collision risk to Avifauna during Operations Phase	Impact on Bird/bats movement and Interference	• Flash lamps on the WTGs will prevent bird collision at nights. • Regular checking of the vacuums or holes in the towers to avoid nesting by any of the birds;	MEIL	Site Inspection and Visual Assessment during construction	Once after completion of constructio n phase	EHS MEIL	Corporate EHS- MEIL	Internal Assessment Report to EHS Corporate

S. No.	Environment /Social Parameters/Project Activities	Impacts/Issue	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines /frequency of Monitoring	Responsibility for implementation of monitoring	Supervision responsibility	Reporting Requirements
					phase				
1.4.2	Electrocution due to internal and external transmission lines	Impact of Electrocution on Birds	• Usage of suspended insulators and insulation of conductors in order to reduce bird and bat mortality through electrocution should be incorporated. • Electrocution clearance for a species of bird is 152 centimetres (cm) a horizontal and vertical clearance of 152 cm and 102 cm is required to reduce the risk of electrocution for the species. As wingspans vary based on bird size, electrocution clearances will also vary to ensure that power poles are safe for different raptor species. • Bird-safe strain poles require insulating chains at least 60 cm in length should be adopted. • Marking overhead cables using diffractors and avoiding use over areas of high bird concentrations, for species vulnerable to collision.	MEIL	Site Inspection; Visual Assessment and Monitoring of actual implementation, budget and responsibility allocation	Monthly	EHS - MEIL	EHS - MEIL	Monthly Report
1.4	**Community Health and Safety**		•						
1.4.1	Community Health & Safety	Community grievance	• Put in place a grievance mechanism to allow for the	MEIL	Records;	Monthly	EHS - MEIL	EHS - MEIL	Monthly Report

S. No.	Environment /Social Parameters/Project Activities	Impacts/Issue	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines /frequency of Monitoring	Responsibility for implementation of monitoring	Supervision responsibility	Reporting Requirements
			community members to report any concern or grievance related to project activities						
1.4.2	Blade throw and natural disasters	Health And Safety	• The disaster management cell of the district and the nearest fire-service station should be involved in preparedness for emergency situation; • Company should get adequate third party insurance cover to meet the financial loss to any third party due to such emergencies.						
1.5	**Social Impacts**		•						
1.4.4	Long-term Employment Opportunities in unskilled and semi-skilled and housekeeping tasks		• MEIL should establish a procedure for employment scheme which sets reasonable targets and estimates of absorbing workforce from the local communities; • Criteria should be set, wherever reasonable and possible for preference of any vulnerable groups/households like SCs/STs; land sellers who ever rendered marginal/landless; women etc.; • Share employment or vendor opportunities with local panchayats and maintain record of such opportunities provided to local community	MEIL	Record Keeping	Quarterly	Community Relations Manager MEIL	EHS - MEIL	Internal Verification Report to EHS Manager

S. No.	Environment /Social Parameters/Project Activities	Impacts/Issue	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines /frequency of Monitoring	Responsibility for implementation of monitoring	Supervision responsibility	Reporting Requirements
			• Provide training on EHS aspects to local employees; • Training provided should also focus on local skill development.						

12 CONCLUSION & RECOMMENDATIONS

12.1 INTRODUCTION

This Environmental and Social Impact Assessment has been conducted to evaluate the impacts associated with the proposed wind farm project of 90.1MW capacity in Habur and Mokal vilages in Jaisalmer district of Rajasthan by Mytrah Energy India Limited. The impact assessment has been conducted in compliance with administrative framework identified herein, including relevant national legislative requirement, international conventions and MEIL's corporate requirements.

12.2 IMPACTS REQUIRING DETAILED ASSESSMENT

Following a Scoping exercise, this ESIA was focused on interactions between Project activities and various resources/receptors that could result in significant impacts. The table below presents the outcomes of the comprehensive assessment of identified impacts as a result of the various phases of the proposed Project and summarize the impacts. Based on the impacts significance, the ESMP has been prepared.

Impact Description	Impact nature		
		Significance of Impact	Residual Impact
Construction Phase			
Change in land use	Negative	Negligible to minor	Minor
Soil erosion	Negative	Negligible	-
Soil compaction	Negative	Negligible	-
Impact on land due to Improper waste disposal	Negative	Minor	Negligible
Soil contamination due to Leaks/spills	Negative	Negligible	Negligible
Impact on Water availability	Negative	Moderate	Negligible to Minor
Impact on water quality	Negative	Negligible	-
Impact on Air quality	Negative	Negligible	-
Increased Ambient Noise Levels		Negligible	-
Higher ambient noise	Negative	Negligible	-
Ecological impacts due to Vegetation Clearance	Negative	Minor	Negligible
Impact due to construction of WTG foundation and installation	Negative	Minor	Negligible
Impact due to laying of approach roads	Negative	Moderate	Minor
Community Health and Safety	Negative	Minor	Negligible to minor
Occupational Health and Safety	Negative	Minor	Negligible to Minor
Impacts on Economic Opportunities	Positive		
Labour Rights and Welfare	Negative	Moderate	Minor

Impacts on Indigenous Communities/Vulnerable Groups	Negative	Minor	Negligible
Operations Phase			
Impact on land due to improper waste disposal	Negative	Negligible	
Soil Contamination due to leaks/spills	Negative	Negligible	
Impact on water availability	Negative	Negligible	
Impact on Water quality	Negative	Negligible	
Impact on air quality	Negative	Negligible	
Impact on ambient noise levels	Negative	Negligible	
Impact on Avifaunal and bat species	Negative	Major-(Species)	Moderate
	Negative	Moderate-Habitat	Minor
Accidents- Blade Throw and Natural Hazards	Negative	Negligible	
Decommissioning Phase			
Impact on land and soil	Negative	Minor	Negligible to minor
Impact on air quality	Negative	Negligible	
Impact on ambient noise levels	Negative	Negligible	

Impact Summary

The proposed project is a green energy project comprising of 53WTG to generate 90.1 MW power through wind energy. Impacts due to wind energy projects are short term, generally limited to construction phase and operation phase have negligible adverse environmental and social impacts.

The Project and its key components such as access road, WTGs, Office building and transmission lines, are likely to have some adverse environmental impacts on baseline parameters such as land use, water quality etc. The social impacts from the project are assessed to be generally beneficial in terms of overall local area development.

The key features of the project in terms of impact include the following:

- There are no sensitive receptors as villages, water bodies within 500 m of the wind farm;
- The entire wind farm mostly falls under barren and culturable wasteland and the WTGs are on government land;
- The construction of proposed project may bring local changes in the landuse pattern of the site but there would be no drastic visual impact to the area as other wind energy projects are already operating in the study area;
- The Project will require ~4 m^3/day of fresh water during operation phase– planned to be sourced from tanker water;
- The project will have negligible impact on air emissions and ambient noise levels due to the distant location of receptors ;
- The negligible quantity of sewage will be generated at site office, which will be disposed through septic tanks;

- The hazardous waste will be disposed of as per authorisation from RSPCB. The storage, handling, transportation and disposal will be strictly as per the requirement of authorisation by RSPCB and Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008. The waste will be stored into closed containers under covered area with concrete flooring and sent for disposal to TSDF through authorized vendors;
- The proposed project will have no significant negative impacts on the nearby communities as there will be no physical displacement of people or impact on private land holdings.

The Environmental and Social Management Plan (ESMP) describes mitigation measures for impacts specific to project activities and also discuss implementation mechanism.

To conclude, the implementation of ESMP will help MEIL in complying with national/ state regulatory framework as well as to meet IFC/ ADB reference framework requirements.

Annex A

WTG Profiling Photodocumentation

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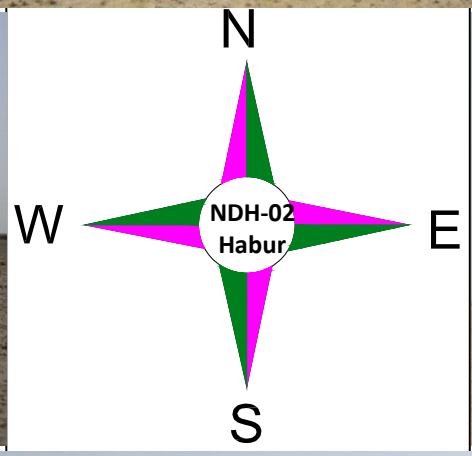
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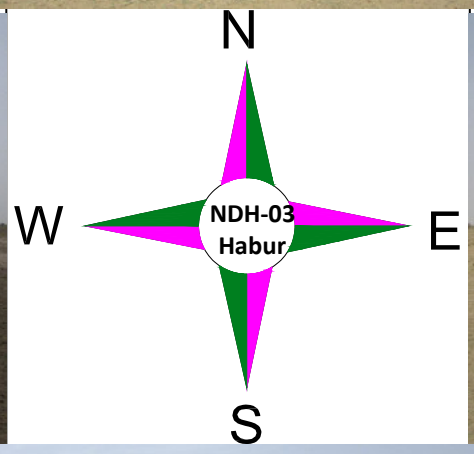
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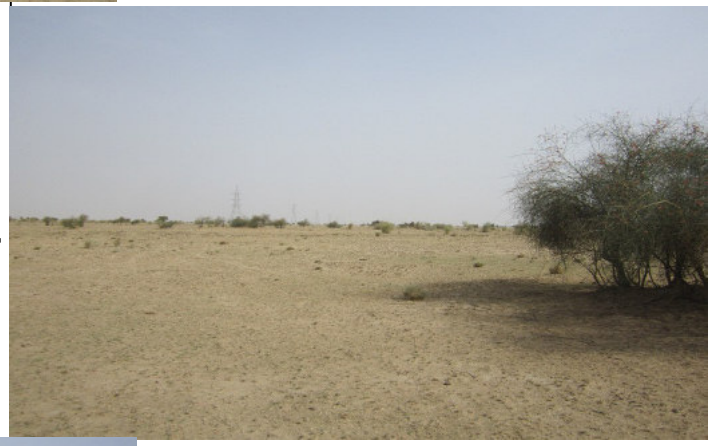

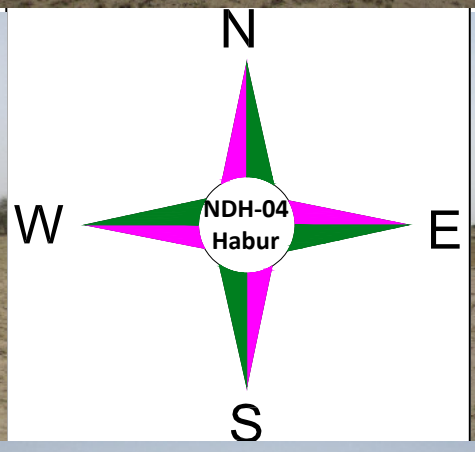
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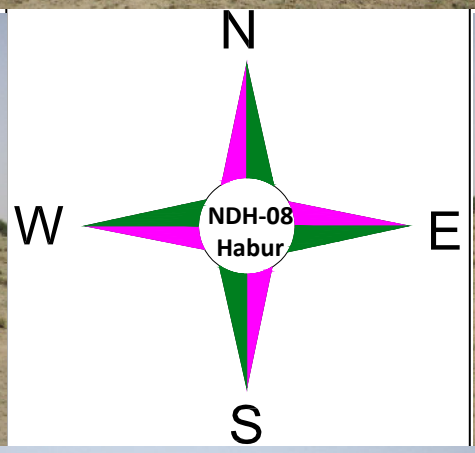
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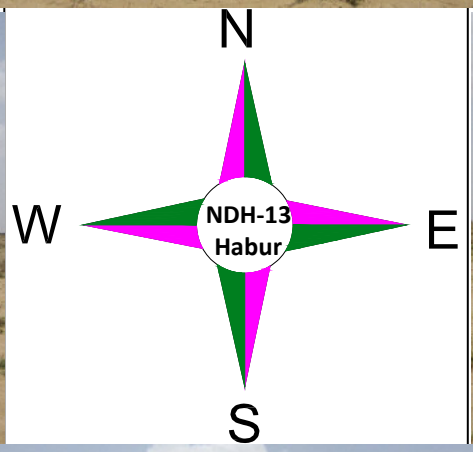
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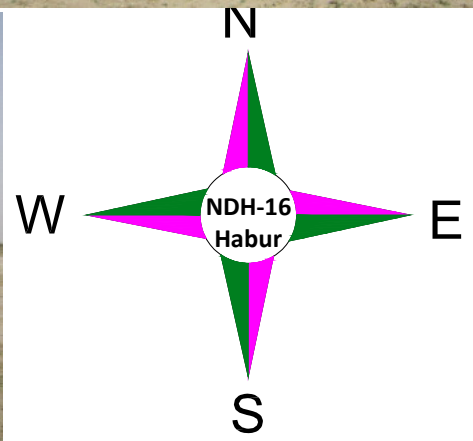
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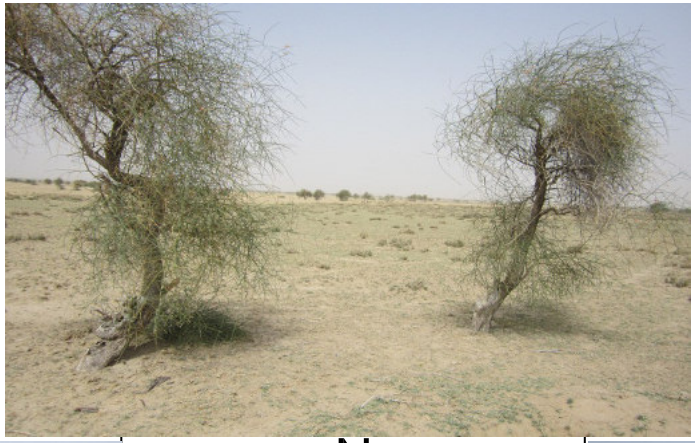

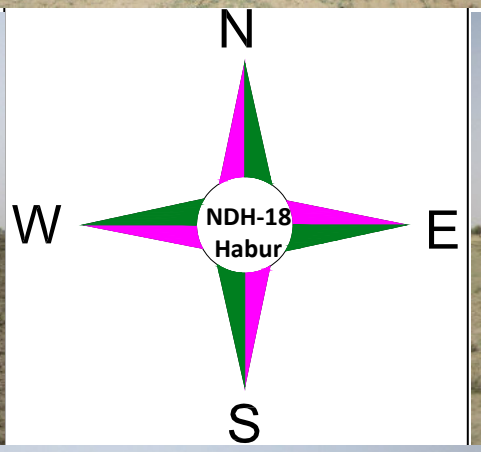
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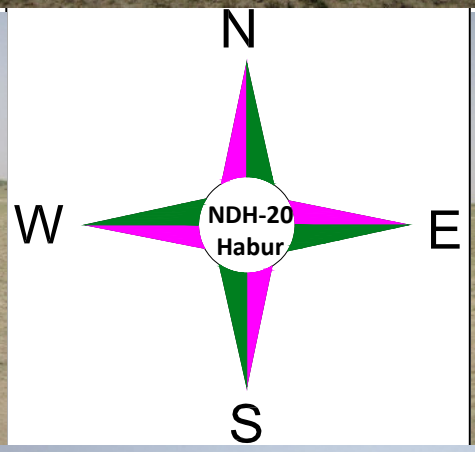
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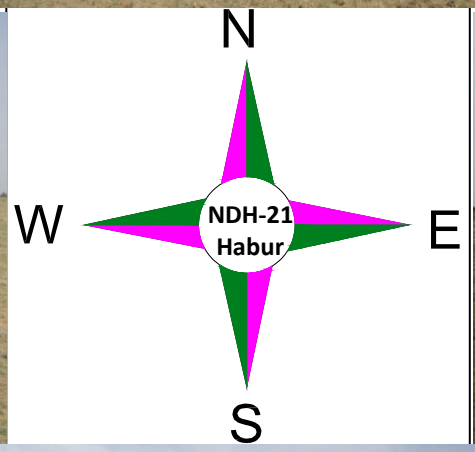
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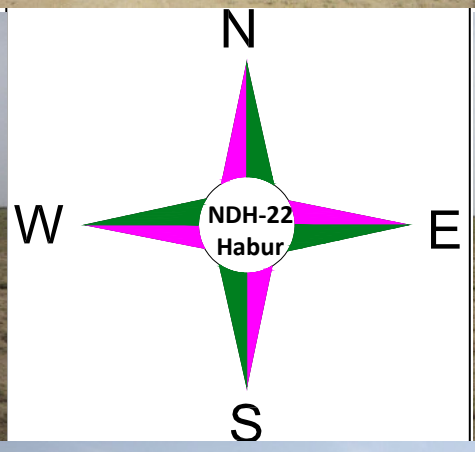
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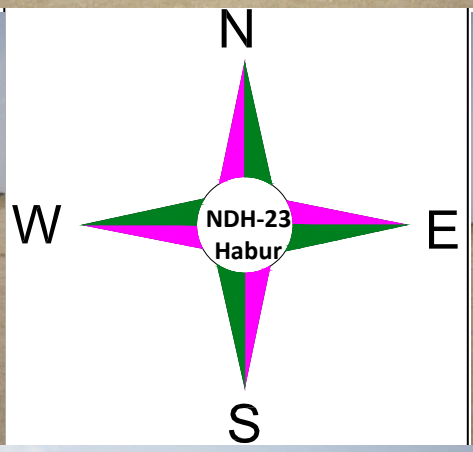
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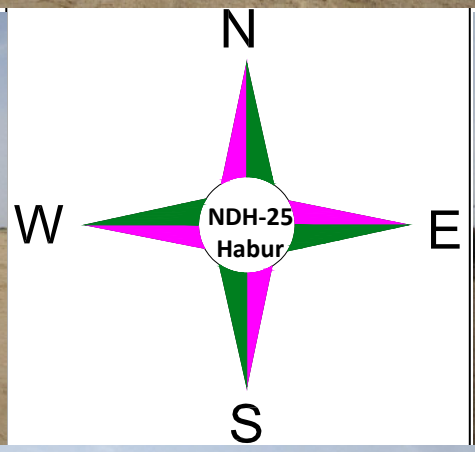
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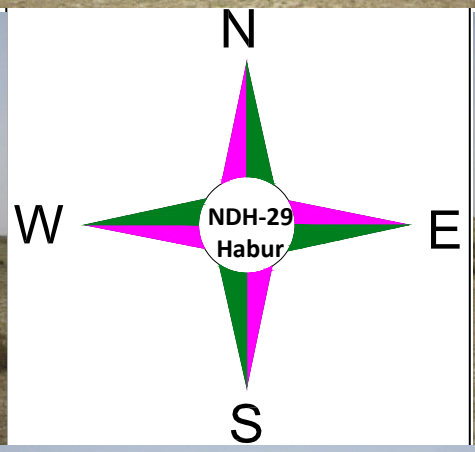
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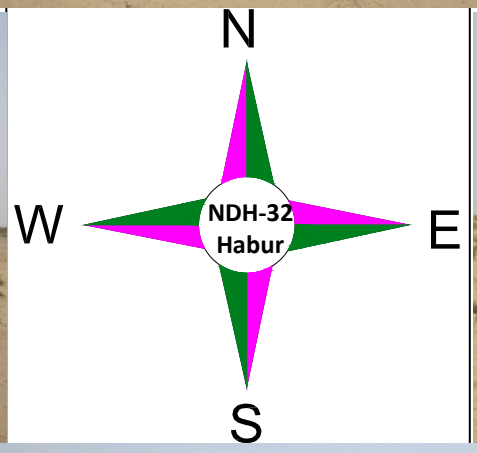
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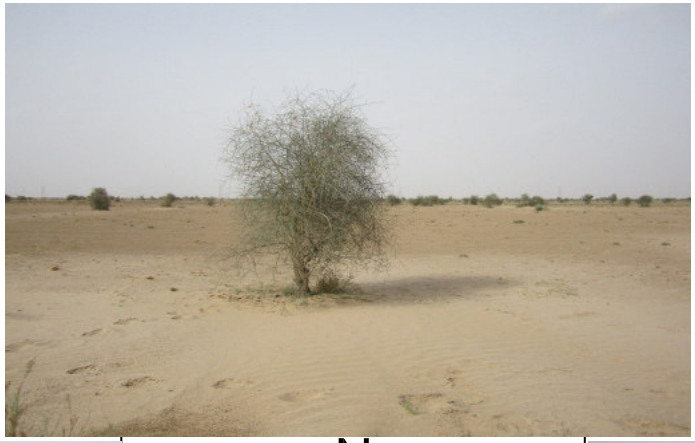

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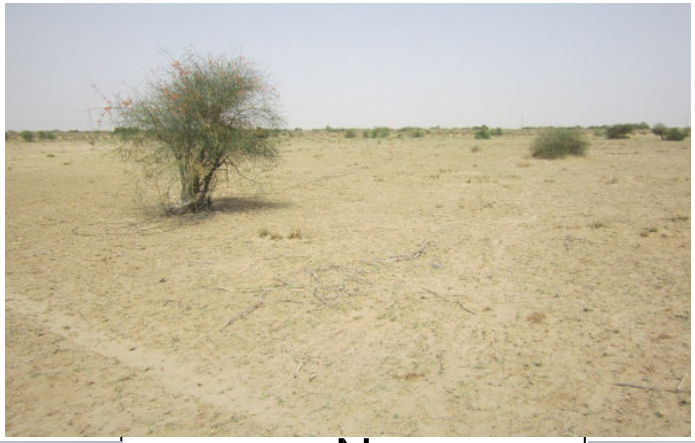

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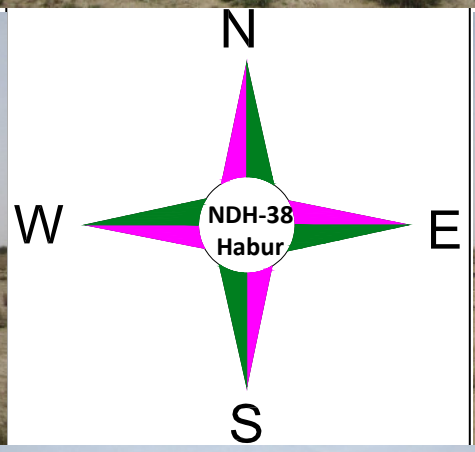
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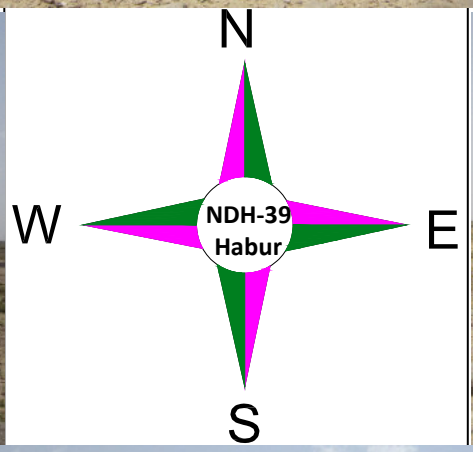
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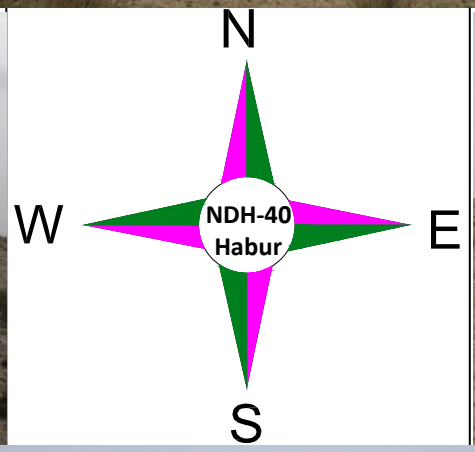
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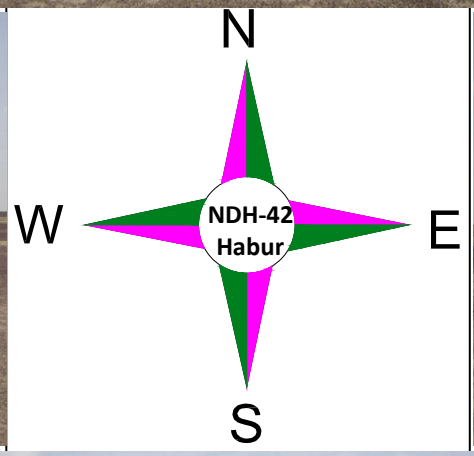
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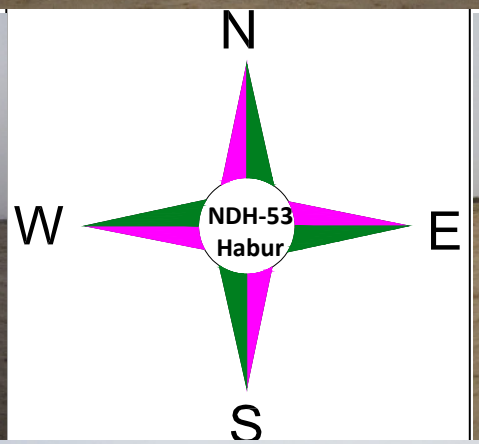
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Annex B

Applicable Environmental Standards

1.1.1 Ambient Air Quality Standards

National Ambient Air Quality Standards (NAAQS)

National Ambient Air Quality Standards (NAAQ Standards), as prescribed by MoEF vide, *Gazette Notification dated 16th November, 2009* are given below in ***Table*** 1.

Table.1 National Ambient Air Quality Standards

Pollutant	Time Weighted Avg.	Concentration in Ambient Air	
		Industrial, Residential, Rural & Other Areas	Ecologically Sensitive Areas (notified by Central Government)
Sulphur dioxide (SO_2) µg/m^3	Annual Average*	50	20
	24 Hours**	80	80
Oxides of Nitrogen (NO_x) µg/m^3	Annual Average*	40	30
	24 Hours**	80	80
Particulate Matter (PM 10) µg/m^3	Annual Average*	60	60
	24 Hours**	100	100
Particulate Matter (PM 2.5) µg/m^3	Annual Average*	40	40
	24 Hours**	60	60
Ozone (O_3) µg/m^3	8 Hours**	100	100
	1 Hour**	180	180
Lead (Pb) µg/m^3	Annual Average*	0.50	0.50
	24 Hours**	1.0	1.0
Carbon monoxide (CO) mg/m^3	8 Hours**	02	02
	1 Hour**	04	04
Ammonia (NH_3) µg/m^3	Annual*	100	100
	24 Hours**	400	400
Benzene (C_6H_6) µg/m^3	Annual*	05	05
Benzo(α)Pyrene-particulate phase ng/m^3	Annual*	01	01
Arsenic (As) ng/m^3	Annual*	06	06
Nickel (Ni) ng/m^3	Annual*	20	20

Note: *Annual arithmetic mean of minimum 104 measurements in a year at a particular site taken twice a week 24 hourly at uniform interval.
** 24 hourly/8 hourly/1 hourly monitored values, as applicable shall be complied with 98% of the time in a year. 2% of the time, it may exceed but not on two consecutive days of monitoring.

As the project is in rural/residential set up, NAAQS for rural/residential area will be applicable for the project.

IFC/WB Air Emissions and Ambient Air Quality Standards

The IFC/WB General EHS guidelines on Air emissions and ambient air quality, specifies that emissions do not result in pollutant concentrations that reach or exceed relevant ambient quality guidelines and standards by applying national legislated standards, or in their absence World Health Organization (WHO) Ambient Air Quality guidelines as represented in ***Table 2.***

Table.2 ***WHO Ambient Air Quality Guidelines***

Pollutant	Averaging Period	Guideline Value in μg/m³
Sulphur Dioxide	24-hour	24-hour
	10 minute	10 minute
		125 (Interim target-1)
		50 (Interim target-2)
Nitrogen Oxide	1 year	40 (guideline)
	1 hour	200 (guideline)
Particulate Matter 10	1 year	70 (Interim target-1)
		50 (Interim target-2)
		30 (Interim target-3)
		20 (guideline)
	24 hour	150 (Interim target-1)
		100 (Interim target-2)
		75 (Interim target-3)
		50 (guideline)
Particulate Matter 2.5	1 year	35 (Interim target-1)
		25 (Interim target-2)
		15 (Interim target-3)
		10 (guideline)
	24 hour	75 (Interim target-1)
		50 (Interim target-2)
		37.5 (Interim target-3)
		25 (guideline)
Ozone	8-hour daily Maximum	8-hour daily Maximum

Source: IFC/WB General EHS Guidelines: Air emissions and ambient air quality, 30 April 2007
Interim target means Interim targets are provided in recognition of the need for a staged approach to achieving the recommended guidelines.

1.1.2 Water Quality Standards

As per the Bureau of Indian Standards, (IS 10500: 2012) drinking water shall comply with the requirements given in ***Table 3.***

Table.3 ***Indian Drinking Water Standard (IS 10500: 2012)***

S.N	Substance/ Characteristics	Requirement (Acceptable limit)	Permissible limit in absence of alternate source
1.	Colour, Hazen units, max	5	15
2.	Odour	Unobjectionable	-
3.	Taste	Agreeable	-
4.	Turbidity, NTU, max	5	5
5.	pH value	6.5 - 8.5	No Relaxation
6.	Total hardness (as $CaCO_3$) mg/l, max	200	600
7.	Iron (as Fe) mg/l, max	0.3	No relaxation
8.	Chlorides (as Cl) mg/l, max	250	1000
9.	Free residual chlorine, mg/l, min	0.2	1
10.	Dissolved solids mg/l, max	500	2000
11.	Calcium (as Ca) mg/l, max	75	200
12.	Magnesium (as Mg) mg/l, max	30	100
13.	Copper (as Cu) mg/l, max	0.05	1.5
14.	Manganese (as Mn) mg/l, max	0.1	0.3
15.	Sulphate (as SO_4) mg/l, max	200	400
16.	Nitrate (as NO_3) mg/l, max	45	No relaxation
17.	Fluoride (as F) mg/l, max	1.0	1.5

S.N	Substance/ Characteristics	Requirement (Acceptable limit)	Permissible limit in absence of alternate source
18.	Phenolic compounds (as C6H6OH) mg/l, max	0.001	0.002
19.	Mercury (as Hg) mg/l, max	0.001	No relaxation
20.	Cadmium (as Cd) mg/l, max	0.003	No relaxation
21.	Selenium (as Se) mg/l, max	0.01	No relaxation
22.	Arsenic (as As) mg/l, max	0.01	0.05
23.	Cyanide (as CN) mg/l, max	0.05	No relaxation
24.	Lead (as Pb) mg/l, max	0.01	No relaxation
25.	Zinc (as Zn) mg/l, max	5	15
26.	Anionic detergents (as MBAS) mg/l, max	0.2	1.0
27.	Total Chromium (as Cr) mg/l, max	0.05	No relaxation
28.	Polynuclear aromatic hydrocarbons (as PAH) g/l, max	0.0001	No relaxation
29.	Mineral Oil mg/l, max	0.5	No relaxation
30.	Pesticides mg/l, max	Absent	0.001
31.	Radioactive materials: a) Alpha emitters Bq/l, max b) Beta emitters pci/l, max	 0.1 1.0	 No relaxation No relaxation
32.	Total Alkalinity (as CaCO3), mg/l, max	200	600
33.	Aluminium (as Al) mg/l, max	0.03	0.2
34.	Boron, mg/l, max	0.5	1.0
35.	Ammonia (as total ammonia-N). mg/l, max	0.5	No relaxation
36.	Barium (as Ba), mg/l, max	0.7	No relaxation
37.	Chloramines (as Cl_2), mg/l, max	4.0	No relaxation
38.	Silver (as Ag), mg/l, max	0.1	No relaxation
39.	Sulphide (as H2S), mg/l, max	0.05	No relaxation
40.	Molybdenum (as Mo), mg/l, max	0.07	No relaxation
41.	Nickel (as Ni), mg/l, max	0.02	No relaxation
42.	Polychlorinated biphenyls, mg/l, max	0.0005	No relaxation
43.	Trilomethanes: a) Bromoform, mg/l, max b) Dibromochloromethane, mg/l, max c) Bromodichloromethane, mg/l, max d) Chloroform, mg/l, max	 0.1 0.1 0.06 0.2	 No relaxation No relaxation No relaxation No relaxation
	Bacteriological Quality		
1.	All water intended for drinking: a) E. coli or thermotolerant coliform bacteria	Shall not be detectable in any 100 ml sample	-
2.	Treated water entering the distribution system: a) E. coli or thermotolerant coliform bacteria b) Total coliform bacteria	Shall not be detectable in any 100 ml sample; Shall not be detectable in any 100 ml sample.	-
3.	Treated water in the distribution system: a) E. coli or thermotolerant coliform bacteria b) Total coliform bacteria	Shall not be detectable in any 100 ml sample; Shall not be detectable in any 100 ml sample.	-

Source: Central Pollution Control Board

General Standards for discharge

The general standards for discharge are as prescribed under the Environment Protection Rules, 1986 and amendments. The project intends to treat the domestic waste water in septic tanks and soak pits. The general standards for

discharge of environmental pollutants are detailed in ***Table 4.***

Table.4 ***General Standards for Discharge of Environmental Pollutants***

S. N	Parameter	Standards Inland surface water	Public sewers	Land for Irrigation
1.	Colour and odour	Refer to Note 1	-	Refer to Note 1
2	Suspended solids mg/l, max.	100	600	200
3	Particle size of suspended solids	Shall 850 micron IS sieve	-	-
4	PH value	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0
5	Temperature	Shall not exceed 5^0 C above the receiving water temperature	-	-
6	Oil and grease, mg/l max,	10	20	10
7	Total residual chlorine, mg/l max	1.0	-	-
8	Ammonical nitrogen (as N), mg/l max.	50	50	-
9	Total Kjeldahl nitrogen (as N); mg/l max	100	-	-
10	Free ammonia (as NH3), mg/l max	5.0	-	-
11	Biochemical oxygen demand (3 days at 27^0 C), mg/l max	30	350	100
12	Chemical oxygen demand, mg/l max	250	-	-
13	Arsenic (as As) mg/l, max	0.2	0.2	0.2
14	Mercury (As Hg) mg/l max.	0.01	0.01	-
15	Lead (as Pb) mg/l, max	0.1	1.0	-
16	Cadmium (as Cd) mg/l, max	2.0	1.0	-
17	Hexavalent chromium (as Cr +6) mg/1 max	0.1	2.0	-
18	Total chromium (as Cr) mg/1 max	2.0	2.0	-
19	Copper (as Cu) mg/1, max	3.0	3.0	-
20	Zinc (as Zn)	5.0	15	-
21	Selenium (as Se)	0.05	0.05	-
22	Nickel (as Ni) mg/1,max	3.0	3.0	-
23	Cyanide (as CN) mg/1,max	0.2	2.0	0.2
24	Fluoride (as F) mg/1,max	2.0	15	-
25	Dissolved phosphates (as P) mg/1,max	5.0	-	-
26	Sulphide (as S) mg/1,max	2.0	-	-
27	Phenolic compounds (as C_6H_5OH) mg/1,max	1.0	5.0	-
28	Radioactive materials: (a) Alpha emitters micro curie mg/1,max (b) Beta emitters micro curie mg/1	10^{-7} 10^{-6}	10^{-7} 10^{-6}	10^{-8} 10^{--7}
29	Bio-assay test	90% survival of fish after 96 hours in 100% effluent	90% survival of fish after 96 hours in 100% effluent	90% survival of fish after 96 hours in 100% effluent
30	Manganese	2 mg/1	2 mg/1	-
31	Iron (as Fe)	3mg/1	3mg/1	-
32	Vanadium (as V)	0.2 mg/1	0.2 mg/1	-
33	Nitrate Nitrogen	10 mg/1	-	-

Source: as per G.S.R 422 (E) dated 19.05.1993 and G.S.R 801 (E) dated 31.12.1993 issued under the provisions of E (P) Act 1986.

Designated Best Use Classification of Surface Water

The designated best use classification as prescribed by CPCB for surface water is as given in ***Table*** 5 below:

Table .5 Primary Water Quality Criteria for Designated-Best-Use-Classes

Designated-Best-Use	Class	Criteria
Drinking Water Source without conventional treatment but after disinfection	A	• Total Coliforms Organism MPN/100ml shall be 50 or less • pH between 6.5 and 8.5 • Dissolved Oxygen 6mg/l or more • Biochemical Oxygen Demand 5 days 20^{o}C 2mg/l or less
Outdoor bathing (Organized)	B	• Total Coliforms Organism MPN/100ml shall be 500 or less • pH between 6.5 and 8.5 • Dissolved Oxygen 5mg/l or more • Biochemical Oxygen Demand 5 days 20^{o}C 3mg/l or less
Drinking water source after conventional treatment and disinfection	C	• Total Coliforms Organism MPN/100ml shall be 5000 or less • pH between 6 to 9 • Dissolved Oxygen 4mg/l or more • Biochemical Oxygen Demand 5 days 20^{o}C 3mg/l or less
Propagation of Wild life and Fisheries	D	• pH between 6.5 to 8.5 • Dissolved Oxygen 4mg/l or more • Free Ammonia (as N) 1.2 mg/l or less
Irrigation, Industrial Cooling, Controlled Waste disposal	E	• pH between 6.0 to 8.5 • Electrical Conductivity at 25^{o}C micro mhos/cm Max.2250 • Sodium absorption Ratio Max. 26 • Boron Max. 2mg/l
	Below-E	Not Meeting A, B, C, D & E Criteria

Source: Central Pollution Control Board

IFC/WB Guidelines for Treated Sanitary Sewage Discharge

Indicative values for treated sanitary sewage discharges are given in ***Table 6.*** These are applicable to meet national or local standards or in the absence of national standards for sanitary wastewater discharges and where either a septic system or land is used as part of treatment system.

Table.6 Indicative values for treated sanitary wastewater discharges

Pollutants	Units	Guideline Value
pH	pH	6-9
BOD	mg/l	30
COD	mg/l	125
Total Nitrogen	mg/l	10
Total Phosphorous	mg/l	2
Oil and grease	mg/l	10
Total suspended solids	mg/l	50
Total Coliform bacteria	MPN*/100ml	400

Source: General EHS Guidelines, World Bank Group, April 2007
*MPN = Most Probable Number

1.1.3 Noise Standards

Noise standards specified by the MoEF vide gazette notification dated 14th February, 2000 based on the *A* weighted equivalent noise level (L_{eq}) are as presented in ***Table 7.***

Table.7 Ambient Noise Standards

Area Code	Category of Area	Limits in dB(A) Leq	
		Day time*	**Night Time**
A	Industrial Area	75	70
B	Commercial Area	65	55
C	Residential Area	55	45
D	Silence Zone**	50	40

Note:*Day time is from 6 am to 10 pm, Night time is10.00 pm to 6.00 am;**Silence zone is an area comprising not less than 100 meters around premises of hospitals, educational institutions, courts, religious places or any other area which is declared as such by the competent authority. Use of vehicle horns, loud speakers and bursting of crackers are banned in these zones. Source: Noise Pollution (Regulation and control)Rules,2000)

As the project is in rural/residential set up, noise standards for residential area will be applicable for the project.

IFC/WB Noise Standards

As per the IFC/WB, General EHS Guidelines on noise management, noise impacts should not exceed the levels presented in ***Table 8.*** or result in a maximum increase in background levels of 3 dB at the nearest receptor location off-site.

Table.8 Noise Level Guidelines

Receptor	One Hour LAeq (dBA) Daytime 07:00 - 22:00	Night time 22:00 - 07:00
Residential; Institutional; Educational	55	45
Industrial; Commercial	70	70

Source: IFC/WB, General EHS Guidelines on noise management, 30 April, 2007

1.1.4 Hazardous Waste Management

The Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008 were promulgated under Environment (Protection) Act 1986, which was further amended in July 2009, September 2009, March 2010 and August 2010.

The major hazardous wastes to be released due to the proposed project are used or waste/used oil, oil containing rags and jutes. The categories of the wastes as applicable to construction and operation phases of the project and as

covered under Schedule 1 of the Hazardous wastes Rules, 2008 are given in the ***Table*** *9.*

Table.9 ***List of Hazardous Wastes Generated in the Project: Schedule-1 of HWM Rules, 2008***

Category No.	Processes	Hazardous Wastes
5	Industrial operations using mineral/synthetic oil as lubricant in hydraulic systems or other applications	5.1 Used spent Oil 5.2 Wastes/ residues containing oil

Schedule V (Part A) to these rules provide specifications for Used Oil suitable for reprocessing /recycling as given in ***Table 10.***
If the specifications are exceeded the oil should be incinerated properly.

Table 10 ***Specifications of Used Oil Suitable for Recycling: Schedule V (Part A)***

S.N	Parameter	Limit
1	Polychlorinated biphenyls (PCBs)	< 2ppm maximum
2	Lead	100 ppm maximum
3	Arsenic	5 ppm maximum
4	Cadmium+ Chromium+ Nickel	500 ppm maximum
5	Polyaromatic hydrocarbons (PAH)	6% maximum

The Central Pollution Control Board (CPCB) has stipulated different environmental standards w.r.t. ambient air quality, noise quality, water and waste water for the country as a whole under EP Act, 1986.

Annex C

Climate Change Risk Assessment - Nidhi

1 INTRODUCTION

Mytrah Energy (India) Limited ('Company' or 'MEIL') is developing a wind farm of 90.1 MW capacity at Habur and Mokal villages in Jaisalmer District of Rajasthan (Project Nidhi). The proposed wind farm will include 53 Wind Turbine Generators (WTGs).

The proposed project site is located in area of 412.1Ha of culturable waste land in the villages of Poonamnagar (Habur) and Mokal in the district and sub-division (tehsil) of Jaisalmer in Rajasthan. The project site is approximately 50 km north-west of Jaisalmer city, which is the administrative headquarters of the district.

This document focuses on the anticipated risk of climate change for the project Nidhi.

1.1 VULNERABILITY ASSESSMENT

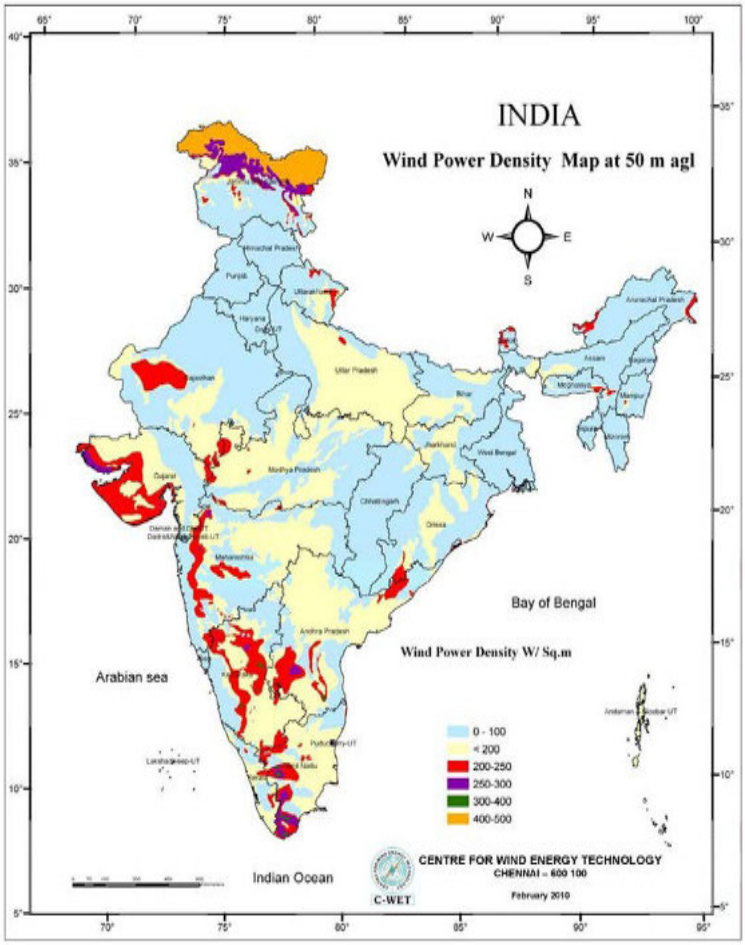
Among the numerous strategies to reduce Green House Gas (GHG) emissions is to decommission carbon intensive electricity production while increase the deployment of renewable energy technologies – such as wind and solar power generation. Yet the generation capacity, availability, and intermittency of these renewable energy sources are strongly climate dependent – and may also shift due to unavoidable human-induced change. The project Nidhi can be at a risk from the potential impacts of climate change such as changes in wind speed, temperature, precipitation etc. The major impacting factor for viability of the project is the **change in wind speed**.

1.1.1 *Selection of the Nidhi Project site*

The key selection aspect for the particular project site was "Wind Resource" as detailed in the DPR considered the following and as can be observed in ***Figure 1.1*** below.

- Site is approved by C WET. (Long term Wind data available from 2 C WET Wind Monitoring stations (WMS) which are within 25 KM proximity to the site).
- Highest wind resource amongst all 36 WMS installed in Rajasthan by C WET. (WPD at 244 and 274 W/ Sq m at 50 M)
- Suzlon's 168 MW of wind farm commissioned from 80 Suzlon's S 88 (2.1 MW) WEG as on 31-March-2011 in the same village. These WEGS are within 10 to 30 KM from plot periphery).
- Data available from 4 nearby wind masts installed by Suzlon. (Suzlon's wind mast installed 5 to 15 KM from the site)
- Site approved by international wind consultant Garrad Hassan. (Wind Resource Assessment Reports done by GH for the site)

Figure 1.1 Wind Resource Map of India



Source: DPR, Project Nidhi

1.1.2 Energy Prognosis-Estimated Annual Energy Generation

As per the DPR, based on Suzlon's Habur Mast the following data was captured (*Ref Doc No: IPD/WRD/F/FM/RJ/11-12/067 Dated: 25.Aug.2011 from SUZLON*).

Table 1.1 Data of Suzlon Habur Mast

Owner	Suzlon Infrastructure
Station	Habur
District, State	Jaisalemer, Rajasthan
Latitude	27o 07' 26.5'' N
Longitude	70o 37' 36.4'' E
Elevation	225 m amsl
Period	April 2010 to March 2011
Duration	12 months
Annual Mean Turbulance Intensity at 15 m/s	0.091 at 50 M AGL

Annual Mean Wind Speed	5.81 m/s at 50 M AGL 202.02 W/m2 at 50 M
Annual Wind Power Density	202.02 W/m2 at 50 M AGL

Table 1.2 Energy Capture Summary based on Suzlon Habur Mast

Project	Tejuva (Nidhi)
Wind turbine type	S97 -90
Turbine Capacity	2100 KW
Hub height	90 m
Number of turbines	60
Site capacity	126 MW
Estimated annual net energy production -P(50)	2736 lac units
Estimated annual net energy production / WTG - P(50)	45.60 lac units

Table 1.3 Summary of Average Annual Generation

Average Annual Estimated Generation (20 Years) - P (50)	46 Lacs kWh
Average Annual Estimated Generation (20 Years) - P (75)	41 Lacs kWh
Average Annual Estimated Generation (20 Years) - P (90)	37 Lacs kWh

Average Annual Estimation Generation (20 years)- P(50)=45.60 Lac KWh(24.79%CUF)

Based on the above, it can be assumed that the project Nidhi which has an estimated service life of 25 years will be functioning viably.

1.2 CLIMATE CHANGE IMPACTING WIND SPEED

Wind speed and cloudiness are strongly influenced by local temperature gradients as well as large-scale climate oscillations such as the El Nino Southern Oscillation (ENSO) and Madden-Julian Oscillation (MJO), which could behave differently in the future[1]. Meehl et al. [2]report that peak wind speeds will likely increase with increasing temperatures, and Hazeleger[3] suggests that the trade winds in particular are likely to change.

[1] M. Rauthe, A. Hense, H. Paeth, A model intercomparison study of climate change-signals in extratropical circulation, Int J Clim, 24 (5) (2004), pp. 643–662

[2] Meehl GA, Stocker TF, Collins WD, Friedlingstein P, Gaye AT, Gregory JM, Kitoh A, Knutti R, Murphy JM, Noda A, Raper SCB, Watterson IG, Weaver AJ, Zhao Z.-C. Global Climate Projections. In: Solomon S, Qin D, Manning M, Chen Z, Marquis M, Averyt KB, Tignor M, Miller HL, editors. Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA; 2007.

[3] W. Hazeleger, Can global warming affect tropical ocean heat transport?, Geophys. Res. Lett., 32 (2005), p. L22701 http://dx.doi.org/10.1029/2005GL023450

In fact, understanding the impacts of climate change on both aerosols in the atmosphere and boundary layer wind speed are problematic because of the spatial scale of current General Circulation Models (GCMs). Studies have been begun to elucidate the impact of climate change on wind and solar parameters, but the subject is less studied.

Preliminary evidence indicates the impact of climate change on wind is likely to be mild over a current project's 20-25 year lifetime[1]. There are hints in the models of modest change over 40 to 50 years[2].

Dr Pascal Storck, global manager of energy services at weather monitoring firm Vaisala, points to a number of studies that have examined the trends either historically, using data, or looking to the future with climate model projections. "The take-away from these studies is that there are probably trends in wind speed connected to climate change, but they are small, they vary regionally, and are not consistently of the same sign".

1.3 CLIMATE CHANGE-IMPACTING PRECIPITATION AND TEMPERATURES

The climate of the region is classified as arid climate having very less precipitation as compared to other parts of India. The total annual rainfall in the region is about 208 mm as per the data from the year 1948-2000.

Table 1.4 Climatology of Jaisalmer (1948 -2000): Ambient Air Temperature and Mean rainfall

Month	Mean Temperature (°C)		Rainfall in mm
	Maximum	Minimum	
January	23.7	7.6	1.5
February	27.1	10.5	3.0
March	32.6	16.4	2.7
April	38.2	21.9	21.0
May	41.6	25.6	8.9
June	40.8	27.0	15.1
July	37.7	26.5	60.1
August	36.0	25.4	75.8
September	36.4	24.2	17.6
October	36.1	20.2	2.4
November	31.0	13.4	1.5
December	25.5	8.5	2.4
Average	33.9	18.9	
Total			208 mm

Source: Monthly Mean Maximum & Minimum Temperature and Total Rainfall based upon 1901-2000 data, India Meteorological Department, Jaisalmer (http://www.imd.gov.in/doc/climateimp.pdf)

Temperature

[1] http://www.windpowermonthly.com/article/1358574/wind-gears-climate-change-impact

[2] Dr Michael Brower, president and CTO of renewable engineering consultancy AWS Truepower, http://www.windpowermonthly.com/article/1358574/wind-gears-climate-change-impact

The temperature in the area begins to increase from January till May. May and June are the hottest months with highest temperature of 41.6^{0}C recorded in May month. The lowest temperature of 23.7^{0}C was recorded in month of January. The daily mean minimum temperature varies from 7.6^{0}C in January to 27.0^{0}C in June, whereas the daily mean maximum temperature varies from 23.7^{0}C in January to 41.6^{0}C in May.

As the area is prone to extremes of temperature and low precipitation, the impacts of climate change can be in the form of heavy precipitation and resultant floods. Some of the adaptation measures related to the same are discussed in the subsequent section.

1.3.1 Adaptation measures

Heavy Precipitation or floods

The Project site and AoI do not fall under flood prone areas although news of flash floods in year 2010 was reported in the Jaisalmer districts.

In case of heavy rainfall there can be resultant water logging and connectivity to some the WTG locations can get affected.

In case it is realized that heavy rainfall is occurring frequently over the years, and resultant issues as connectivity to certain areas/WTGs are getting affected, a detailed study needs to be undertaken for continuity of the project.

Change in Wind Speed

It is anticipated that wind speed changes would not occur in immediate 10 years as can be deduced from the various studies referenced above.

Annex D

Minutes of Meetings

Meeting – I

Basic details	
Location: Habur Village	District: Jaisalmer
Project: MEIL	Date: 12-07-2015
Purpose of the visit: To understand the Livelihood and Social Impact of the Project	

Important Notice: This document, intended for internal use of ERM, provides a working summary of the main facts captured during the meetings held, not formal minutes. It is therefore deliberately not exhaustive or chronological and, being provided for information, is not intended for official review or approval.

Key points Discussed :

The summary of the discussions is provided below

Community Profile: Habur is one of the larger villages in Jaisalmer Tehsil, with a dominance of Rajput population and presence of Meghwals, Manganiars and Suthars (belonging to Scheduled Caste). The villages comprises of 500 households, with a majority of nuclear families in the village. The women in the village are generally confined to households and follow *Purdah* system and are paid less than their male counterparts for the same amount and duration of work hours. Hindi and Marwari are the prominent languages of the village, in addition to the local dialect.

Land Ownership: The area around the village is Revenue Land, owned by the Government. The people of the village have small land-holdings, which are allotted at a distance of 10-15 km from the village. The area is entirely dependent on rainfall for agriculture, with Guar (Cluster Bean) and Bajra (Millet) being the major crops grown in the area.

Livelihood Practices: The community members have a host of livelihood sources, which includes agriculture, animal husbandry, jobs with armed forces and the upcoming trend of being employed by the Wind Power Projects as security guards. The projects have resulted in the improvement of the wellness index of the people. The major crops in the area are Cluster Beans, Groundnut, Millets and Mustard. The water for irrigation is usually rain water stored by the villagers or from the tube wells in rare cases.

Infrastructure: There is no tap water in the village and the tube wells are the only steady source of drinkable water. There is high salt content in the water around the village. There is a steady supply of electricity in the village however the sanitation scenario is worrisome. Open defecation is a common scenario, as 90% households do not have toilets and the people of remaining 10% households with toilets, do not use them. The people of the village invariably use Cow dung cakes to fuel traditional stoves for cooking and the use of LPG is rare, but slowly increasing.

There is a private Upper Primary school and a co-educational Senior Secondary Government School, but the girls generally drop out after 5th class, because of approaching puberty, coupled with the discomfort of sharing classrooms with boys or being taught by male teachers. The boys attain education till 12th, but only few go for higher education, as the facilities are situated away from the village. However, there is a growing inclination towards ITIs (Industrial Training Institutes), fuelled by the prospective job opportunities with Wind Power projects, mushrooming in nearby areas.

There is also a Primary Healthcare Centre (PHC) in the village. The people generally suffer from common cold and cough or fever and receive treatment for the same in the PHC.

5 Need areas as pointed out by stakeholders:

- Literacy sessions and training of women needed in the area
- Provision of an all-girls school in the village with female teachers
- Toilets to be constructed in the existing Government school
- Water coolers to be installed in Bus stands and other public places
- Provision of fans, lights, chairs and tables in the school

CSR activities undertaken by other companies in the past

- Donation for the village temple
- Plantation of nearly 1000 saplings around the village temple

Impact of establishment of Wind Energy plants on the village community

- People have bagged jobs in the Plants
- People have the opportunity of giving their cars on rent
- Education, especially ITI courses, have received a thrust as the people take cognizance of benefits of education and are willing to tap the job opportunities in the power plants
- Some unskilled people receive trainings

Meeting Attended By :	
1.	**ERM**: Akshita Misra, Saumya Srivastava
2.	**Stakeholder Group:** Men and Women of Habur village, in separate consultations
3.	**Stakeholder Representatives:** Mr. Jitender Singh, Mrs. Rekha Singh, Mrs. Chandrima Singh

Meeting – II

Basic details	
Location: Serawa Village	District: Jaisalmer
Project: MEIL	Date: 13-07-2015
Purpose of the visit: To understand the Livelihood and Social Impact of the Project	

Important Notice: This document, intended for internal use of ERM, provides a working summary of the main facts captured during the meetings held, not formal minutes. It is therefore deliberately not exhaustive or chronological and, being provided for information, is not intended for official review or approval.

Key points Discussed :

The summary of the discussions is provided below:

Community Profile: Serawa is another village which lies in the 5 km buffer area from the project boundary. The village has around 80 households, taking care of 400 people. The village falls under Sonu Gram Panchayat and is inhabited by Rajputs (67%) and Meghwals (33%).

Land Ownership: Almost all the households of the village have landholdings, ranging from 10 Bighas to 20 Bighas. Rainfall is the driving factor for agriculture in the village as ground water table is quite low in the area, with Guar (Cluster Bean) and Bajra (Millet) being the major crops grown in the area.

Livelihood Practices: The community members practice agriculture; however the erratic nature of rains makes it less dependable. The major crops in the area are Cluster Beans, Millets and Mustard. Animal husbandry is also a major driver of the village economy. The upcoming Wind-power plants have also opened avenues for the people in the form of jobs (as security guards) and renting village's vehicles for the project's needs. In addition, nearly 5% of working population is employed with Armed forces or other Government jobs.

Infrastructure: The village is dependent on tube wells for its daily water needs, which is also there in Sonu village. There is a separate tube well in the vicinity of the village, but it draws out salty water, which is unfit for human consumption. Most of the people have tanks in their houses, where they store rain water and keep utilising it after monsoons.

Toilets have been recently constructed under the Swachh Bharat Yojna and people are starting to use them.

There is one Government Primary school in the village. The girls also attend school freely and study upto 8th class. Some boys are sent out of the villages by their families to continue their education. The children generally opt for ITI, Nursing and B.Ed. courses after school, as they are expected to assure better jobs in the area.

There is one Primary Healthcare Centre (PHC) in the village. The people generally suffer from common cold or fever.

Need areas as pointed out by stakeholders:

- Construction of Water tanks and water harvesting systems in the village
- Refinement of status of Electricity in the village
- Training of women of the village along with ANMs, to equip them with skills to take care of people in emergency

CSR activities undertaken by other companies in the past

- Suzlon had initiated the formation of Village Development Committee in 2011 through which it plans its CSR activities in the village
- Suzlon has given a compensation of Rs. 1 lac per WTG to the VDC
- Suzlon has carried out construction of Community hall in the village

Meeting Attended By :

1.	**ERM**: Akshita Misra, Saumya Srivastava
2.	**Stakeholder Group:** Men of Serawa village
3.	**Stakeholder Representatives:** Mr. Madan Singh, Mr. Veerbhan Singh, Mr. Shantaram

Photo Documentation


Meeting – III

Basic details	
Location: Mokla Village	District: Jaisalmer
Project: MEIL	Date: 13-07-2015
Purpose of the visit: To understand the Livelihood and Social Impact of the Project	

Important Notice: This document, intended for internal use of ERM, provides a working summary of the main facts captured during the meetings held, not formal minutes. It is therefore deliberately not exhaustive or chronological and, being provided for information, is not intended for official review or approval.

Key points Discussed :

The summary of the discussions is provided below

Community Profile: Mokla village lies on the periphery of the study area selected by ERM. The village has a population of around 1000 people, out of which 50% people are Rajputs and the rest population comprises Meghwals, Dholis, Jogis and Manganiars (all of them belonging to Scheduled Caste). The women are generally confined to the houses and follow *Purdah* system.

Livelihood Practices: The community members engage in agriculture, animal husbandry and are employed by Rajasthan State Mines, Indian Armed forces and the Wind Power projects. Only 15-20% people of the village have landholdings and the major crops in the area are Cluster Beans and Millets. The water for irrigation is usually rain water stored by the villagers in tanks or fetched from rain-fed ponds, by the women.

Infrastructure: There is no tap water or tube wells in the village. The women have to travel long distances to fetch water from nearby ponds. There is high salt content in the water around the village and hence scarcity of drinking water is a pressing problem. There are frequent instances, where people have to pay Rs. 3000-4000 per month per household, for tanks of water, ordered from outside. Power cuts are frequent in the area, making lives even more difficult. 90% households have toilets in their houses, which are hardly being used, according to discussions with the women's group. However, in consultations with men's groups, it was said that the women use toilets.

There is a co-educational Secondary Government School, which has been upgraded to senior secondary in this year. The consultations with the men's and the women's group pointed towards the fact that both girls and boys attend schools till 10th class. However, there is a discomfort in sending girls to a co-educational school and hence there is a dire need of an all-girls school in the village. The boys attain education till 12th, and a few go out of the village for higher education. The interest in ITI courses has picked up in the area, after the establishment of Wind Power plants.

There is one Primary Healthcare Centre (PHC) in the village, with 1 ANM. The people travel to Jaisalmer in case of serious ailments like Malaria and Pneumonia.

Need areas as pointed out by stakeholders:

- Construction of Water tanks and water harvesting systems in the village
- Refinement of status of Electricity in the village
- Vocational and literacy trainings of women in the village
- Setting up of a separate school for girls of the village

Meeting Attended By :

1.	**ERM**: Akshita Misra, Saumya Srivastava
2.	**Stakeholder Group:** Men and Women of Habur village, in separate consultations
3.	**Stakeholder Representatives:** Ms Poonam, Ms Rekha and others –Women Mr Abhay Singh Soda, MR Dhirander Singh, Mr Hati Singh Bhathi, Mr Swaroop Singh, Mr Rajendra Singh – Men

Photo Documentation

Meeting – IV

Basic details	
Location: Jaisalmer	District: Jaisalmer
Project: MEIL	Date: 14-07-2015
Purpose of the visit: To understand the formation and working of Village Development Committee of Habur	

Important Notice: This document, intended for internal use of ERM, provides a working summary of the main facts captured during the meetings held, not formal minutes. It is therefore deliberately not exhaustive or chronological and, being provided for information, is not intended for official review or approval.

Key points Discussed :

The summary of the discussions is provided below

A Village Development Committee, comprising 15 members, is responsible for coordinating and conducting welfare activities in the village. This committee is formed by nomination of members by the villagers, in an open meeting and has representation of women and Scheduled Caste members in the committee, which is a registered entity with the district administration.

The VDC undertakes following tasks throughout the year:

- Training women of the village on stitching
- Organising Veterinary camps in the village to facilitate proper guidance to people on care of cattle and also to help keep a tab on the health status of the cattle
- Organising monthly health check-up camps in the village to address the health issues of the villagers
- Organising training of farmers from the village on advanced farming techniques, in collaboration with KAAJRI, an organisation providing agricultural training to people.

Meeting Attended By :

1. **ERM**: Akshita Misra, Saumya Srivastava
2. **Stakeholder Group:** VDC members
3. **Stakeholder Representatives:** Mr. Padam Singh, president of Habur VDC

Photo Documentation

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